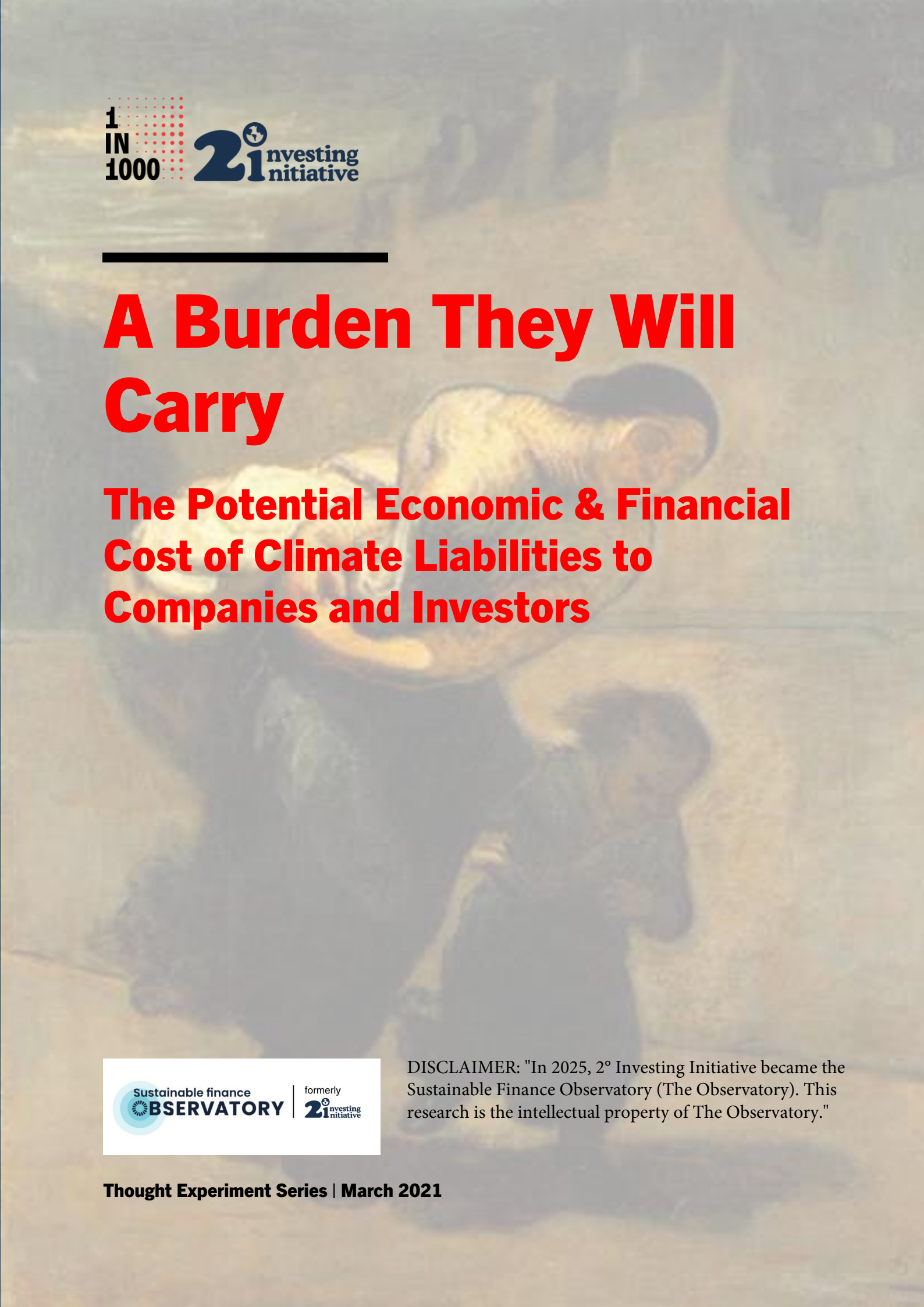
A Burden They Will Carry

The Potential Economic & Financial Cost of Climate Liabilities to Companies and Investors



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Summary

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The 2° Investing Initiative (2DII) is an international, non-profit think tank working to align financial markets and regulations with the Paris Agreement goals.

Working globally with offices in Paris, New York, Berlin, Brussels, and London, we coordinate the world's largest research projects on climate metrics in financial markets. In order to ensure our independence and the intellectual integrity of our work, we have a multi-stakeholder governance and funding structure, with representatives from a diverse array of financial institutions, regulators, policymakers, universities, and NGOs.

About our funder

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This report has been prepared by 2° Investing Initiative (2DII) a leading not-for-profit think-tank on climate-related metrics and policies in financial markets. The Report summarizes different hypothetical calculation options to allocate the economic and financial costs of climate change to companies, based on different scenarios and approaches related to their relative contribution and responsibilities. These scenarios are an expression of hypothetical pathways under a set of hypothetical assumptions made at a given point in time, based in part on the climate scenario analysis work of the think tank as well as other resources. This analysis in turn is based on a limited 'point in time' estimate of the alignment between the Company's revealed business plans for its power generation and / or oil & gas business in the period 2019-2023, versus the economic trends embodied in the International Energy Agency's (IEA's) 'World Energy Outlook' and 'Energy

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1

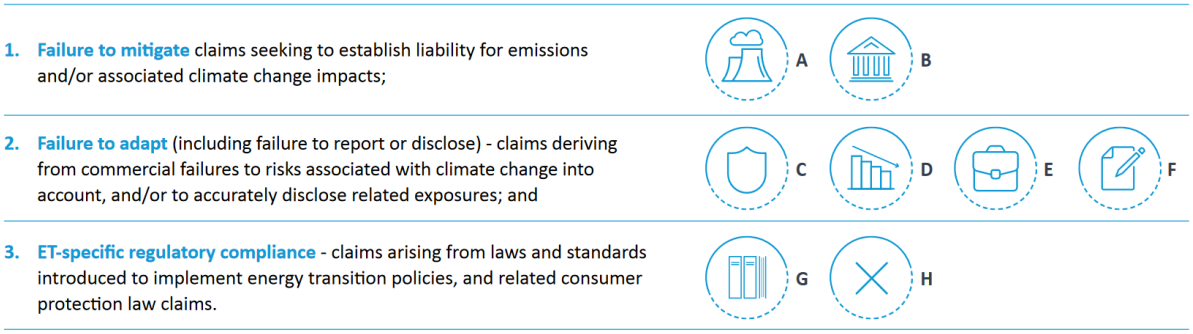
Introduction

Climate litigation is a growing concern for high-carbon companies. While for some this may still seem like science fiction, there may be a future where these companies experience a 'tobacco' moment from a wave of litigation. To date, there is little research as to the potential scale that this type of litigation may have in terms of financial impacts for these companies.

A number of first pilot cases are making their way through the courts, operating with various angles of attack. For example, the German utility RWE is being sued by a Peruvian farmer for climate damages. Numerous cases in the United States and elsewhere focus on issues around climate disclosures. The legal NGO ClientEarth in turn has recently won a lawsuit preventing the construction of a coal-fired power plant, based on considerations of stranded assets. A recent court decision in the Netherlands has required Shell to increase its climate ambition.

In a study from 2017, Minter-Ellison highlighted three types of litigation risks: i) failure to mitigate, ii) failure to adapt, iii) energy transition specific regulatory compliance (see Fig. 1).

Figure 1: Taxonomy of Climate Litigation Risk (Source: Minter-Ellison 2017)



Key current obstacles relate to a court's lack of authority to consider some cases, causation, demonstrating standing etc. While climate litigation cases are growing exponentially, their success is still limited. A host of legal uncertainties and the novelty of some of these cases leads some to believe that they may forever remain science fiction. But despite these obstacles, the scope of this class of action continues to develop. Claimants are bringing novel arguments and over time there will be increasing pressure on high carbon companies to accept responsibility for the harm caused by their activities. The extent to which this is already the case can be seen by lobbying attempts in the United States to indemnify oil & gas companies from legal action related to climate change.[1]

In parallel to climate action, there is also a growing debate about the extent to which policy responses to climate change should be funded by polluting companies.

Some of this is already captured by carbon tax systems. Future policy interventions however may consider discrete penalties by "polluting companies" based on some formula allocating responsibility. This formula however, both for litigation and policy, remains the big uncertainty.

[1] https://www.vox.com/2018/10/18/17983866/climate-change-exxon-carbon-tax-lawsuit

Beyond the legal and policy issues, arguably the biggest challenge plaguing both the climate litigation drive and policy action more broadly relates to allocating responsibility for climate change damages to individual economic actors.

While the traditional literature of externalities from Coase and others mostly focuses on narrow externalities (the classic example being cows that eat the neighbor's grass), climate change may represent the most radical challenge to the question of internalizing externalities. The emissions from a coal-fired power plant in Germany will impact the climate around the world (global). The actual costs of climate change – the "externality" – may not materialize for decades for certain actors (temporal). Then there is the uncertainty related to the climate damages themselves versus non-anthropogenic climate change. Finally, the economic costs are not linear. The marginal ton of CO2 emitted in 1950 will be less damaging for climate change than the emissions taking place at climate tipping points. All of these different factors have so far largely made it impossible to advance on allocating responsibility to companies.

This paper represents a thought experiment around how to quantify corporate climate costs that can form the basis of future litigation and policy actions. It quantifies the costs using traditional 'externality' accounting through the 'social cost of carbon' literature, as well as damages based on historical cumulative emissions, using estimates from Heede et el. (2017).

It also puts forward a new metric – called the climate delta liability – which quantifies costs as a function of the 'carbon overshoot' of a company relative to a 1.5°C and 2°C scenarios in terms of their investment and production plans. This approach provides unique advantages as it demonstrates the 'marginal contribution' to different global warming outcomes, and directly links the forward-looking planning of companies to a measure of accruing accountability for climate change.

Important to note that this analysis is not a comment on the actual likelihood of climate litigation itself, but simply the potential responsibility for climate damages should the legal theories underpinning legal actions prove successful in court. Thus, it does not address the legal intricacies associated with this emerging field, but instead focuses on the much more nascent research area of quantifying corporate climate costs and their responsibility for global climate damages.

We hope to stimulate discussion as to how this metric might be assimilated into litigation strategies or stewardship activities of investors, as well as financial sector policies.

Section 2 will outline the methodologies for quantifying corporate climate costs. Section 3 will quantify these liabilities for a sample of 437 oil & gas companies and 100 power companies under three litigation scenarios and potential implications for share prices and costs (in the form of foregone dividends) faced by investors in these companies. Section 4 will provide some concluding remarks.

2

Quantifying corporate climate costs

2.1 Overview

Quantifying corporate climate costs requires an answer to three distinct questions:

What are the expected damages? The first and most obvious question relates to the scale of the damages that companies may be responsible for in the future. The challenge in projecting different "damage scenarios" is that some of these damages may not have materialized yet and companies may find themselves in the context of settlement paying for future damages that at the time of the settlement may not have materialized neither. Past damages can be estimated based on analysis of "additional cost of climate change" or using similar concepts of the "social cost of carbon". According to the Environmental Defense Fund, the current central estimate for the social cost of carbon is $40. According to the IPCC, estimates in a 1.5°C scenario estimate wildly between hundreds and thousands of dollars per ton of CO2.

How do you allocate responsibility / liability? The second question then is by which allocation key or framework will individual companies be held responsible or liable for these damages? What is the framework that governs these rules, in particular in complex causality dynamics unlike the traditional externality problems associated with local pollution? There are two responsibility components to disentangle, the first relating to the 'allocation' of emissions themselves to companies, the second to the responsibility distribution of climate costs based on the allocated emissions. Traditionally, these issues have been considered based on historical contributions to climate change. Analysis by Heede et al. (2017) provides evidence of the historical share of corporates' contributions to climate change from the mid-19th century to today.

A novel approach to calculating these costs, introduced by this paper, takes advantage of cutting-edge analytical approaches, including those developed in the Sectoral Decarbonization Approach (SDA), developed in the context of the Science Based Targets initiative and the PACTA model of the 2° Investing Initiative to calculate emissions misalignment of companies.

The concept of emissions misalignment can then be used to calculate the marginal contribution of a company to temperature outcomes, which can then be paired with future climate damage estimates.

What are the potential payouts associated with those damages? The third, non-trivial question is what the potential pay outs will be under the scenarios explored in this report, should a settlement take place or companies be found guilty in court. In principle, these can be anywhere between 0-100%. As a rule, the more "indirect" the impact, the more likely it is that the payments will be on the lower end of the spectrum, tobacco being a case in point (as will be explored later in this paper). The work here however will not seek to comment on the likelihood of liability but simply provide for scenarios.

Creating scenarios can involve a range of approaches combining different assumptions around the three inputs described here. This paper looks at three distinct approaches.

It's important here to note that the analysis is limited to scenarios for damages, and does not address other key risks to businesses arising from climate litigation, consumer responses, or policy intervention, e.g. financial and reputational costs, disruption to operations etc. For example, some studies suggest an average stock price drop of 7.6% following the announcement of a SEC

investigation and 17% following corrective disclosures. These generic role models will help to anchor potential effects of climate litigation on companies, however, may be wildly inaccurate in predicting specific share price shocks.

2.2 A brief comment on actual damages paid

One of the key interests in understanding corporate climate costs is in the context of legal or political penalties inflicted on these companies. When simulating these, the key question relates to the potential percentage of damages that companies will ultimately be expected to pay. This analysis can then introduce assumptions about whether these liabilities should be assumed to materialize 100% or whether companies are likely to only pay for a part of their liabilities. Given the issues described above, it seems unlikely that companies will have to pay for their entire corporate climate costs. However, one interesting reference point may be based on a simplified application of the US Tobacco Master Settlement Agreement (see box below). This involved total estimated costs to tobacco companies of $206 billion over 25 years, which represents roughly 2.7% of the total economic costs of tobacco to the United States. This 2.7% figure is simply scaled to the global level, recognizing the uncertainty of the exercise.

TOBACCO MASTER SETTLEMENT AGREEMENT

The Tobacco Master Settlement Agreement (MSA) is a settlement agreement entered in 1998, originally between the four largest US tobacco companies (although more have subsequently been joined to the MSA) and the attorney generals of 46 states. Among other things the MSA establishes a schedule of initial, annual and strategic contribution payments from the tobacco companies to the settling states of approximately $206 billion over 25 years (and $9 billion per year in perpetuity).

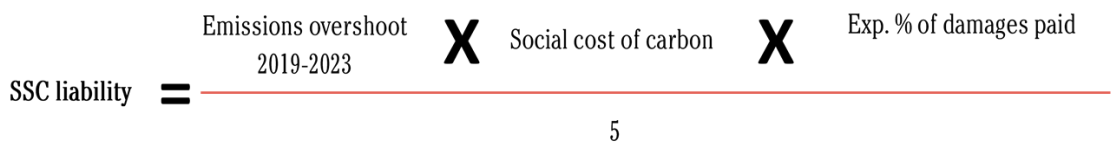
2.3 Social cost of carbon scenario (SCC)

The methodology to calculate potential climate costs using the social cost of carbon concept ascribes the scale of potential responsibility for climate damages as a function of an external social cost of carbon concept.

The question when applying this approach is what the scope of emissions are on which this concept is applied. If companies would be held liable for the social cost of carbon of all historical emissions, the emissions in any given year, or the emissions, or the 'marginal' emissions misaligned with the 1.5°C climate scenario.

The equation below summarizes the general principle underpinning this calculation approach. For the specific application in Section 3, the percentage of damages paid in settlement is 2.7%, based on an analysis of the Tobacco Master Settlement Agreement and an extrapolation of that case to the exercise described in this paper. In terms of the social cost of carbon, for this paper this is set at $40, recognizing that it may be significantly higher in practice or defined differently by different authorities.

Figure 2: Quantifying Potential Social Cost of Carbon Liabilities (Source: Authors)



2.4 Historical emissions responsibility scenario (HER)

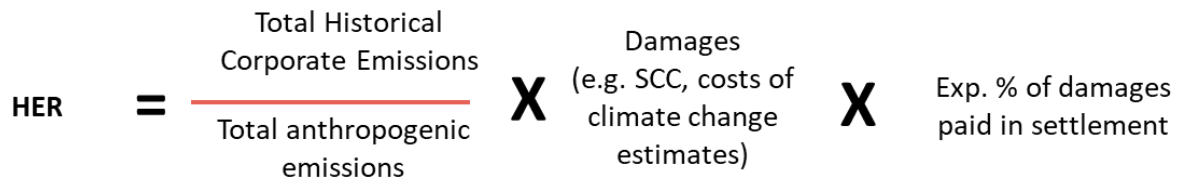
The methodology around calculating cumulative emissions responsibility assumes that liabilities are accrued as a function of the historic responsibility for climate change. This approach takes into account total historical emissions. Such data has been estimated for 100 companies by Heede et al. (2017), although in theory could likely be estimated for a larger universe of companies.

The liabilities could then be calculated based on social cost of carbon, the damage of climate change associated with the global warming for the time period over which the historical emissions have been calculated, or as a function of some responsibility to overall future global warming.

This paper in Section 3 takes the second option, calculating potential damages as a function of current climate change. Numbers for this figure are highly uncertain. Recent estimates by MorganStanley (2019) suggest that climate change cost $650 billion over the past three years. However, such estimates are currently largely unable to define the baseline of costs with no climate change. Moreover, dramatic climate change costs according to the IPCC are expected at above 2°C warming, with current warming levels at around 1.1°C warming. Another challenge is changes in historic responsibility, notably for Russian companies not considered liable for emissions from their state-owned predecessors.

Given this uncertainty, the approach here simply assumes a ten-year period of "Morgan Stanley-estimated costs" as a first proxy and order of magnitude of potential costs, recognizing that this represents a very much back-of-the-envelope estimate. That implies essentially liability of $2 trillion allocated based on the share of the company in historical emissions and multiplied by 2.7% in line with the Tobacco Master Settlement Agreement also applied for the Social Cost of Carbon concept. Again, the actual damage calculations can obviously be based on a range of different approaches in practice.

Figure 10: *Historical Emissions Responsibility.*



2.5 Climate delta damage scenario (CDD)

This approach 'starts' the climate delta liability from the Paris Agreement or some point thereafter for which data is available. Further analysis could seek to identify additional climate delta liabilities resulting from climate deltas in previous years. However, with the Paris Agreement as the reference point, this analysis can only be extended backward to 2015. While other modelling approaches may take a more ambitious approach when considering historical liabilities and responsibility pre–Paris Agreement, considering previous legal benchmarks, the approach here takes the Paris Agreement as the legal reference point from which the responsibility can be derived. Specifically, it works as follows:

1. **Calculate the carbon delta.** The advancement of models around measuring the consistency of microeconomic actors with macroeconomic climate goals, enable an assessment of alignment of companies' current forward-looking projections with climate scenarios. This infrastructure creates the capability to quantify the 'carbon overshoot' above a certain temperature outcome. In this paper, the estimates use the PACTA model for estimating forward-looking emissions alignment based on a 5-year time horizon considering forward-looking production profiles.
2. **Calculate the percent contribution to marginal temperature change.** Based on the carbon deltas, each company's percent contribution to additional global warming can be quantified. For example, each year ExxonMobil is estimated to contribute about 0.2% to the difference between a 1.5°C warming outcome and a 2°C warming outcome. Over a 5-year time horizon, this equates to about 1%. This means that over the next 5 years, ExxonMobil can be said to be responsible for contributing 1% to moving from 1.5°C and 2% to moving to 4°C. The estimates only go to the 4°C scenario and don't consider additional emissions overshoot beyond 4°C.
3. **Calculate economic damages.** The next step is then to calculate economic damages associated with various temperature outcomes and critically, the delta in terms of economic damages between different temperature outcomes. This allows for an attribution of the delta in economic damages between for example a 1.5°C and a 2°C scenario to be allocated to companies based on their relative contribution to having that delta come about. In this study, we use estimates from Burke et al. (2018) suggesting that the difference in economic costs between a 1.5°C and a 2°C scenario are about $20 trillion. This number roughly doubles under a 4°C scenario.

Of course, to apply the method, you actually need data on the "carbon delta". Given data limitations, currently the paper was only applied to simulate the scenario approach based on the

carbon delta from 2019-2023. A more comprehensive approach from e.g. the Paris Agreement would thus likely find even higher effects. Further data analysis is needed however to implement such an approach.

Figure 11: Quantifying Climate Delta Liabilities using the 2019-2023 reference point (Source: Authors)

$$\text{Climate delta liability} = \frac{\text{Emissions overshoot 2019-2023}}{\Delta \text{ carbon budget between 1.5°C and X°C scenario}} \times \frac{\Delta \text{ economic damages between 1.5°C and X°C scenario}}{5} \times \text{Exp. \% of damages paid in settlement}$$

2.6 Caveats to the analysis

The analysis described above is subject to the usual limitations associated with modelling approaches. In particular, we highlight the following key caveats.

- **Legal exposure.** The actual legal exposure of companies is at least in part a function of their geographic location and business model, notably given how that impacts the standing of claimants and jurisdictions of courts. While on the one hand, international companies may be considered exposed in some form to legal frameworks across jurisdictions, in practice both the focus of lawsuits to domestic actors given political and economic interests, as well as in some cases de facto insulation through governments or local business models will materially affect the scenarios. This paper does not purport to model the actual legal scenarios beyond the top-down assumption of what percent has to be paid, which may be considered reflective of some legal insulation. Saying that, the companies analyzed were filtered to be limited to companies headquartered in North or South America, Europe, South Korea, and Japan.
- **Emissions uncertainty.** The analysis builds on the forward-looking emissions and production estimates used in the PACTA model. These estimates are associated with uncertainty as to the actual emissions profile of any oil and gas field, as demonstrated in the research of the Carnegie Oil Climate Index (Carnegie 2019).
- **Attributing responsibility.** Finally, the analytical approach ascribes responsibility for these emissions to companies in a way that may be contested. As stated elsewhere in this paper, the legal uncertainties associated with climate litigation are outside the scope of this paper. In addition, the structure of the Tobacco MSA is such that it applies only to the US jurisdiction (whereas the economic damages associated with climate change are global and the oil and gas companies in the sample cover a variety of jurisdictions) and applies only to state and local government lawsuits (not private actions by individuals or health care providers). Attributing responsibility means that depending on the scopes, legal liability may be double counted in the analysis.

- **Planning uncertainty.** In addition to emissions uncertainty, the analysis has static assumptions around business planning (which in reality may change as companies change their strategies). Indeed, in some sense this paper is designed to help companies and investors identify potential changes that mitigate climate liability risk.
- **Carbon budget & damage uncertainty.** In addition to the uncertainty associated with company data above, there is also uncertainty as to carbon budget associated with temperature outcomes and the economic damages that these temperature outcomes will generate.

3

Cost for companies

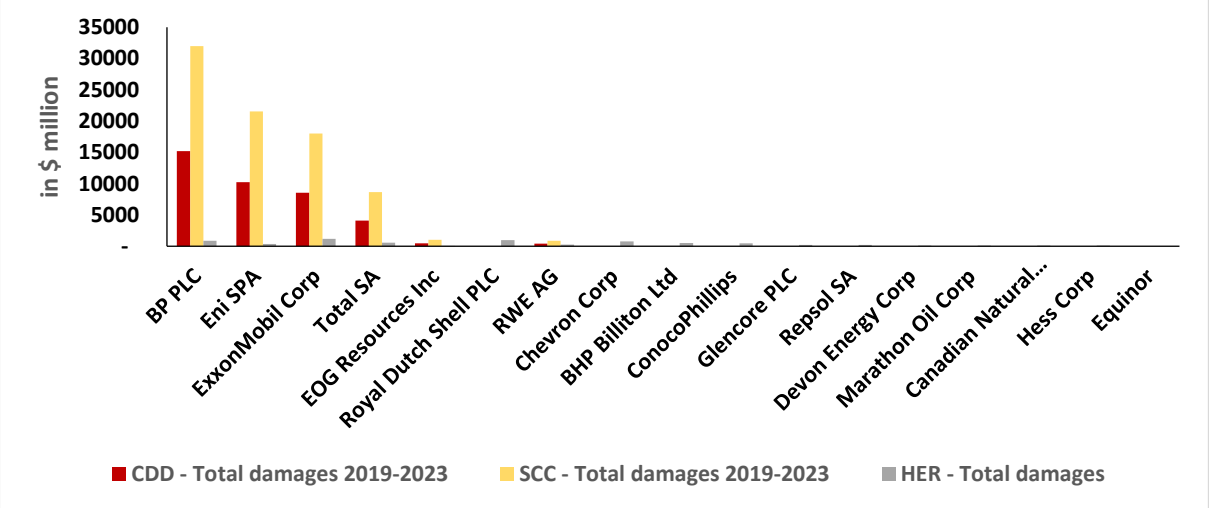
3.1 Corporate costs

Using the approaches outlined in Section 2, we apply the corporate climate cost concepts to 17 oil & gas companies (Fig. 5). The 17 companies were chosen based on the data availability across all three approaches identified in this report, in particular regarding cumulative historical emissions. Data availability would cover most if not all large oil & gas companies when focusing only on the CDD approach. The analysis is based on 2019 PACTA data and 2017 Heede data related to aggregate historical emissions. An older dataset was chosen given some of the complexities of interpreting more recent data related to the COVID-19 pandemic

17 companies are set to generate between $1.4 to $3 trillion in estimated corporate climate costs (based on the CDD approach), on top of the ~$250 billion in climate damages already generated through historical emissions (SCC / HER). These climate damages are calculated based on the expected future marginal climate change cost associated with emissions misaligned with 1.5°C decarbonization pathways. The wide margin is a function of multiplying the emissions by a social cost of carbon indicator of $40 or as a fraction of future marginal climate change costs based on Nature estimates.

Using the Tobacco Master Settlement Agreement as a reference point, these damages equate to simulated liabilities of between $7 to $82 billion across these 17 companies.[2] The liabilities under the MSA scenario vary widely by company. The company with the highest expected pay-out is the oil & gas company BP with an emissions pathway that creates between $15 and $30 billion of potential climate litigation pay-outs under a MSA scenario, over $100 of potential damages accumulated per second. Of course, the analysis here is limited to damages accumulated over 5 years only, with liabilities potentially increasing over longer time horizons.

Figure 19: Potential Climate Litigation Pay-outs under three different Litigation Cost Scenarios (Source: Authors, based on the PACTA model, Nature 2018, Morgan Stanley 2019)



[2] Note, a previous version of this paper highlighted a different figure, subsequently cited by the Economist. The difference is a function of considering that oil & gas companies that are aligned do not have CDD damages. The original paper took as a baseline that no oil & gas companies would be aligned in their business model, even if their short-term emissions profile is aligned. Taking the original approach may still be relevant, however, it is not the approach ultimately chosen in this paper.

Historical damages "only" add around $7 billion of potential damages, based on the assumption of "responsibility" for roughly $250 billion of damages. Here too however, the individual liability distribution is significant, from $64 million for EOG Resources to over $1 billion for ExxonMobil.

Of course, the lower band of $7 billion is not actually the 'correct' lower band, but rather $0. There isn't a lower bound to potential damages paid, but rather the range is determined based on the different scenarios developed above.

As outlined in the methodology documentation, the responsibilities based on historical responsibility are highly uncertain, given the lack of clarity of whether a share of responsibility for future damages exists.

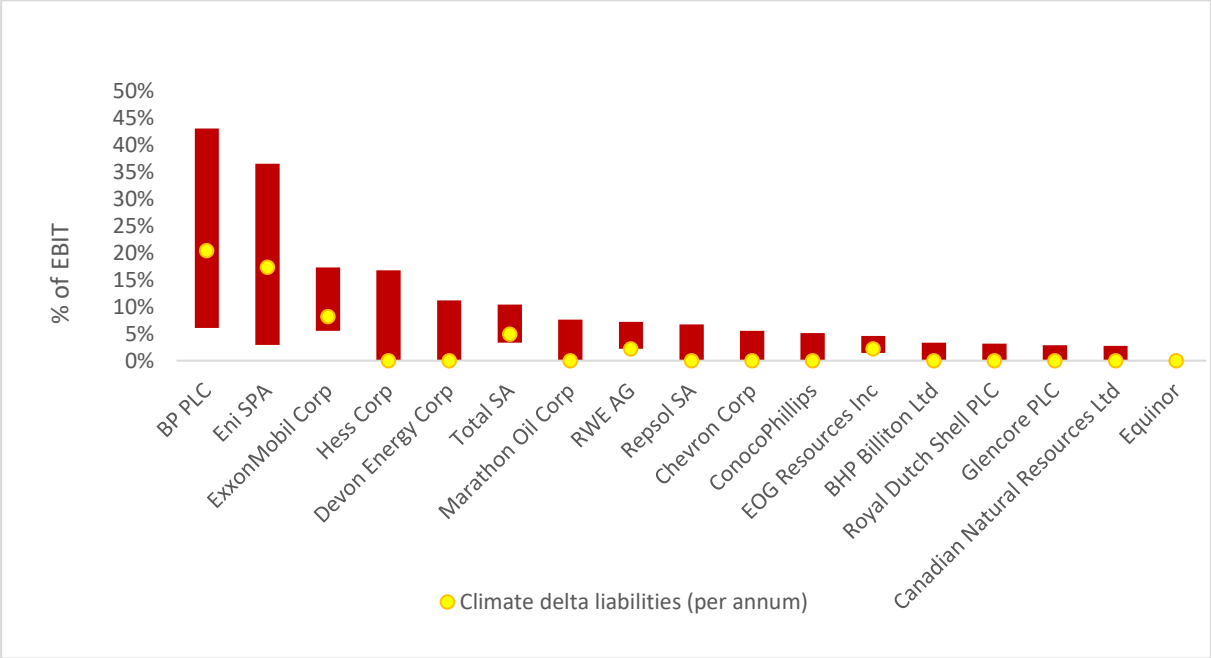
Here, a conservative modelling approach was chosen, focusing exclusively on damages based on existing climate change costs. Future costs could be a multiple and effectively bankrupt companies with large historical emission footprints. Moreover, the commentary is not on likely damages, but simply the types of damages companies would have to pay if confronted with a MSA scenario.

3.2 Impact on EBIT & share prices

Linking these figures to corporate revenues (EBIT), materiality can range anywhere from less than 10% to upwards of 40% (Fig. 6).

The range of outcomes represents the different potential climate costs modelled. Results here are obviously contingent on EBIT. Hess Corp for example in absolute terms is 16th out of the 17 companies in terms of potential climate liabilities, but has the 4th largest effect on EBIT of up to 16%.

Figure 20: Range of potential Climate Liabilities as % of Ebit (Source: Authors, based on own analysis and Bloomberg)



Should these costs materialize, they may translate into effects for share prices and thus investors. Estimating share price effects associated with the climate delta liability analysis provided above is obviously highly uncertain. The analysis provided in this section should thus be considered illustrative as to the range of potential share price shocks that may materialize. Applying the costs to a generic oil & gas company with 15% of EBIT annually in climate delta damages, involving either a litigation (or policy) event in 5 years (2024) or a litigation (or policy) event in 10 years (2029), with subsequent alignment of the operations with a 1.5°C scenario. The estimates are based on a simple generic discounted cash flow model using a 2% dividend growth rate, assuming that liabilities translate one-to-one into dividend adjustments, and applying a discount rate of 3%. The results show that for a typical oil & gas company, a litigation event in 5 years could lead to a stock price drop of ~6%-18%. A litigation event in 10 years significantly amplifies the shock from ~15%-48% of total share price value in 10 years.

3.4 Impact on ultimate owners

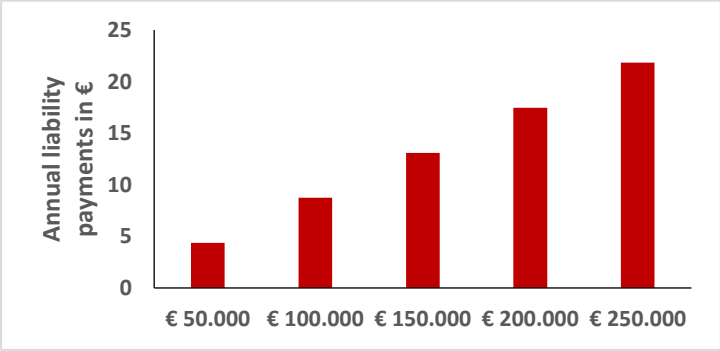
When considering these corporate climate costs, it is also important to consider the ultimate owner or "carrier of the cost". The challenge of course is that these companies are to a large degree owned by households through their pension, insurance and other financial assets, as well as sovereign wealth funds themselves.

The following illustrates the annual costs for a typical European citizen, suggesting that litigation costs may ultimately be carried by the public. These figures are largely consistent with economic quintiles using European averages, although of course in some countries savings in stock and bond markets are largely private and in others they are more likely to be intermediate through the pension system.

Given the variability as to actual savings and ownership models in different countries, the analysis here simply demonstrates what typical savings, using the asset allocation of the European pension sector as a whole for reference, would yield in terms of annual liabilities of ExxonMobil.

The analysis shows that a citizen with €50,000 in savings would lose €5 due to the annual liability payments associated with Exxon alone, under a climate delta liability assessment using the Tobacco MSA. This number intuitively is 5x as high for savers with €250,000. The analysis is based on ExxonMobil's 2018 dividend payments, assuming a 16% liability for these payments and 30% of savings allocated to equity.

Figure 21: Potential Annual ExxonMobil Liability Payments for Different Standard "Diversified" Portfolios at Different Portfolio Size



4

Conclusion

The findings in this paper present a new metric for the quantitative analysis of corporate climate costs of oil & gas companies that can be used by investors, policymakers, or in the context of climate litigation.

It demonstrates that even under highly conservative assumptions regarding economic damages from climate change and attribution responsibilities, these climate liabilities can create significant economic and financial costs, both for companies and the investors that own them.

The analysis is based on a combination of market-leading and accepted modelling around alignment of companies and portfolios with climate goals, as well as robust historical models related to the potential attribution of social costs to companies.

Of course, legal action may yield higher payouts. At the high end of spectrum, climate litigation has the potential to bankrupt the oil & gas sector. This finding may seem like hyperbole, but is borne by findings suggesting that the largest oil & gas companies operating on capital markets in the world collectively are responsible for creating significant economic damages that they could be held liable for.

Crucially, each oil & gas company has the capacity to reduce their exposure under the CDD metric to zero by aligning their business model with the 1.5°C climate goal. Some oil & gas companies are already on this pathway or approaching it.

This point is critical. The Paris Agreement is an insurance policy for oil & gas companies. Aligning with it may provide protection against litigation, since their activities can be considered in accordance with the political goal. Conversely, misalignment with the Paris Agreement can create risks from a clear violation of the political intention. The climate delta liability metric highlights that that choice, independent of the transition risks documented at length, can provide the basis of legal liabilities at an unprecedented scale.

Bibliography

Carnegie (2019). Carnegie Oil Climate Index. Available at: https://oci.carnegieendowment.org/.

CDC (n.d.). Economic Trends in Tobacco. Available at: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/economics/econ_facts/index.htm.

Hoffman, P. (1991). Valuation of Cases for Settlement: Theory and Practice. Journal of Dispute Resolution. Volume 1001, Issue 1, Article 5.

Minter-Ellison (2017). The Carbon Boomerang. Litigation Risk as a Driver and Consequence of the Energy Transition. Available at: http://degreesilz.cluster023.hosting.ovh.net/wp-content/uploads/2018/01/me_2ii_carbonboomerang_v0.pdf.

MSA (n.d.). Master Settlement Agreement. Available at: https://web.archive.org/web/20080625084126/http://www.naag.org/backpages/naag/tobacco/msa/msa-pdf/1109185724_1032468605_cigmsa.pdf.

Nature (2018). Curbing global warming could serve UF$20 trillion. Available at: https://www.nature.com/articles/d41586-018-05219-5.

2DII (2018). PACTA. Available at: https://www.transitionmonitor.com/.