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Corporate Liability for Climate Change Adaptation Costs: A Market Share/ Several Liability Approach

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Abstract

Allocating financial responsibility for climate change costs to major energy companies could happen in many fora—at the federal, state, or international level, via legislation, treaties, or adjudication. This Article explores the allocation in the context of state law climate adaptation cost suits in the United States, and argues that a market share/several approach is tenable, although it raised complicated questions, most notably those surrounding wrongfulness. Of course, it is possible that legal institutions of all sorts ultimately will choose to focus solely on financial responsibility for harms associated with current or future emissions, or ignore corporate responsibility altogether. However, the airing of the issues discussed in this Article about harms from past emissions could also inform debates over responsibility for harms associated with current and future emissions.

Corporate Liability for Climate Change Adaptation Costs: A Market Share/Several Liability Approach

David A. Dana*

Climate change-related litigation has exploded in recent years.[1] One prominent category of climate change litigation involves claims by governments of various sorts (and in few instances, individuals and private entities) against companies that produced and sold fossil fuels. These suits seek recovery of the costs and future costs of adapting to the impacts of climate change-related phenomena, such as extreme weather like hurricanes and sea level rise. In the United States, there have been well over thirty such lawsuits, the bulk of which are still ongoing.[2] The plaintiffs in pending lawsuits include the States of Rhode Island, Delaware and California, and a range of localities, including, for example, Honolulu, the City of Chicago and an array of municipalities in Puerto Rico.[3] The total costs of addressing and adapting to climate change are estimated to be truly enormous[4]; the financial stakes for the plaintiffs and defendants in these (and similar future) lawsuits, as well as the suits' extra-judicial, political implications, could be significant.[5]

So far, however, these suits have been bogged down in an array of preliminary, pre-discovery issues – issues such as whether the courts in question could or should choose to exercise jurisdiction over the suits at all.[6] This Article considers the normative question: *assuming the corporations named as defendants should bear some financial responsibility for the costs borne by governments of adapting to anthropogenic climate change, how should that liability be measured and divided up among the corporations?* Before explaining how that question might be answered in the context of the tradition of and ideas animating American tort law, it is worth asking: *is* this is indeed an important question to bother with in the first place? The answer is yes, for several distinct reasons.

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[1] See, e.g., https://insideclimatenews.org/news/27072023/climate-change-litigation-explosion/.

[2] https://climatecasechart.com/case-category/common-law-claims/ (listing 36 common law actions, last visited September 10, 2024)

[3] See https://climatecasechart.com/case/city-of-chicago-v-bp-plc/ (Chicago); https://climatecasechart.com/case/people-v-exxon-mobil-corp/ (California); https://climatecasechart.com/case/municipality-of-san-juan-v-exxon-mobil-corp/ (San Juan); https://climatecasechart.com/case/city-county-of-honolulu-v-sunoco-lp/ (Honolulu); https://climatecasechart.com/case/state-v-bp-america-inc/ (Delaware); https://climatecasechart.com/case/rhode-island-v-chevron-corp/ (Rhode Island).

[4] For example, a single project to protect lower Manhattan from sea level rise alone is now budgeted at $7 billion. https://www.nyc.gov/site/lmcr/progress/financial-district-and-seaport-climate-resilience-master-plan.page. President Biden's proposed 2024 budget allocates $23 billion to climate adaptation and resilience. https://www.whitehouse.gov/omb/briefing-room/2024/03/11/fact-sheet-the-presidents-budget-creates-good-paying-clean-jobs-cuts-energy-costs-and-delivers-on-the-presidents-ambitious-climate-agenda/.

[5] So far, however, there is no evidence that any of the defendant companies' share prices have been impacted by climate-relate litigation risk. Indeed, major oil companies have flourished financially in recent years. See, e.g., https://www.cnn.com/2024/06/11/economy/oil-industry-profits-under-biden/index.html.

[6] *See generally* Zachary B. Clopton and David A. Dana, *Climate Change in Court*, Parts I and II, NORTHWESTERN L Rev (forthcoming 2025) (file available from author) (reviewing the jurisdictional battles in the climate suits).

First, it bears emphasis that the damages in these cases, the scope of any actual damages allowed by courts – as opposed to those sought - may be very substantially circumscribed by court rulings and thus relatively modest.[7] Even so, an award and allocation of damages by a court could serve as a precedent for domestic legislative efforts to impose financial responsibility on corporations through taxation or other means. While the usual rationales for a carbon tax focus on creating incentives for future behavior, a backward-looking rationale based on tort-like responsibility also could be powerful.[8]

Second, even in the absence of taxes or fees via legislation, a court's imposition and allocation of liability among energy-producing corporations might energize shareholder and consumer pressure for the corporations to "voluntarily" contribute to adaptation efforts.

Third, since the defendant corporations in these suits are largely affiliated with the United States, the United Kingdom, and EU nations -- the industrialized "West," if you will -- the imposition and allocation of liability in a court judgement could influence international negotiations by serving as a precedent for how much relative responsibility for global adaptation costs should be borne by the West and its component nations. A court judgment, in theory, could even influence the discourse surrounding how much investment in decarbonization and mitigation (as opposed to adaptation) the West should be obliged to undertake.

Finally, I want to make claim about the importance of the liability and liability allocation question that does not depend on there ever being *any* actual precedents finding and allocating liability. The availability of a well-thought-out, tenable theory for the imposition and allocation of liability among corporate defendants might make judges more willing to proceed with these suits to discovery and adjudication on the factual merits. And even if these suits result in judgments for the defendants *after* discovery and adjudication on the merits, that discovery and adjudication itself could be politically and thus perhaps (via legislation or regulation) legally important. Most notably, discovery and adjudication could either lend credence or detract from claims that certain major corporations had a real impact on public policy and popular perceptions through campaigns of misinformation and information suppression regarding climate change and the viability of alternatives to fossil fuels.[9]

It is worth knowing, then, whether there is, in fact, a well-thought-out, tenable theory for the imposition and division of liability among corporate defendants that builds on the concepts and understandings of American tort law. I argue, qualifiedly, that there is. On the one hand, market share liability ideas in tort law can be adapted to allow the plaintiffs in climate suits to overcome the "but-for" causation problem inherent in trying to hold any particular source of greenhouse gas emissions liable for damages resulting from anthropogenic climate change. However, the only

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[7] For example, courts could hold that the defendants caused a share of anthropogenic climate change but also hold that only a small portion of the claimed damages can be shown to be caused by climate change, as opposed to a mix of other factors.

[8] *See* Amy Sinden, *Allocating The Costs of the Climate Crisis*, 85 WASHINGTON L R 293, 294-302 (2010) (explaining that the standard rationales for taxes are efficiency-based ones that focus on the future, but justice considerations that focus on the past also bear on the question of who should pay for climate change).

[9] *See* David A. Dana, *Public Nuisance when Politics Fails*, 83 OHIO S L J 62, 115 (2022) (addressing discovery in adaptation litigation); Nora Engstrom and Robert Rabin, Pursuing Public Health Through Litigation: Lessons from Tobacco and Opioids, 73 STAN L REV 285, 354 (2021) ("in addition to drawing attention to a brewing problem, public-health litigation--and the reciprocal discovery at its contemporary core--can help to uncover documents and other evidence" that . . . "map the extent of the problem, trace its root causes, allocate responsibility …").

allocation-among-energy-producing-companies theory that is tenable and prudent in the climate context is market share liability coupled with several liability (what I will call "market share/several liability"), rather than market share liability coupled with joint and several liability. In other words, the only plausible allocation is one that would hold a defendant liable only for a share of damages that correspond to its absolute share of the relevant pool of cumulative greenhouse gas ("GHG") emissions, even if that means that there is no entity available under court jurisdiction to pay a large portion or even most of any given plaintiff's damages.

Application of this sort of market share/several liability, however, will be very complicated for several reasons. First and foremost, the pool of GHG emissions that will constitute the relevant "market" will depend in part upon a determination of when and how much the defendants acted "wrongfully;" that is so because only wrongfully-made emissions will satisfy the proximate causation requirement of applicable American tort law and because there is and will be the common sense demand for some explanation as to why energy producers should bear the adaptation costs, rather than wholesale and retail consumers of energy, who after all were more proximate to the actual emissions.

In public nuisance suits, some courts have allowed product makers to be held on the grounds that the defendants knew of the products' risks when they sold them while never disclosing those risks or outright lying about them.[10] These precedents and the ideas in them could be built upon – and adapted – to the climate change context to justify court holdings that (1) the corporate defendants became proximately causal agents once they "wrongfully" started producing and selling fossil fuels, or started producing and selling them at a level/amount they knew was harmful for the global commons, and (2) the liability of the defendants will track their share of global, aggregate emissions for the time period beginning with their clear commencement of their acting "wrongfully" and ending when they have stopped acting wrongfully (if they have).

As explicated in Part III, however, what wrongfulness would mean exactly is not so clear in the climate change context. Questions abound, such as: to the extent that each individual defendant may have commenced acting wrongfully at different dates, should liability be apportioned for different time periods for the different defendants? And to the extent that some defendants acted more wrongfully than others (however wrongfulness is defined), should the allocation of damages among defendants reflect that?

The wrongfulness issue, however, is not the only complexity in the application of market share/several liability to the climate change suits. As discussed in Part IV, there are thorny, non-wrongfulness-related issues with dividing liability based on a market share approach in this context, including: how to account for the fact that some share of anthropogenic climate change and hence some share of adaptation costs have no direct, obvious link to fossil fuels at all; and whether to treat emissions as equally harmful no matter when they occurred or instead adjust for temporal differences in the net harm from emissions based on timing.

Some may believe that imposing any liability on energy producers is fundamentally mistaken and that, therefore, these climate suits deserve no commentary other than a condemnation. But in one form or venue or another, these kinds of actions may proceed, and even if they do not, the question whether corporations and the nations in which they were and are based

[10] *See* Albert C. Lin and Michael Burger, *State Public Nuisance Claims and Climate Change Adaptation*, 36 PACE ENVTL. L. Rev. 49, 89 (2018).

should bear any financial responsibility for adaption costs remains. A market share/several liability approach is tenable in addressing this question, but it requires sorting through a number of less-than-straight-forward inquiries, above all, when, how and to what extent the fossil fuel products were made and sold wrongfully. [11]

Part I very briefly outlines the climate litigation. Part II explicates the concept of market share/several liability and argues that it is a reasonably good fit for the climate litigation. Part III addresses the proximate causation/wrongfulness problem. Part IV addresses other complexities in actually implementing the market share/several approach in the climate suits.

I. A Very Brief Overview of Climate Litigation

The world faces a huge climate crisis.[12] Even the major fossil fuel companies themselves and oil-producing nations now at least nominally acknowledge as much.[13] Remarkably, the most recent Conference of the Parties international meeting on climate change was hosted by the United Arab Emirates.[14] What are seen by many as climate-related phenomena such as wildfires and extreme weather dominate the news.[15]

One of the principal arguments for a substantial judicial role in climate change has been that the more political branches of government have not acted with anything like alacrity with respect to either mitigation or adaptation.[16] Broadly speaking, the adaptation suits have sought damages that would fund efforts to address negative climate impacts to date and prepare for and lessen the harms from climate change overall, going forward, through adaptive investments.[17]

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[11] For a thoughtful discussions of the applicability of market share liability to one of the earliest climate change adaptation lawsuits, see Samantha Lawson, *The Conundrum of Climate Change Causation: Using Market Share Liability To Satisfy The Identification Requirement in Native Village of Kivalina v. ExxonMobil Co.*, 22 FORDHAM ENVTL L REV 433 (2011). Much of the academic literature on these suits, however, has not focused on markets share liability specifically and how it may or may not apply to these suits. See, e.g. Berger & Lin, supra note [ ] (addressing a range of issues raised by these suits but not allocation or market share).

[12] Indeed, the crisis is so severe that even skeptics of what appears to be risky "geoengineering" technologies like solar radiation management now seem to acknowledge that such technologies may need to be part of the global response. *See, e.g.*, https://www.economist.com/science-and-technology/2023/11/22/solar-geoengineering-is-becoming-a-respectable-idea?utm_medium=cpc.adword.pd&utm_source=google&ppccampaignID=17210591673&ppcadID=&utm_campaign=a.22brand_pmax&utm_content=conversion.direct-response.anonymous&gad_source=1&gclsrc=ds.

[13] *See, e.g.*, Shell, https://www.shell.com/sustainability/our-climate-target.html ("Tackling climate change is an urgent challenge.").

[14] That meeting was the first to result in an explicit consensus statement in favor of the transition away from fossil fuels. *See* https://www.europarl.europa.eu/news/en/press-room/20231205IPR15686/cop28-climate-talks-agree-on-transitioning-away-from-fossil-fuels.

[15] See, e,g, https://www.nytimes.com/2024/07/10/climate/wildfires-heat-wave-night-temperature.html ("Climate change is causing more fires to burn overnight, growing bigger, lasting longer and challenging the fire teams trying to control them."); https://www.nytimes.com/2024/06/20/climate/climate-change-mexico-heat-wave.html ("Globally, heat waves are becoming more frequent, longer and hotter as levels of greenhouse gases in the atmosphere rise from the burning of fossil fuels for energy. This week, wide swaths of the United States have been experiencing record-breaking heat …").

[16] See Dana, supra note 9, at 115-118.

[17] See, e.g., California Complaint, https://climatecasechart.com/case/people-v-exxon-mobil-corp/, at 132 (as prayer for relief, seeking to "Compel[] Defendants to abate the ongoing public nuisance [of climate change] their conduct has created in California, including by establishing and contributing to an abatement fund to pay the costs of such abatement").

However, a few suits have a more specific in focus, seeking damages for the economic costs from particular hurricanes the plaintiffs tied to climate change.[18]

In the context of United States standing law, especially federal standing law, states and localities are much more likely to be deemed to have standing to sue than individual or non-governmental communities. For example, the federal district court in Kivalina dismissed on standing grounds an Inuit village's suits seeking damages to fund its relocation from its currently-sinking site.[19]

The principle focus of adaptation damages litigation regarding the suits brought by States and localities has been on the question of *where* – whether in federal or state courts – these suits will be adjudicated. Plaintiffs initially brought suits in federal courts under "federal common law,"[20] but the federal courts have been inclined to to dismiss such suits on the theory that federal common law is displaced by federal statutory law.[21] Plaintiff then began to sue in state courts under state common law.[22] The defendants sought removal of these cases from state court to federal courts on the grounds that federal law totally preempted state law in the climate change/air pollution context, but the federal courts of appeal, however, have so far have all agreed that the cases are not removable.[23] The United States Supreme Court has not yet weighed in, although there is a concerted effort to persuade the Court to accept certiorari and hold that state courts lack jurisdiction for any damages claims based on out-of-state greenhouse gas emissions.[24]

One open question is whether we will see similar damages suits brought elsewhere - in European courts, in the United Kingdom, Canada, and/or Australia.[25] Because standing barriers may be less or at least not the same as in the United States a related question is whether, if we do see such suits, it is possible they will proceed with individual or property owners or non-governmental entities as plaintiffs in addition or instead of governments. The recent highly-publicized success of individual climate plaintiffs – notably a group of elderly Swiss women – in the European Court of Human Rights involved demands for increased government-ordered climate

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[18] See, e.g., Municipality of San Juan v. Exxon Complaint, https://climatecasechart.com/wp-content/uploads/case-documents/2023/20231213_docket-323-cv-01608_complaint-1.pdf (seeking damages resulting from hurricanes in 2017).

[19] *See Native Village of Kivalina v. ExxonMobil Corp.*, 663 F.Supp.2d 863, 868-870 (N.D. Cal. 2009).

[20] *See, e.g., City of New York v. Chevron Corp.*, 993 F.3d 81, 102 (2d Cir. 2021); *Native Village of Kivalina v. ExxonMobil Corp.*, 696 F.3d 849 (9th Cir. 2012).

[21] *See id.*

[22] Among the earliest state court suits were brought by localities in California. *See, e.g.*, San Mateo complaint. Complaint, San Mateo v Chevron, July 17, 2017, at 34-47, available at https://climatecasechart.com/wp-content/uploads/case-documents/2017/20170717_docket-17CIV03222_complaint.pdf.

[23] *City of New York*, 993 F.3d at 94 (summarizing and addressing these cases).

[24] See Petition for a Writ of Certiorari, Sunoco v. Hawaii, 2022 WL 17487995 (U.S. Dec. 2, 2022); https://climatecasechart.com/wp-content/uploads/case-documents/2024/20240610_docket-23-947_order-list.pdf. For our further commentary on this case and the certiorari petition, see Zachary Clopton & David Dana, *Climate change should get its day in court*, https://www.chicagotribune.com/2024/07/16/opinion-climate-change-fossil-fuel-companies-supreme-court-jurisdiction/.

[25] There was at least one suit in Canada for climate-related damages, which was dismissed. See *Environnement Jeunesse v. Attorney General of Canada* (Quebec), https://climatecasechart.com/non-us-case/environnement-jeunesse-v-canadian-government/.

mitigation rather than requests for adaptation damages.[26] But that success nonetheless may spur activists outside the United States to bring damages-focused actions as well.[27]

IV. Market Share Liability with Several Liability

To understand why a market share/several liability approach is tenable in the climate adaptation suits, some preliminary concepts and terminology need to be addressed. Factual causation of the plaintiff's harm is an essential element of any tort, but causation can be more or less strictly required. In the strictest but also most common form (in the context of a product), the plaintiff must show that "but for" the defendant's product, the plaintiff would not have incurred its damages.[28] In market share liability, which is an alternative and less demanding means of showing factual causation, manufacturers of products that imposed the same risk in a given "market" can be held liable for a plaintiff's injuries as a result of the risk inherent in the product, even if the plaintiff cannot show which that any particular manufacturer was the but-for cause of the plaintiff's damages.[29]

The market-share approach can be paired with either several or joint and several liability. In market share/several liability pairing, the defendant is responsible only for a percentage of the plaintiff's damages that correspond to the defendant's percentage share of the market in the relevant time period[30]; so, for example, if Company A had a 10 percent market share in a risky product, and plaintiff suffered $100,000 damages as a result of the product, Company A is liable for no more than $10,000. In joint and several liability, any liable defendant can be held liable for all the plaintiff's damages even if there are other defendants who are liable or non-parties who could be held liable. Thus if Company A in the above example were the only defendant and other manufacturers could not be brought into the suit for whatever reason or another, Company A would be responsible for 100% of plaintiff's damages. [31]

For plaintiffs in the climate adaptation suits, there are, in fact, two distinct factual causation hurdles. The first is to prove that the defendant or defendants caused anthropogenic climate change. The second is to prove that this anthropogenic climate change caused plaintiff's specific injuries

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[26] *See* https://climatecasechart.com/wp-content/uploads/non-us-case-documents/2024/20240409_Application-no.-5360020_judgment-1.pdf.

[27] There has been discussion among activists about bringing climate suits against corporations in the UK and EU. See, e.g., https://www.law.ox.ac.uk/sites/default/files/2024-03/Climate%20Litigation%20in%20Europe_Catalysing%20Action%20against%20States%20and%20Corporations.pdf.

[28] But-for causation is a commonplace requirement not just in the American system but in tort systems, generally. See Martin Spitzer & Bernhard Burtscher, *Liability for Climate Change: Cases, Challenges and Concepts*, JETL 2017(2), at 166 ("Everywhere, causation is determined according to the 'but-for' test.").

[29] On market share liability as an alternative theory of causation, see generally Spitzer & Burtscher, supra note 30, at 171 (noting that this approach also has some purchase in European law); Allen Rostron, *Beyond Market Share Liability: A Theory of Proportional Share Liability for Nonfungible Products*, 52 UCLA Law R 151 (2004); Kathy J. Owen, *Industry-Wide Liability: Protecting Plaintiffs and Defendants*, 44 Baylor L R (1992); Gregory C. Keating, *Products Liability as Enterprise Liability*, 10 J. Tort L. 41 (2017).

[30] On several liability, see Jonathan Hoffman, Claim Splitting in the New World of Several Liability and Personal Jurisdiction, 86 J. Air Law and Commerce 377 (2021) ("Pure several liability [is where] [e]ach party is only liable for its own percentage of fault").

[31] RESTATEMENT (THIRD) OF TORTS: APPORTIONMENT OF LIABILITY § 10 (AM. L. INST. 2000) ("When, under applicable law, some persons are jointly and severally liable to an injured person, the injured person may sue for and recover the full amount of recoverable damages from any jointly and severally liable person.").

and associated damages (like sea level rise, fires, drought). The second inquiry often comes under the rubric "climate attribution"; improving climate science may well make it possible for plaintiffs now or soon to show that anthropogenic climate change is the but for cause of a certain percentage of an observed increase in flooding or drought or fires or heat waves. .[32] But that debate is outside the scope of this Article.[33] What is clear – what is not debatable and presumably will not be affected by improving climate science, whatever the improvements – is that plaintiffs can never show that any single defendant is the but for cause of anthropogenic climate change.

The reason this is so is simple: anthropogenic climate change is a collective phenomenon, the result of direct greenhouse gas emissions and destruction of carbon sinks from tens of thousands of sources over decades and decades. No single energy company, under any possible attribution methodology, can be claimed to account for more than a very small percentage of historic, cumulative emissions; no company thus can be held responsible for a percentage of emissions such that it one could confidently conclude that that, but for those emissions, the atmosphere would not be experiencing the level of warning that can be tied to current and future damages.[34]

Plaintiffs, however, can prevail under the market share liability approach, if that approach can be understood to fit their claims. Market share liability was first embraced by court in the United States in the context of DES, a drug that some women took during pregnancy with the result that their children years later suffered from vaginal cancer and reproductive issues. At least partly because of the time gap between when the mother took the drug and the daughter developed health issues, the manufacturer of the DES taken in individual cases usually could not be identified.[35] A similar concept, comingled market share liability, has been applied in the context of MBTE, a gasoline additive that, when it enters water systems, causes environmental harms and necessitates expensive clean up.[36] Because the gasoline with MBTE was stored with other

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[32] See Aisha I. Saad, *Attribution for Climate Torts*, 64 B. C. L. REV. 867, 870-71 (2023) (arguing that improving science will facilitate attribution in litigation).

[33] I address that causation question, and various ways how courts might handle it, in Climate Adaptation as Individual Rights Discourse, in Jonathan Adler, ed., CLIMATE LIBERALISM: PERSPETICIVES ON LIBERTY, PROPERTY AND POLLUTION (2023).

[34] See Lin & Burger, supra note 12, at 86 ("Whether courts would find the alleged conduct a substantial factor in causing the nuisance is less certain: while the defendants in the . . . complaint are alleged to be five of the nine 'largest cumulative producers of fossil fuels worldwide from the mid nineteenth century to present[,]' they collectively appear responsible for approximately 7.4 percent of cumulative global GHG emissions, according to one methodology of tracing emissions to certain actors." (footnote omitted)); see also Spitzer & Burtscher, *supra* note 30, at 167 (arguing that but-for causation can never be shown with respect to an individual emitter in the climate context")

[35] As the New York Court of Appeals explained, "The identification problem has many causes. … The long latency period of a DES injury compounds the identification problem: memories fade, records are lost or destroyed, and witnesses die. Thus, the pregnant women who took DES generally never knew who [produced the drug they took, and there was no reason to attempt to discover this fact until many years after ingestion, at which time the information is not available." *Hymowitz v. Eli Lilly & Co.*, 539 NE2d 1069, 1072 (NY 1989).

[36] See Justine S. Hastings & Michael A. Williams, *Market Share Liability : Lessons from New Hampshire v. Exxon Mobil*, 34 J. ENVTL. L & LITIG. 219 (2019) (explaining that "[c]ommingled product theory is a 'modification of market share liability" adopted in the DES cases, with two difference – it involves a new, blended commodity and "plaintiffs cannot identify the actual tortfeasors even if they are harmed immediately after the occurrence of the contamination" and "Once it is released into the environment, MTBE lacks a 'chemical signature' that would enable identification of the refinery or company that manufactured that particular batch of gasoline").

gasoline in storage tanks by retailers, it was impossible to trace the manufacturer source of the MBTE once the MBTE gasoline had entered water systems and waterways.[37]

In the DES and MBTE contexts, some courts adopted a flexible, market share conception of causation, holding that because the defendant or defendants had produced the product that did impose risk and may have caused the harms at issue, it was reasonable for the defendant or defendants to bear liability. The alternative, the courts explained, was for the plaintiffs, who imposed no risk on anyone, to bear all the harm, while the defendant(s) who imposed risk would escapes responsibility altogether and has no incentive to try to create safer products in the future.[38]

Fossil fuel products that cause climate change emissions are, in some respects, like DES and MBTE. The courts have limited market share lability to products that are question are fungible in terms of the risk of harm they created – DES, no matter who produced it, imposed the same risk on women and their children, and so too MBTE, no matter who produced it, imposed the same environmental risk regardless of manufacturer.[39] Thus there seems to be a certain fairness in treating the manufacturers the same for liability purposes, as their product, in risk terms, were the same. On one level, fossil fuel products seem much more less fungible than DES or MBTE, as there are different types of fossil fuels, most notably coal, natural gas, and oil. But in terms of the atmospheric warming impact – in terms of how much GHGs are produced per unit of the fuel – these fuels can be run through an equivalence adjustment so that they are all understood based on the same warming metric and thus are as essentially fungible. For example, one unit of combusted natural gas may produce (to pick a random number) 20% less carbon dioxide emissions than one unit of oil, but then it is possible to say that .8 units of gas and 1 unit of oil are fungible for risk purposes.[40]

Even if one is persuaded as to fungibility, however, one might retort that there is a key difference between DES on the one hand and fossil fuel products on the other: In the climate context, it is not true that, even in theory, the harm from any particular plaintiff could be

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[37] *Id*. at 231; *State v. Exxon Mobil Corp*, 126 A2d 266, 292-292 (N.H. 2015); see also *In re Methyl Tertiary Butyl Ether Products Liability Litig*, 379 F. Supp. 2d 348 (S.D.N.Y. 2005) ("Although cognizant of the Court's obligation to apply state substantive law, I note that MTBE contamination presents as compelling a circumstance for the application of market share liability as does DES. At this early juncture, the balance of equities weighs in favor of applying market share liability.")

[38] *Sindell v. Abbott Labs,* 607 P.2d 924, 936 (1980).See also *In re Methyl Tertiary Butyl Ether Products Liability Litig*, 379 F. Supp. 2d 348 (S.D.N.Y. 2005) ("Following *Sindell,* five states adopted some form of market share liability: Wisconsin, Washington, New York, and Florida in DES cases, and Hawaii in a case involving a blood product needed by hemophiliacs. Although each court modified *Sindell*'s formulation of market share liability, they all agreed that an innocent plaintiff should not be left without a remedy where each of the defendants acted tortiously; in that situation, it is reasonable to shift the burden of identification to the defendants.").

[39] *State v. Exxon Mobil Corp*, 126 A2d at. 292 (holding that MBTE, like DES, meets the fungibility criteria); Rostron, supra note 31, at 153 ("Courts have curtailed the reach of this theory beyond DES by emphasizing the notion that market share liability can apply only when the product is perfectly 'fungible.').

[40] See EPA's Greenhouse Gasses Equivalence Calculator, https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references; Carbon Dioxide Equivalents, https://climatechangeconnection.org/emissions/co2-equivalents/. Similarly, different greenhouse gasses, most notably carbon dioxide and methane, can similarly be expressed in terms of the same warming metric. https://www.eia.gov/energyexplained/natural-gas/natural-gas-and-the-environment.php.

attributable in a but-for way to any particular defendant. But in the DES context, we do know that it was at least possible that one of the defendants held liable under a market share approach was also but-for responsible for some DES victims, although again, there was no way of actually knowing in any given case. On a deeper level, though, fossil fuel products are even more intuitively appealing candidates for the market share approach than DES (or MBTE). The emissions tied to the energy producers *all* played and play some (if not, a but-for) role in *all* climate-related harms, whereas we know not that not all DES manufacturers played a role in all DES injuries, and the same may be true with MBTE contamination.[41]

One of the most controversial aspects of market share liability has been that it potentially exposes manufactures/producers to liability simply because they are available to be sued. The market share approach can allow entities that are more difficult or impossible to sue to escape liability, even though those entities may have caused the harms just as much or even more than the defendants. Indeed, this issue was one of the bases for the dissent in Sindell, [42] the case that pioneered the concept of market share liability in the context of cases involving women injured as a result of their mothers having taken the drug DES: as Judge Richardson wrote in dissent, emphasizing the "complete unfairness" of subjecting only five of two hundred DES manufacturers to liability in California, "it is readily apparent that market share liability will fall unevenly and disproportionately upon those manufacturers who are amenable to suit in California …. ."[43]

Judge Richardson's point in the Sindell case is relevant to the climate suits because, depending on which estimates of emissions per company one uses, the defendants in the suits brought to date account for far than less than half of historic, cumulative fossil fuel emissions. While there are some differences in the defendants in these suits, by and large, the companies sued are the large US, UK, and EU-based companies, such as Exxon, BP, Shell, and Chevron.[44] The only entity from outside the US, UK, or EU sued so far is Motiva, which is a US corporation that until recently was co-owned by Saudi Arabia's Aramco and Shell.[45] Motiva aside, none of the suits name the nationally-owned fossil fuel entities that are central to the economy of leading fossil fuel

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[41] A market share approach also may be more tractable in the climate context than in other products contexts because the courts might well have no need to define local or even national markets, but rather a single, global market, as befits a global phenomenon such as climate change. In the DES context, the courts struggled with how to define a local market for a product market. *See Hymowitz v. Eli Lilly & Co.*, 539 NE2d 1069, 1077 (NY 1989) (explaining that courts in other states had adopted a local or state market approach with great difficulty and instead adopting a national market approach because the "determination of any market smaller than a national one likely is not practicable" even though "[w]e are aware that the adoption of a national market will likely result in a disproportion between the liability of individual manufacturers and the actual injuries each manufacturer caused in this State.").

[42] *Sindell v. Abbott Laboratories*, 607 P.2d 924, 940 (Cal. 1980) (Richardson, J., dissenting).

[43] *Id.* at 940.

[44] *See, e.g.*, Complaint, City of Chicago v. BP P.L.C. et al., (2024) (No. 1:24-CV-02496) (naming as defendants BP, Chevron, ConocoPhillips, Phillips 66, ExxonMobil, Shell, and American Petroleum Institute); Complaint, Bucks County v. BP P.L.C. et al., (2024) (No. 2024-01836) (naming as defendants BP, American Petroleum Institute, Chevron, ConocoPhillips, ExxonMobil, Phillips 66, and Shell); Complaint, People v. Exxon Mobil Co. et al., (Sept. 15, 2023) (No. CGC-23-609134) (naming as defendants Exxon Mobil, Shell, Chevron, ConocoPhillips, Phillips 66, BP, and American Petroleum Institute).

[45] For an example of climate change litigation where Motiva was a named defendant, see Rhode Island v. Shell Oil Products Co., 35 F.4th 44 (1st Cir. 2022). In 2017, Amarco paid Shell $2.2 billion to assume sole ownership of Motiva. *See* Summer Said, Saudi Aramco to Pay Royal Dutch Shell $2.2 Billion in Motiva Breakup, THE WALL STREET JOURNAL (Mar. 7, 2017, 8:24AM), https://www.wsj.com/articles/saudi-aramco-to-pay-royal-dutch-shell-2-2-billion-in-motiva-breakup-1488883611?reflink=desktopwebshare_permalink.

producing nations, such as Saudi Arabia, Russia, Iran, and Venezuela.[46] That is entirely understandable because plaintiffs might face doctrinal challenges in suing such entities: notably it may be more difficult to establish personal jurisdiction over such entities than it is to establish it over companies like Exxon,[47] and such entities also could press a sovereign immunity argument that companies like Exxon cannot even attempt to make.[48] Moreover, collecting actual judgments against such companies would seem very difficult, as they may have no or limited assets in the US and collecting a US judgement in (for example) Iran or Venezuela would be no easy task, to say the least.[49] Finally, (as discussed below) part of the underlying theory of the public nuisance claims in these suits is that the companies should be held liable because they suppressed information about climate change and affirmatively misled the public and regulators, particularly in the US and Europe; it seems plausible that the nation-state producers of Russia and Iran and Venezuela or Saudi Arabia or China were not involved, or in any event not as involved, in these alleged courses of conduct.

Moreover, these nation-state producers account, depending on the source one uses, for as much or more of historic, cumulative emissions than the relatively few companies named in the adaptation suits. According to one NGO report, the fossil fuel emissions-related, climate-change damages attributable to Saudi Arabia's Aramco, Russia's Gazprom, and Iran's National Iranian Oil Co. exceeded that of Exxon, Shell, BP, and Chevron.[50] Indeed, according to this NGO's calculations for the 1935-2018 time period, eight of the top 12 contributor's to fossil-fuel-generated climate damage are nation-state-owned energy companies, none of whom are defendants in any of the adaptation damages suits.[51] According to another NGO report for cumulative fossil fuel emissions from 1854 to 2010, nation state-owned energy companies held third, fifth, seventh, eighth, and tenth places in the top-ten list of emitters.[52]

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[46] This statement is based on a review of the Sabin Center US Climate Change Litigation Database as of June 2024. *See* U.S. Climate Change Litigation: Common Law Claims, SABIN CENTER FOR CLIMATE CHANGE LAW, https://climatecasechart.com/case-category/common-law-claims/ (last visited Jun. 11, 2024)

[47] Even the US-based defendants in these suits have argue they lack the minimum contacts with (for example) Delaware or Rhode Island such that those state's courts may exercise personal jurisdiction over them. *See e.g.* Motion of Seven Defendants Not Incorporated In Delaware for Dismissal For Lack of Personal Jurisdiction, https://climatecasechart.com/wp-content/uploads/case-documents/2023/20230518_docket-N20C-09-097_motion-to-dismiss-4.pdf; Joint Motion of https://climatecasechart.com/wp-content/uploads/case-documents/2020/20200113_docket-PC-2018-4716_memorandum-of-law-3.pdDefendants for Dismissal for Lack of Personal Jurisdiction in Rhode Island, https://climatecasechart.com/wp-content/uploads/case-documents/2020/20200113_docket-PC-2018-4716_memorandum-of-law-3.pdf. Discovery in both Rhode Island and Delaware pertaining to personal jurisdiction has been allowed and is ongoing.

[48] For a discussion of actions against foreign states and personal jurisdiction in transnational climate damages litigation, see Byers et al., *The Internationalization of Climate Damages Litigation*, 7 WASH. J. ENVTL. L. & POL'Y 286-92 (2019), https://digitalcommons.law.uw.edu/wjelp/vol7/iss2/3.

[49] *See* Lawrence W. Newman, *Enforcement of Judgments*, 17 VAND. J. TRANSNAT'L L. 77, 81-84 (1984); *See generally* Luke J. Umstetter, *Enforcing Foreign Judgments: In Search of a Treaty to Locate Assets Abroad*, 3 S.C. J. INT'L L. & BUS. 85 (2007).

[50] Carl-Friedrich Schleussner et al., *Carbon Majors' Trillion Dollar Damages*, CLIMATE ANALYTICS 13 (2023), https://ca1-clm.edcdn.com/Carbon-majors-trillion-dollar-damages.pdf?v=1700056637.

[51] *Id.* at 13, 27.

[52] Richard Heede, *The Arc of the Carbon Majors Work Bends Toward Fossil Fuel Company Accountability*, CLIMATE ACCOUNTABILITY INSTITUTE 6 (Mar 29, 2024), https://climateaccountability.org/wp-content/uploads/2024/03/Heede-CarbonMajorsEssay-Apr24.pdf.

The fact that there are major missing producers of climate harm in climate lawsuits is a powerful argument for court's limiting any defendant's liability in a climate suit to that company's actual percentage share of cumulative global emissions – that is, several liability. Some of the climate complaints nonetheless seek joint and several liability,[53] which, again, would mean that the defendants would be held liable for all the damages attributable to the nation state producers not named in the suits. Some commentators, too, seem to support joint and several liability in these suits. [54] And, indeed, outside the climate context, there is some basis in precedent for applying joint several liability to public nuisance and civil conspiracy claims, which are among the claims in these climate suits.[55] There is also some precedent, in the DES cases, for marrying a market share approach with joint and several liability.[56]

But there are a number of reasons why several liability is a far more tenable approach than joint and several liability in the climate suits. First, the precedential support for applying joint and several liability with civil conspiracy or public nuisance largely involve cases that are light years away from the factual context of climate change.[57] Second, it seems unfair to ask a corporation

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[53] One of the most recent complaints, Chicago's complaint against the fossil fuel companies, explicitly seeks to hold defendants jointly and severally liable. Chicago Complaint, https://climatecasechart.com/wp-content/uploads/case-documents/2024/20240220_docket-2024CH01024-_complaint.pdf, at 184 (asking the court to hold "Defendants jointly and severally liable for any costs incurred by the City in response to all unlawful conduct described ").

[54] *See, e.g.*, Justine S. Hastings & Michael A. Williams, *Market Share Liability: Lessons from New Hampshire v. Exxon Mobil*, 34 J. ENVTL. L. & LITIG. 219, 248-50 (2019) (arguing that joint and several liability would be preferable for climate litigation because "it gives each defendant more incentive [than market share liability] to minimize its ongoing greenhouse gas emissions to avoid exposure to joint liability."); R. H. Weaver & Douglas A. Kysar, *Courting Disaster: Climate Change and the Adjudication of Catastrophe*, 93 NOTRE DAME L. REV. 295, 338-39 (2017) ("Although these doctrines [such as joint and several liability] remain at the margins of tort practice, a warming world may prompt courts to look at them in a more favorable light. The scientific consensus on climate change is overwhelming, and it favors the plaintiffs, at least with respect to matters of general causation.) (footnotes omitted).

[55] Regarding public nuisance, see, e.g., City of Benton City v. Adrian, 748 p.2d 679 (Wash. App. Div. 3 1988) (holding that in public nuisance cases, when "the injury is indivisible, and apportionment of responsibility almost impossible, the effect will be to make all defendants jointly and severally liable."); 58 AM. JUR. 2D NUISANCES § 202 (2024) ("According to some courts, if the acts of several persons, although separate and distinct as to time and place, culminate in producing a public nuisance that injures the person or property of another, they are jointly and severally liable . . . ."). Regarding civil conspiracy, see Lyndon Bittle, *Conspiracy: Has Joint and Several Liability Been Supplanted by Proportionate Liability?*," 69 BAYLOR L. REV. 378, 379 n.3 (2017) ("The common law roots of joint and several liability for conspirators . . . are deep."); Carroll v. Timmers Chevrolet, Inc., 592 S.W.2d 922, 925 (Tex. 1979) ("The concept of civil conspiracy is sometimes used by an injured plaintiff as a basis for establishing joint and several tort liability among several parties.")..

[56] *See Sindell*, 607 P.2d at 936-37 (establishing market share liability in California as a remedy for plaintiffs who could not show actual causation through apportioning defendants' damages based on their respective share of the market); *see also* Martin v. Abbott Laboratories, 689 P.2d 368, 382 (Wash. 1984) (establishing a similar solution to Sindell's approach for DES cases in Washington except with a rebuttable presumption that the defendants have equal shares in the market). However, the California Supreme Court opted for several liability instead of joint and several liability in Brown

[57] The civil conspiracy cases imposing joint and several liability, for example, largely involve some sort of financial fraud. LandAmerica Commonwealth Title Company v. Wido, 2015 WL 6545685 (Tex.App.-Dallas, 2015); Tilton v. Marshall, 925 S.W.2d 672, 678 (Tex. 1996). *See also* John Bourdeau et al, AMJUR NUISANCES Section 202 (noting that there is case law authority both for and against the proposition that joint and several liability applies to public nuisance). Moreover, there is a reason civil conspiracy does not figure more prominently in the complaints: corporate misinformation alone, parallel courses of misconduct, **or** some coordination with other companies (only one of which is all that may be needed for public nuisance liability) is easier to prove than a full-fledged conspiracy under common law. The complaints, in fact, allege separate, parallel, and coordinated actions to promote

that contributed (say) 2 or 4 percent to that portion of anthropogenic climate that is due to fossil fuel emissions to pay for the abatement of the whole harm. Joint and several liability would be much more intuitively appealing if *any* of the defendants in these suits accounted for the lion share of the market in harm-creating fossil fuels.

Third, and most important, the consequences of plaintiffs seeking and/or obtaining joint and several liability judgments in these cases could be counterproductive to the interests of the climate activists and (to the extent one believes them to be different or even contrary) the society as a whole. First, judges, faced with demands to impose joint and several liability (as opposed to several liability) in these suits, may be more inclined to balk, and instead opt to dismiss these suits even before the factual merit can be explored via discovery. And discovery may be more valuable than anything else in informing the long-term political discourse regarding what should or should not be done about climate change. Second, the threat of joint and several liability might well motivate the companies to lobby state legislatures and Congress to pass legislation blocking these suits altogether. In seeking such a backlash, US-based companies could make a powerful argument that joint and several liability will unfairly disadvantage U.S. corporations as compared to those foreign energy producers not named in these suits that are effectively beyond the reach of U.S. courts.[58] Third, if joint and several liability ever actually were imposed, that could prompt companies to seek bankruptcy protection (depending on the magnitude of plaintiffs' damages deemed proven), and thereby limit actual recovery, while creating enormous economic disruption, including the disruption of oil and gas production, processing and distribution, which, at this moment in time, is still needed for the economy to operate and presumably will be until a substantial expansion and improvement of renewable energy capacity and delivery is achieved. All these problems could obtain with several liability too, admittedly, but they seem less plausible than with joint and several liability.

III. Wrongfulness as a Key Determinant Of Which Emissions Count in the "Market"

Proximate causation is a core requirement of our tort tradition, and, reductively, it seems to capture the notion that holding but-for-responsible parties liable in tort does not always serve the underlying goals of the tort system in the first place; sometimes, but-for is not enough

misinformation. *See, e.g.*, Complaint at 79, City of Chicago v. BP P.L.C. et al., (2024) (No. 1:24-CV-02496) ("The Fossil Fuel Defendants' public campaign of deception was accomplished individually, through API, and through various other trade associations and front groups.); Complaint at 95, People v. Exxon Mobil Corp. et al., (2023) (No. CGC-23-609134); Complaint at 4, City of Annapolis v. BP P.L.C. et al., (2021) (No. C-02-CV-21-000250).

[58] A similar argument has been deployed by the energy corporations and conservative groups in lobbying against international climate agreements and domestic climate change initiatives. *See, e.g.,* Kevin Dayaratna et al., *The Unsustainable Costs of President Biden's Climate Agenda*, THE HERITAGE FOUNDATION (Jun 16, 2022), https://www.heritage.org/energy-economics/report/the-unsustainable-costs-president-bidens-climate-agenda ("With no enforcement mechanisms and no repercussions for failing to meet emissions reduction targets, countries can continue to emit GHGs well into the future."); *Paris Deal Would Have Given India and China a Free Pass: Pence*, The Economic Times (Jun. 21, 2017), https://economictimes.indiatimes.com/news/politics-and-nation/paris-deal-would-have-given-india-and-china-free-pass-pence/articleshow/59247335.cms ("Paris climate deal would have given a virtual 'free pass' to Indiana and China and cost the US economic more than 6.5 million jobs, Vice President Mike Pence said today."); Diana Furchtgott-Roth, *China Abandons Paris Agreement, Making U.S. efforts Painful and Pointless*, THE HERITAGE FOUNDATION (Jul. 26, 2023), https://www.heritage.org/global-politics/commentary/china-abandons-paris-agreement-making-us-efforts-painful-and-pointless.

justification.[59] Put in the context of the climate adaptation suits, the climate plaintiffs need some theory as to why tort principles are served by holding energy producers liable, rather than the entities and individuals who are actually far more proximate (temporally and physically) to the actual missions – those who burnt fossil fuels for energy and consumed the energy as part of industrial, commercial, and everyday life.[60]

The two main rationales for tort liability are widely recognized to be deterrence and corrective justice.[61] Put crudely, the law generally only seeks – or should seek – to deter conduct that was in some sense "wrongful." Nonetheless, deterrence (or economic rationales more broadly) might be reconcilable with true strict liability[62] but, intuitively, it fits with wrongful conduct more straightforwardly: if a defendant's action were not wrongful at all, it seems less than intuitive to use liability to deter that conduct. Corrective justice captures the intuition that when one has been wronged by another, justice requires the wrong be corrected by the imposition of liability on the wrongdoer.[63] Definitionally, then, corrective justice presumes wrongful conduct. Theory aside, the case law overwhelmingly (but not exclusively) requires a showing of tortious,

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[59] For a thoughtful discussion of efforts to define proximate causation, see Anat Lior, *The Accident Network: A Network Theory Analysis of Proximate Causation*, 106 MARQ. L. REV. 377, 386-87 (2022) "Another attempt to better establish the meaning and application of proximate causation can be found in the "harm within the risk" test . . . This test examines two different tiers, first if the plaintiff was among the class of people who could foreseeably be harmed, and second whether the harm inflicted was foreseeable within the class of risks. The Third Restatement embodies this test by asking "whether there is an intuitive relationship between the act(s) alleged and the damages at issue (that is, whether the conduct was wrongful *because* that type of damage might result)." *See also* Eric Biber, *Law in the Anthropocene Epoch*, 106 GEO. L.J. 1, 42–43 (2017) (explaining that proximate cause reflects a range of considerations regarding the societal importance, administrative feasibility, and practical consequences of holding parties liable).

[60] This is a point recognized even by those who see climate as a crisis and litigation as a potentially very useful avenue. See, e.g., Douglas A. Kysar, What Climate Change Can Do About Tort Law, 41 ENVT' L L. 1, 39 (2011) ("[T]he climate change context poses distinct conceptual problems in terms of attribution, given the participation of so many actors. . . . ").

[61] *See*, *e.g.*, Daniel A. Farber, *Apportioning Climate Change Costs*, 26 UCLA J. ENVTL. L. & POL'Y 21, 29 (2007) ("Probably the two most important goals are deterring harmful conduct (the efficiency or deterrence rationale) and corrective justice (restoring moral balance by rectifying harm."); Michael J. Saks, *Do We Really Know Anything About the Behavior of the Tort Litigation System-and Why Not?* 140 U. PA. L. REV. 1147, 1150 (1992) ("The substantive rules of tort law exist to serve certain social purposes. The most prominent among these are compensating innocent victims for injury and deterring behavior that presents risks that exceed their social value.").

[62] *See generally* Florian Baumann et al., *Market Collusion with Joint Harm and Liability Sharing*, 61 Int'l Rev. L. & Econ. 1, 3 (2020) (reviewing the modelling literature as to strict liability and market share liability).

[63] *See* Matthew D. Adler, *Corrective Justice and Liability for Global Warming*, 155 U. PA. L. REV. 1859, 1859 (2007) ("A standard suggestion is this: [corrective justice] imposes a duty on the agent who has acted wrongfully, and thereby caused loss to some individual, to repair the loss."). *See also* Gary T. Schwartz, *Mixed Theories of Tort Law: Affirming Both Deterrence and Corrective Justice*, 75 TEX. L. REV. 1801 (1997) ("Currently there are two major camps of tort scholars. One understands tort liability as an instrument aimed largely at the goal of deterrence, commonly explained within the framework of economics. The other looks at tort law as a way of achieving corrective justice between the parties."); Stephen R. Perry, *The Moral Foundations of Tort Law*, 77 IOWA L. REV. 449 (1992); Jules L. Coleman, Tort Law and the Demands of Corrective Justice, 67 IND. L.J 349 (1992); Richard Epstein, *A Theory of Strict Liability*, 2 J. LEGAL STUD. 151 (1973).

wrongful, conduct, for plaintiffs to prevail even under public nuisance, which is the most strict liability-like claim and the centerpiece claim of the claims alleged in the climate suits.[64]

The complaints in the adaptation damages cases do suggest a theory as to of how the defendant companies acted wrongfully and hence what exactly should be deterred and what exactly is the wrong that must be corrected as a matter of justice. According to the complaints, the companies acted wrongfully by suppressing and misrepresenting information regarding climate change and sowing climate change skepticism, such that governments did not push for low- or no-carbon technologies and fossil fuel limits that otherwise could have been and would have been developed implemented.[65] While pursuing this strategy of non-disclosure and misinformation, a strategy that delayed and delays the path to decarbonization the United States otherwise would have taken, companies wrongfully produced and sold products at a volume that they knew would culminate in a climate change crisis.[66] Wrongfulness as nondisclosure and lying and manipulation of the publicly available information was accepted by the California courts as sufficient, if provable, for imposing public nuisance liability on paint manufacturers:

> Here, Santa Clara, SF, and Oakland alleged that defendants assisted in the creation of this nuisance by concealing the dangers of lead, mounting a campaign against regulation of lead, and promoting lead paint for interior use even though defendants had known for nearly a century that such a use of lead paint was hazardous to human beings. Defendants "[e]ngag[ed] in a massive campaign to promote the use of Lead on the interiors and exteriors of private residences and public and private buildings and for use on furniture and toys." Had defendants not done so, lead paint would not have been incorporated into the interiors of such a large number of buildings and would not have created the enormous public health hazard that now exists. Santa Clara, SF, and Oakland have adequately alleged that defendants are liable for the abatement of this public nuisance.``[67]

However, this non-disclosure/lying/information manipulation theory of wrongfulness poses (at least) four analytically distinct but related questions the climate complaints do not address and that have not yet been aired in the acidic commentary regarding climate litigation. First, if liability is tied to knowledge of undisclosed harm, when exactly did the defendant's knowledge of

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[64] *See* Leslie Kendrick, *The Perils and Promise of Public Nuisance*, at 758 ("Under the law of many states, then, defendants' conduct is in fact a primary focus of public-nuisance liability, and only wrongful conduct warrants liability." But see id (noting case law in New York, Rhode Island, and Michigan suggesting public nuisance liability does not depend on there heaving been wrongful behavior).

[65] *See, e.g.*, City of Chicago, *supra* note 3, at 177 ("Defendants had abundant knowledge that fossil fuel products and their derivatives caused and continue to cause Climate-Related Harms, and actively campaigned to keep that knowledge from becoming open and obvious."); People, *supra* note 40 at 125 ("Defendants . . . have made environmental marketing claims that are untruthful, deceptive, and/or misleading").

[66] *See e.g.*, City of Chicago, *supra* note 3, at 150 ("Defendants knew . . . of the climate effects inherently caused by the normal use and operation of their fossil fuel products and derivatives"); People, *supra* note 3, at 123 ("Defendants . . . affirmatively and knowingly promoting the sale and use of fossil fuel products in California which Defendants knew would cause or exacerbate climate change and its impacts, including extreme heat, drought, extreme weather, and sea level rise").

[67] County of Santa Clara v. Atl. Richfield Co., 137 Cal. App. 4th 292, 329 (Ct. App. 2006).

the relevant harm reach a requisite level to begin the time period for which defendants should be held legally responsible for climate-related harms from their emissions? What, in other words, is the start date for the "market" for application of the market share approach?

Second, for the period for which defendants knew they were causing harm while wrongfully staying silent or lying, are or should they be held legally responsible all their emissions or only those emissions that were above and beyond what fully-informed governments and populations would have wanted, needed, or permitted?

Third, to the extent wrongfulness is tied to non-disclosure and especially misinformation, are there certain defendants who acted more wrongfully than others and (if so) should their emissions somehow count more in the ultimate assignment of financial responsibility?

Fourth, once the role of fossil fuels in creating a climate crisis became widely known, and the extent of misinformation on the part of defendants become known at least to some extent, did the period of the defendants' liability meaningful wrongfulness end, on the theory that they no longer could have any wrongful influence once governments and consumers have extensive, accurate information? In other words, is there a date for when the market for the market share approach closes?

These are questions that cannot be readily or breezily answered but I offer a few thoughts here. As to the timing when wrongfulness and hence legal responsibility would begin, several dates are, in theory, tenable, even if one focuses only on what the companies actually knew or must have known and not their (as yet not fully explored, at least via litigation) misinformation campaigns. The companies allegedly understood that fossil fuels contribute to climate change as early as the 1950s. [68] But knowing that continued fossil fuel emissions are poised to tip the planet into a genuine climate crisis is another thing. Although discovery in these cases (if allowed) would help us better understand what they as entities actually knew and when, it is reasonable to presume the companies understanding of fossil fuels' harmfulness has grown over the years. Thus, perhaps only more recent emissions should count as wrongful and hence legally relevant, as those emissions took place when the companies must have known that the risks would become extreme and create near certain harms if they continued to produce and sell their products in the manner they did.[69] One possible start date is 1992, when an international consensus of a sort seemed to

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[68] *See* City of Chicago, *supra* note 3, at 93 ("[T]he Fossil Fuel Defendants' acts and omissions since the 1970s—including taking expensive actions to protect their own investments from the impacts of climate change—have evinced their clear understanding of the realities of climate change and its likely consequences."); People, *supra* note 3, at 35 ("Defendants have known about the potential warming effects of GHG emissions since as early as the 1950s, and they developed a sophisticated understanding of climate change that far exceeded the knowledge of the general public."); *see also* Emily Williams, *Attributing blame?—climate accountability and the uneven landscape of impacts, emissions, and finances*, 161 CLIMATIC CHANGE 273, 273–290 (2020), https://doi.org/10.1007/s10584-019-02620-5 (arguing that public knowledge of climate change risks from fossil fuel combustion was widespread by the 1980s but that certain oil and gas companies knew of the link between GHG emissions and ACC long before the 1980s due to research conducted in-house).

[69] Matthew Adler has expressed some skepticism as to corrective justice as a basis for the imposition of liability on greenhouse gas emitters, based in part on a lack of knowledge he attributes to greenhouse gas emitters. *See* Adler, *supra* note 44, at 1862. Adler notes that corrective justice requires "wrongfulness" and that "[o]ne route to wrongfulness is to show the actor 'intentionally' caused the loss: that he acted with the very purpose of causing it, knew that it would result from his action, or at least should have believed to a certainty or near certainty that it would result." *Id.* at 1862. Adler, writing in 2007, contends that "given the uncertainty about causes and consequences of global warming, it will be very difficult to show that some group of GHG emitters knew, or had any

emerge regarding the threats of climate change and its causes.[70] Or perhaps wrongfulness need not necessarily be a binary/ either-or, but rather a spectrum, such that some very early emissions would not count at all; later, but still early emissions would carry some weight; and the most recent and current emissions would carry the most weight.

For any time period, it would be no small feat to separate out those emissions that exceeded what would have been allowed and occurred in an environment where climate risk information had not been suppressed or misrepresented and governments had moved in a rational, fully-informed way toward a decarbonized economy, as opposed to the emissions that would not have been allowed and occurred – which might be called wrongful emissions. Dan Farber has suggested that the emissions companies should be held financially responsible for are those for which the marginal social cost exceeded the social benefit, which he refers to as an excess emissions.[71] One might posit that a fully-informed government would bar or at least heavily tax such excess emissions, so the concept of excess emissions and wrongful emissions elide, to an extent. But it is far from clear which emissions from fossil fuel out of all emissions in 1980 or 1990 or 2000 or 2010 should qualify as wrongful or excess emissions. Given the energy needs o the economy and the availability of fossil fuels, it is reasonable to suppose that, at least, some percentage of emissions would have been allowed and occurred in the past even if the government and populace had been fully informed about climate risks and decarbonization had been assertively pursued as a goal starting decades ago.

Finally, and relatedly, there is the market-end-date question: even if plaintiffs can show that defendants' non-disclosure and misrepresentations caused delays in the transition to a decarbonized economy, is there some time after which knowledge of climate change and its risks and the role of fossil fuels was so widespread that the defendants' conduct becomes irrelevant and hence no longer a basis for holding them liable for products governments allow to be sold and that consumers purchased.? The intuition here is that it is no longer really wrongful to utter lies or half-truths when everyone knows them to be so – or if they do not know, are willfully ignoring the readily ascertainable truth. But what is that date? One could argue that it is as early as the 1990s, or as late as 2023, the hottest year on record (and part of a trend on increasingly hot years), a year so hot that perhaps past misinformation no longer should be deemed relevant.[72] On the other hand, one could argue that the effects of the companies' non-disclosure and misinformation continue to inform public understandings and directly or indirectly shape policy[73]; perhaps especially in our

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reason to believe to a near-certainty, that any environmental damage …. Would result from its emissions." *Id.* But knowledge of a near certainty of harm may be provable, although the date for such near certainty may depend on discovery in these cases and even then may be contestable. For his part, Adler also seems to acknowledge that, despite his reservations, corrective justice may support some compensation schemes for "sufficiently large actors." *Id.* at 1867.

[70] *See* Farber, *supra note* 63, at 32 (suggesting 1992 as a possible date when emission should count for tort responsibility purposes because that was when "the US and other nations entered a framework agreement to reduce greenhouse gasses" and thus "any source of emissions after that date was at least on notice of the damaging nature of the conduct.").

[71] *See id.* at 40-41 (distinguishing total from excess emissions, and defining excess emissions as emissions beyond what have been made in a regime that through taxation required the full internalization of climate externalities); *see also* Daniel A. Farber, *Basic Compensation for Victims of Climate Change*, 155 U. PA. L. REV. 1605 (2007).

[72] *See, e.g.*, https://www.climate.gov/news-features/featured-images/2023-was-warmest-year-modern-temperature-record.

[73] The complaints do point to ongoing misinformation campaigns, which could form the basis for a longer time period for liability, perhaps including even the current day. City of Chicago, *supra* note 3, at 103 ("Defendants'

age of intense political polarization, misinformation, once disseminated and nurtured, simply endures, and hence the wrongfulness has no end date.[74]

Commentators have suggested that focusing on unjust enrichment and disgorgement of unjustly gained profits could be a workaround some of the issues inherent in allocating liability based directly on fossil fuel emissions.[75] And some complaints do include an unjust enrichment count.[76] Moreover, while there are notable data gaps with respect to the calculation of companies' emissions,[77] the data regarding profits was collected and publicly disclosed, at least for publicly traded companies. But the same issues or questions regarding wrongfulness would need to be addressed. If the companies' enrichment was wrong because and to the extent they misrepresented climate risks, then the wrongful/unjust profits would be those gained only during that time of misrepresentation. And the profits would only be unjust on those sales that exceeded those that would have obtained in the absence of the misrepresentations. And once (or if) accurate information was widely available, were profits then still unjust? In other words, with unjust enrichment, we do not avoid the questions of what and when companies knew exactly, what knowledge and behavior was enough to trigger liability and how much liability, and when (if at all) the companies' wrongful behavior ended or no longer mattered for liability purposes.

IV. Two Reasons Why Market Share Liability Is Unusually Complicated (But Not Impossible) In Climate Cases

Even assuming these specific wrongfulness issues are resolved, or courts determine they can proceed to impose liability without wrongfulness or with it only as a generalized background principle, any market share/several scheme of liability will not be exactly uncomplicated in the climate change context. This Part discussed two market-share-specific complexities in the context of the suits against the fossil fuel companies for adaptation damages: non-fossil fuel sources of anthropogenic climate change, and the fact that the timing of emissions may determine their connection to current harms.

i. Non-Fossil Fuel Sources

Any market share allocation must account for non-fossil-fuel sources of anthropogenic climate change. Anthropogenic climate change is, definitionally, due to anthropogenic emissions, emissions tied to human activity on the planet. Fossil fuels certainly account for a large share of those emissions historically and currently, especially if one includes the emissions associated with

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deceptive conduct continues to the present day, albeit through updated messaging"); People, *supra* note 3 at 80-81 ("By advertising fossil fuel products as environmentally friendly . . . Defendants seek to convince consumers that fossil fuel products are beneficial to the environment."). And, indeed, we continue to see press reports to this effect, now focused on the feasibility of renewable energy sources as a feasible alternative to fossil fuels. Andrew Dessler, *Oil and Gas Companies Are Trying to Rig the Marketplace*, NEW YORK TIMES (June 1, 2024), https://www.nytimes.com/2024/06/01/opinion/clean-energy-solar-wind.html.

[74] *See generally* Tobia Spampatti et al., *Psychological inoculation strategies to fight climate disinformation across 12 countries,* 8 NATURE HUM. BEHAV 380 (2024) https://doi.org/10.1038/s41562-023-01736-0.

[75] *See generally* Zora Djenohan, *Making Way for Unjust Enrichment in Environmental Justice Litigation*, 67 LOY. L. REV. 223 (2020); William Montgomery, *Polluter Disgorges: Climate Accountability and the Law of Unjust Enrichment*, 35 TUL. ENVTL. L.J. 165 (2022).

[76] City of Chicago, *supra* note 3, at 173.

[77] *See* Richard Heede, *The Carbon Majors Database Launch Report*, THE CARBON MAJORS 9 (2024), https://carbonmajors.org/briefing/The-Carbon-Majors-Database-26913.

production of fossil fuels and with fossil fuel corporate operations, as well (of course, and especially) the emissions from the use of fossil fuels products.[78]

However, even taking all indirect and direct fossil fuel emissions as the responsibility of the fossil fuel companies, it does not follow that such fossil fuel emissions account for all anthropogenic climate change. Two very substantial sources of anthropogenic climate change are (1) land use changes, and specifically land development that eliminates "sinks" that store carbon dioxide (such as forest clearing),[79] (2) and methane emissions associated with agriculture and especially livestock production.[80] Nitrous oxide emissions associated with agriculture are also a significant contributor, albeit much less than methane.[81]

The IPCC has estimated the magnitude of the effective emissions from land use changes.[82] In a 2022 IPCC report, the authors estimated that between 1990 and 2019, net greenhouse emissions from land use, land use changes, and forestry ranged from 11 to 13 percent of net greenhouse gas emissions (expressed in a common metric of carbon dioxide equivalents, to account for the different warming impacts of the gasses). [83]

The same report identified carbon dioxide emission from fossil fuels and fossil fuels and fossil fuel-driven industry ranged from 59 to 64 percent.[84] But in addition to carbon dioxide emissions from fossil fuels, some methane and some nitrous oxide emissions derive from fossil fuel production and use. In the same 1990 to 2019 time period, emissions from nitrous oxide ranged from 4 to 5 percent of net greenhouse gas emissions, and emissions from methane ranged from 18 to 21 percent of net greenhouse gas emissions.

About 60 percent of methane emissions and 40 percent of nitrous oxide emissions are due to non-natural, anthropogenic sources.[85] According to two recent estimates, of the 6o percent of methane emissions that are anthropogenic, about 37 percent can be attributed to fossil fuel production, so something like 22 percent of total methane emissions are due to fossil fuels. Of the 40 percent of nitrous oxide emissions that are anthropogenic, about 13 percent can be attributed to

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[78] PIERRE FRIEDLINGSTEIN ET AL., EARTH SYSTEM SCIENCE DATA, GLOBAL CARBON BUDGET 2023, 1 Introduction, (2023), https://doi.org/10.5194/essd-15-5301-2023 (fossil fuels became "the dominant source of anthropogenic emissions to the atmosphere from around 1950 and their relative share has continued to increase until the present").
[79] FRIEDLINGSTEIN ET AL., *supra* note 58, at Section 3.4 (contribution of land-use change to total anthropogenic emissions was 18 % during the period 1960–2022 and 12 % from 2013–2022).
[80] SHOBHAKAR DHAKAL ET AL., IPCC 2022: CLIMATE CHANGE 2022: MITIGATION OF CLIMATE CHANGE. CONTRIBUTION OF WORKING GROUP III TO THE SIXTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE: EMISSIONS TRENDS AND DRIVERS, AT FIGURE 2.5 (P.R. Shukla et al. eds., Cambridge University Press, Cambridge, UK and New York, NY, USA 2022) (2022) doi:10.1017/9781009157926.004. Dhakal, S., J.C. Minx, F.L. Toth, A. Abdel-Aziz, M.J. Figueroa Meza, K. Hubacek, I.G.C. Jonckheere, Yong-Gun Kim, G.F. Nemet, S. Pachauri, X.C. Tan, T. Wiedmann, 2022: Emissions Trends and Drivers.
[81] *Id.*
[82] See, e.g., FRIEDLINGSTEIN ET AL., *supra* note 58, at Section 2.2 (estimating emissions from land use).
[83] DHAKAL ET AL., *supra* note 61, at Figure 2.5.
[84] *Id*.
[85] International Energy Agency, *Understanding methane emissions*, INTERNATIONAL ENERGY AGENCY (2024), https://www.iea.org/reports/global-methane-tracker-2024/understanding-methane-emissions; Nature, *A comprehensive quantification of global nitrous oxide sources and sinks*, NATURE (October 7, 2020), https://www.nature.com/articles/s41586-020-2780-0.

fossil fuels, so something like five percent of total nitrous oxide emissions are due to fossil fuels.[86] Thus, as a very crude estimate, in addition to the (more or less) 60% net greenhouse gas emissions from carbon dioxide, fossil fuels could account for perhaps something like an additional 10% of net greenhouse gas emissions, due to methane and nitrous oxide.

Altogether, as a back of the envelope matter based on these numbers, we might that around seventy percent of anthropogenic emissions can be attributed to fossil fuels, at least in the 1990 to 2019 period. That percentage, even assuming it is close to correct, may be different for all historic, cumulative emissions, because the relative percentages of different sources of emissions varied between 1850 and 1990.[87]

The upshot is that fossil fuels' responsibility for anthropogenic climate change is notably less than 100%. The exact percentage number for fossil fuels, viewed in historic, cumulative terms, would almost certainly subject to debate in a contested litigation context regarding market share liability.

ii. The Timing of Emissions

The DES market share liability cases involved a product that was dangerous – capable of producing harm – no matter when precisely the product was produced and consumed. However, the harmfulness from fossil fuel emissions may depend, at least arguably, with when exactly the emissions took place. More recent emissions might translate into greater actual harm than much older emissions because of the physical nature and lifespan, as it were, of greenhouse gasses. Greenhouse gas emissions do not stay in the atmosphere forever, and thus, at some point, older emissions no longer can be a source of ongoing climate change and related adaptation damages. While carbon dioxide emissions stay in the atmosphere effectively forever, 50% of carbon dioxide dissipates from the atmosphere within 30 years.[88] Methane dissipates altogether relatively quickly – in about 12 years.[89] Thus, companies' emissions – especially methane emissions – that occurred

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[86] International Energy Agency, *Understanding methane emissions*, INTERNATIONAL ENERGY AGENCY (2024), https://www.iea.org/reports/global-methane-tracker-2024/understanding-methane-emissions (the energy sector was responsible for nearly 130 Mt of methane emissions in 2023 – more than one third of the total amount attributable to human activity and second only to agriculture (around 145 Mt in 2017)); Nature, *A comprehensive quantification of global nitrous oxide sources and sinks*, NATURE (October 7, 2020), https://www.nature.com/articles/s41586-020-2780-0. ("Anthropogenic sources contributed, on average, 43% to the total N_2O emission (mean: 7.3; min–max: 4.2–11.4 Tg N yr^{-1}), of which direct and indirect emissions from nitrogen additions in agriculture and other sectors contributed around 52% and around 18%, respectively. Of the remaining anthropogenic emissions, about 27% were from other direct anthropogenic sources including fossil fuel and industry (around 13%), with about 3% from perturbed fluxes caused by changes in climate, CO_2 or land cover.").

[87] Our World in Data, *Annual CO_2 emissions including land-use change*, OUR WORLD IN DATA (June 6, 2024), https://ourworldindata.org/grapher/annual-co2-including-land-use; Our World in Data, *Greenhouse gas emissions by gas, World, 1850 to 2022*, OUR WORLD IN DATA (June 6, 2024), https://ourworldindata.org/grapher/ghg-emissions-by-gas.

[88] https://blogs.edf.org/climate411/2008/02/26/ghg_lifetimes/#

[89] https://www.iea.org/reports/methane-tracker-2021/methane-and-climate-change. See also Hannah Ritchie, Pablo Rosado and Max Roser (2020) - "Greenhouse gas emissions" Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/greenhouse-gas-emissions' [Online Resource](" The average 'lifetime' of nitrous oxide in the atmosphere is around 121 years. This is typically shorter than CO_2 (which can persist for centuries or even thousands of years), but longer than methane (which has an average lifetime of 12 years).

in (say) the 1970s arguably should receive different weight than emissions in the 2010s or 2020s (quite apart from the knowledge/wrongfulness considerations discussed above).[90]

It would be much easier for a court to treat each fossil fuel company's emissions as the same in calculating the company's cumulative emissions for market share purposes regardless of when the emissions were made, rather than trying to weigh the emissions based on when they were made. In order to know whether adjusting for timing would affect substantially the share of liability of any of the named defendants in these suits, one would need a careful analysis of the emissions history of each company. If some compan(ies) would benefit from weighting, it seems plausible that that company or companies would press the issue of weighting by time of emission.

Conclusion

Allocating financial responsibility for climate change costs to major energy companies could happen in many fora – at the federal, state or international level, via legislation, treaties or adjudication. This Article has explored the allocation in the context of state law climate adaptation cost suits in the United States, and has argued that a market share/several approach is tenable, although it raised complicated questions, most notably those surrounding wrongfulness. Of course, it is possible that legal institutions of all sorts ultimately will choose to focus solely on financial responsibility for harms associated with current or future emissions, or ignore corporate responsibility altogether. However, the airing of the issues discussed in this Article about harms from past emissions could also inform debates over responsibility for harms associated with current and future emissions.

[90] While shorter-lived, methane is more potent than carbon dioxide, so while a company's methane emissions remains in the atmosphere, any weighing of the relative impact of carbon dioxide emissions must take into account both duration and potency. Hannah Ritchie & Max Roser, Greenhouse Gas Emissions (last visited June 22, 2023), Our World in Data, available at https://ourworldindata.org/greenhouse-gas-emissions. (discussing the differences between CO and methane but not suggesting a way to weight them such as to account both for potency and duration).