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NEGLIGENCE IN THE AIR: THE DUTY OF CARE
IN CLIMATE CHANGE LITIGATION

DAVID HUNTER[†] & JAMES SALZMAN^{††}

INTRODUCTION

The past eighteen months have witnessed a remarkable surge of popular interest in climate change and its impact. Sensitized by the devastation of Hurricane Katrina in New Orleans and the heavy hurricane season through the Gulf states, the public has gained a newfound appreciation for the remote-sounding predictions that global warming may increase severe storm activity.¹ Timing is everything, and the recent releases of the disaster movie *The Day After Tomorrow*² and Al Gore's documentary *An Inconvenient Truth*³ have spurred widespread interest from the workplace to the blogosphere over a topic that long seemed the exclusive province of tree-huggers and policy wonks.

Indeed, just six years ago, soon after his election in 2000, President Bush reversed his campaign position on climate change and suffered no political fallout.⁴ Since refusing to send the Kyoto Protocol to the Senate for ratification, the Bush administration has maintained a consistent policy of opposition to any "targets and timetables" or similar approach to climate change that would involve mandatory reduction or stabilization of greenhouse gases (GHGs). Instead, the administration has called for voluntary commitments by industry and

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¹ See Pew Ctr. on Global Climate Change, Hurricanes and Global Warming—Q & A, <http://www.pewclimate.org/hurricanes.cfm> (last visited May 1, 2007) (suggesting that global warming may exacerbate severe storm damage).

² THE DAY AFTER TOMORROW (20th Century Fox 2004).

³ AN INCONVENIENT TRUTH (Paramount Classics 2006).

⁴ See Douglas Jehl with Andrew C. Revkin, *Bush, in Reversal, Won't Seek Cut in Emissions of Carbon Dioxide*, N.Y. TIMES, Mar. 14, 2001, at A1 (discussing President Bush's decision to no longer seek regulation of carbon dioxide emissions).

increased efforts in research and development.⁵ To date, this inaction at the federal level has not resulted in any clear political cost. Indeed, during the 2004 presidential election, John Kerry deliberately avoided the topic of climate change—an issue focus groups apparently deemed too remote or politically damaging on which to run.⁶

While not making a noticeable difference at the ballot box, failure to take significant action at the federal level to address climate change concerns has triggered three significant responses. The first has been increased corporate activity. Companies have begun rebranding themselves to suggest a more climate-friendly agenda—such as British Petroleum’s new tag line “Beyond Petroleum”⁷—and a wide range of corporations are establishing corporate GHG reduction targets,⁸ while entrepreneurs look to profit from people’s desires to do something about the climate problem.⁹

The second response has taken the form of increased political activity at the subnational level.¹⁰ Communities around the nation have

⁵ See, e.g., The White House, Climate Change Fact Sheet (May 18, 2005), <http://www.whitehouse.gov/news/releases/2005/05/20050518-4.html> (describing President Bush’s support for “voluntary, regulatory, or incentive-based programs on energy efficiency, agricultural practices, and greenhouse gas reductions”).

⁶ See David L. Greene, *Bush Seen as Polluter, but Kerry’s Plan Vague*, BALTIMORE SUN, Oct. 17, 2004, at 1F (“Despite conservationists’ strong feelings about Bush’s record, environmental concerns have been all but invisible in the presidential campaign, elbowed aside by Iraq and terrorism.”). But see Amanda Griscom Little, *How Green Was My Election*, GRIST, Nov. 9, 2006, <http://grist.org/news/muck/2006/11/09/election> (reporting that “the environment played a central role in some high-profile victories” in the 2006 mid-term elections).

⁷ See BP, Beyond Petroleum, <http://www.bp.com/sectiongenericarticle.do?categoryId=9010219&contentId=7019491> (last visited May 1, 2007). Chevron has changed its slogan to the enigmatic “Human energy.” See [willyoujoinus.com](http://www.willyoujoinus.com), The Advertising, <http://www.willyoujoinus.com/advertising> (last visited May 1, 2007) (displaying Chevron’s new advertising campaign); see also Steven Mufson, *Exxon Mobil Warming Up to Global Climate Issue*, WASH. POST, Feb. 10, 2007, at D1 (discussing a possible shift by ExxonMobil toward acknowledging the scientific consensus that the climate is changing).

⁸ See CLIMATE GROUP, CARBON DOWN, PROFITS UP 6-13 (2d ed. 2005) (providing an extensive list of corporate emissions targets).

⁹ See, e.g., TerraPass Home Page, <http://www.terrapass.com> (last visited May 1, 2007) (allowing consumers to purchase carbon offsets for their car, flight, and home energy emissions); Chicago Climate Exchange Home Page, <http://www.chicagoclimatex.com> (last visited May 1, 2007) (providing a “voluntary, legally binding rules-based greenhouse gas emission reduction and trading system”).

¹⁰ See generally PEW CTR. ON GLOBAL CLIMATE CHANGE, LEARNING FROM STATE ACTION ON CLIMATE CHANGE: JUNE 2006 UPDATE (2006), available at <http://www.pewclimate.org/document.cfm?documentID=548> (describing regional initiatives and state policies designed to reduce greenhouse gas emissions).

created climate action plans.¹¹ States have joined the action, as well. Twenty-two states and the District of Columbia require utilities to obtain a specific percentage of their electricity from renewable sources, while Washington and Oregon require offsets for utilities' greenhouse gas emissions.¹² California has taken the strongest actions, requiring greenhouse gas emissions to be reduced to 1990 levels by 2020.¹³ And seven northeastern states have joined together in the Regional Greenhouse Gas Initiative (RGGI)—a regional strategy that mandates a ten percent reduction in carbon dioxide emissions from electric power generators by 2019.¹⁴

The third response to federal inaction has come through increased litigation, including legal actions brought by environmental groups, tobacco class action attorneys, municipalities, state attorneys general, and others. Some litigation has focused on suits against public bodies. For example: Massachusetts and eleven other states sued the EPA under the Clean Air Act to require the agency to regulate carbon dioxide as a pollutant;¹⁵ cities and environmental groups filed suit against the Overseas Private Investment Corporation (OPIC), demanding that it produce environmental impact statements considering the climate impacts of its loans;¹⁶ and representatives of the Arctic Inuit people filed a petition against the United States government before the Inter-American Commission on Human Rights.¹⁷ Most of these cases are still pending, although the Supreme Court recently reached a decision in the plaintiffs' favor in *Massachusetts v. EPA*.¹⁸

¹¹ See, e.g., Mass. Climate Action Network, Sample Municipal Climate Action Plans, <http://www.massclimateaction.org/plans.htm> (last visited May 1, 2007) (providing links to climate action plans for communities in Massachusetts and other states).

¹² PEW CTR. ON GLOBAL CLIMATE CHANGE, *supra* note 10, at 6.

¹³ California Global Warming Solutions Act of 2006 sec. 1, pt. 3, § 38550, CAL. HEALTH & SAFETY CODE § 38550 (West Supp. 2007); see also Cal. Exec. Order No. S-3-05 (2005), available at <http://gov.ca.gov/index.php?/executive-order/1861> (mandating an additional reduction to 80% below 1990 levels by 2050).

¹⁴ Regional Greenhouse Gas Initiative, Memorandum of Understanding in Brief, http://www.rggi.org/docs/mou_brief_12_20_05.pdf (last visited May 1, 2007).

¹⁵ *Massachusetts v. EPA*, 127 S. Ct. 1438 (2007).

¹⁶ *Friends of the Earth, Inc. v. Watson*, No. C 02-4106 JSW, 2005 U.S. Dist. LEXIS 42335 (N.D. Cal. Aug. 23, 2005).

¹⁷ Martin Wagner & Donald M. Goldberg, An Inuit Petition to the Inter-American Commission on Human Rights for Dangerous Impacts of Climate Change (Dec. 15, 2004) [hereinafter Inuit Petition], available at http://www.ciel.org/Publications/COP10_Handout_EJCIEL.pdf.

¹⁸ 127 S. Ct. at 1462 ("EPA can avoid taking further action only if it determines that greenhouse gases do not contribute to climate change or if it provides some reasonable explanation as to why it cannot or will not exercise its discretion to determine

Likely far more important in the future will be tort actions filed against private parties. We are aware of four such cases thus far, but observers (including the organizers of this Symposium) expect the number to increase significantly.¹⁹ If successful, these and future cases will have a huge impact on the industries sued and, as hopeful lawyers have mused, could make the tobacco litigation look small by comparison.²⁰ For example, the most recent case—filed in September 2006 by the Attorney General of California against six major car manufacturers—requests damages for, among other things, “such future monetary expenses and damages as may be incurred by California in connection with the nuisance of global warming.”²¹ That could be a whopper of a check, but will the case succeed?

As law students all dutifully learn in their first-year Torts classes, a prima facie negligence claim must satisfy four elements: duty, breach, causation, and injury.²² Our sense is that most of the discussion and analysis of climate change cases to date have focused on the third and fourth elements.²³ In terms of causation, for example, how can plaintiffs persuasively link the particular emissions of cars driven in Cali-

whether they do.”).

¹⁹ Tomas Kellner, *Hurricane Tort*, FORBES.COM, Sept. 29, 2005, http://www.forbes.com/free_forbes/2005/1017/052.html.

²⁰ Vanessa Houlder, *Climate Change Could Be the Next Legal Battlefield*, FIN. TIMES (London), July 14, 2003, at 10 (quoting one lawyer as claiming “[t]he potential compensation for climate change impacts would make the tobacco pay-outs look like peanuts”).

²¹ Complaint at 14, *California v. Gen. Motors Corp.*, No. 3:06CV05755 (N.D. Cal. Sept. 20, 2006) [hereinafter *California Complaint*].

²² See John C.P. Goldberg & Benjamin C. Zipursky, *The Restatement (Third) and the Place of Duty in Negligence Law*, 54 VAND. L. REV. 657, 658 & n.1, 659 & nn.3-5 (2001) (citing caselaw, treatises, and casebooks that adopt the four elements).

²³ See David A. Grossman, *Warming Up to a Not-So-Radical Idea: Tort-Based Climate Change Litigation*, 28 COLUM. J. ENVTL. L. 1, 9-33 (2003) (discussing the effects of climate change that could substantiate claims for damages and the challenges of showing causation); Vincent S. Oleszkiewicz & Douglas B. Sanders, *The Advent of Climate Change Litigation Against Corporate Defendants*, 35 Env't Rep. (BNA) 2365, 2369 (Nov. 12, 2004) (“Causation is the crucial issue for defendants because it will be the most difficult for a plaintiff to demonstrate . . .”); see also *Comer v. Nationwide Mut. Ins. Co.*, No. 1:05 CV 436 LTD RHW, 2006 WL 1066645, at *4 (S.D. Miss. Feb. 23, 2006) (“I foresee daunting evidentiary problems for anyone who undertakes to prove, by a preponderance of the evidence, the degree to which global warming is caused by the emission of greenhouse gasses; the degree to which the actions of any individual oil company, any individual chemical company, or the collective action of these corporations contribute, through the emission of greenhouse gasses, to global warming; and the extent to which the emission of greenhouse gasses by these defendants, through the phenomenon of global warming, intensified or otherwise affected the weather system that produced Hurricane Katrina.”).

fornia with reduced snowpack in the Sierra Nevada? And even if a causal link can be established between the offending action and the harm, what is the proper measure of the car companies' liability in the face of multiple sources of greenhouse gases over an extended time period?

These are challenging issues, and surely deserve careful attention. What remains surprising, though, is that little beyond passing mention has been written about the first two elements of negligence—the duty of care and its breach. Suppose one could establish that emissions from a utility company or an automobile manufacturer's cars proximately caused greater storm surges that, in turn, harmed a particular coastal community, or proximately caused reduced snowpack that led to water shortages for a specific farming community. Key questions would still remain. Did the utility or car manufacturer owe a duty of care to these specific communities? If so, what was the nature of that duty and was it breached?

To improve our understanding of the short-term and long-term potential for climate change tort litigation, this Article focuses on these first two elements of a tort action—the duty of care and its breach. Part I addresses general doctrine. What role does the duty of care play in tort actions? Part II then explores the likely scenarios for climate-based tort actions, including a summary of the tort-based actions brought thus far. Who are the likely plaintiffs and defendants? How have litigants attempted to satisfy the duty of care elements in climate litigation? The final Parts assess the duty of care for a range of tort actions—negligence (Part III), products liability (Part IV), and private and public nuisances (Part V)—that may in the future form the basis of climate-based claims.

I. DUTY OF CARE

As the *Restatement (Second) of Torts* explains,²⁴

[t]he word “duty” is used . . . to denote the fact that the actor is required to conduct himself in a particular manner at the risk that if he does not do so he becomes subject to liability to another to whom the duty is owed for any injury sustained by such other, of which that actor's conduct is a legal cause.

²⁴ RESTATEMENT (SECOND) OF TORTS § 4 (1965). Prosser and Keeton similarly define duty as “an obligation, to which the law will give recognition and effect, to conform to a particular standard of conduct toward another.” W. PAIGE KEETON ET AL., PROSSER & KEETON ON THE LAW OF TORTS 356 (5th ed. 1984).

Parsing this definition, the duty element can be seen to imply two separate questions: (1) to whom is the duty owed?, and (2) what does the duty entail? Put another way, a successful plaintiff must demonstrate that the defendant “was obligated to the plaintiff to take care to avoid causing the type of injury plaintiff suffered.”²⁵

In most negligence cases, the answer to both questions is related to the foreseeable risks under the circumstances. The general duty owed is to act reasonably under the circumstances (i.e., not to create unreasonable risks), and that duty is owed to those who are foreseeably at risk from the defendant’s behavior. In many tort cases, the answers to these questions are clear, and neither the litigants nor the judge need dwell on them. Consider, for example, a driving accident. Drunk is driving down the road after downing a six-pack and hits Bystander, who is minding her own business waiting for a bus. It goes without saying that Drunk (1) owes a duty to bystanders (2) not to drive on the sidewalk. For this reason, the duty element is often conflated with the related question of breach of duty.²⁶

The duty of a driver to pedestrians and other motorists is obvious. But as the links of causation (and thus the foreseeability of the injury) become attenuated, the analysis of duty also becomes more complicated. To modify our example above, assume that while driving down the road, Drunk is pulled over for driving under the influence. Tow Truck Driver arrives to pick up Drunk’s car and is injured when hit by a passing car. Drunk’s driving clearly was negligent, and if she had struck someone while driving she surely would have been liable. But does she owe a duty to Tow Truck Driver for his injuries?²⁷ Or imagine if Drunk, while weaving down the road, notices in her mirror that Victim, standing on the side of the road, is suffering a heart attack, but she keeps driving. Does Drunk owe a duty to Victim?²⁸

²⁵ Goldberg & Zipursky, *supra* note 22, at 698.

²⁶ Indeed, there is currently an effort to write duty almost entirely out of the *Restatement (Third)*. See *id.* at 692-97 (discussing the Reporters’ “duty skepticism,” and their effort to avoid including the concept of duty in the *Restatement (Third)*).

²⁷ This scenario is discussed by Goldberg and Zipursky. *Id.* at 709-10 (discussing the court’s analysis of such a case in *Bryant v. Glatetter*, 38 Cal. Rptr. 2d 291 (Ct. App. 1995)).

²⁸ Generally, no duty exists to act affirmatively to save someone else. See, e.g., *Long v. Patterson*, 22 So. 2d 490, 492 (Miss. 1945) (finding no duty to warn others of dangerous traffic); *Krieg v. Massey*, 781 P.2d 277, 279 (Mont. 1989) (holding that a landlord had no duty to take a gun from a suicidal tenant); *Yania v. Bigan*, 155 A.2d 343, 346 (Pa. 1959) (finding no duty to save a neighbor from drowning).

In both cases, the law would say no. Drunk's driving was clearly negligent, but she owes a duty only to the class of victims put at risk by her negligent activity—pedestrians, not people stopping to tow her car or suffering heart attacks on the sidewalk. Neither Tow Truck Driver nor Victim is in the zone of foreseeable parties to whom Drunk owes a duty of care.

When framed in this manner, it is apparent that the function of duty in tort claims is *relational*. It is not enough to focus solely on whether the actor exercised reasonable care or whether the resulting harm was proximately caused by the activity. A duty must also be owed by the party *to the victim*. A duty is owed to another person or a class of persons, not to the world at large.

Nowhere has this doctrine been made clearer than in the opinion of Justice Cardozo in the classic case of *Palsgraf v. Long Island Railroad*.²⁹ Mrs. Palsgraf sued the railroad for injuries suffered when a railroad conductor negligently pushed a passenger leaping onto the train, causing the passenger's package to fall on the tracks. The package exploded, dislodging scales that fell on Mrs. Palsgraf, who was standing some distance away on the platform. In denying her claim, Cardozo famously noted:

The conduct of the defendant's guard, if a wrong in its relation to the holder of the package, was not a wrong in its relation to the plaintiff, standing far away. Relatively to her it was not negligence at all. Nothing in the situation gave notice that the falling package had in it the potency of peril to persons thus removed. Negligence is not actionable unless it involves the invasion of a legally protected interest, the violation of a right. Proof of negligence in the air, so to speak, will not do.³⁰

From this perspective, the duty of care requirement ensures that a defendant's action cannot be negligent in and of itself.³¹ Rather, the act is negligent only with respect to specific parties and specific harms. When assisting a passenger on the train, the conductor owed a duty of care to that passenger, not to the class of parties (including Mrs. Palsgraf) standing some distance away on the platform, apparently well out of harm's way. She and the other waiting passengers were not within the zone of foreseeable risk from the conductor's conduct.

²⁹ 162 N.E. 99 (N.Y. 1928).

³⁰ *Id.* at 99 (internal quotation marks omitted).

³¹ "If an instance of unreasonable or faulty conduct is to constitute a 'breach,' then it must be a breach of some duty. Thus, in the absence of a concept of duty, there is no basis for describing unreasonable conduct as 'breach' . . ." Goldberg & Zipursky, *supra* note 22, at 684.

Whether or not a duty of care exists or should exist between the actor and a distant injured party is never an easy question.³² What is the duty of care owed by gun manufacturers to victims of crime?³³ What is the duty of cigarette manufacturers to those harmed by second-hand smoke?³⁴ Or, closer to the subject of this Symposium, what is the duty of care owed by oil companies to beach communities threatened by increased coastal erosion? Climate change is essentially a global environmental tort. If the courts look at the duty as relational, will they be willing to recognize a relationship between the defendants and virtually everyone else in the world (because everyone is placed at risk by the activities of the defendants)? In reviewing which plaintiffs are within the zone of foreseeable risk and thus owed a duty, the courts may return to a Palsgrafian analysis or to other concepts of duty to define the extent of tort liability.³⁵

Assuming the courts find that the defendant does indeed owe a duty to the particular plaintiffs, there remains the equally difficult and related question of *what* the duty of care should entail. For negligence actions, the general level of the duty of care is well known—to act reasonably or not to act in such a way that creates an unreasonable risk of harm.³⁶ Typically, as when Drunk drives into Bystander, we find that Drunk has violated her duty by acting unreasonably toward Bystander (i.e., driving drunk on the sidewalk). But how would we characterize the reasonableness of the behavior of energy utilities whose emissions contribute to an increase in temperature that re-

³² “‘Duty’ is simply ‘an expression of the sum total of those considerations of policy which lead the law to say that the particular plaintiff is entitled to protection.’” *Brennen v. City of Eugene*, 591 P.2d 719, 722 (Or. 1979) (quoting *Mezyk v. Nat’l Repossessions, Inc.*, 405 P.2d 840, 842 (Or. 1965)).

³³ Compare *Hamilton v. Accu-Tek*, 62 F. Supp. 2d 802, 827 (E.D.N.Y. 1999) (concluding that manufacturers had a duty to victims “to market and distribute handguns responsibly”), *rev’d sub nom.* *Hamilton v. Beretta U.S.A. Corp.*, 264 F.3d 21 (2d Cir. 2001), with *Hamilton v. Beretta U.S.A. Corp.*, 750 N.E.2d 1055, 1068 (N.Y. 2001) (holding that no such duty was owed).

³⁴ Cf. Renee Vintzel Lorigas, Annotation, *Secondary Smoke as Battery*, 46 A.L.R. 5th 813 (1997) (discussing secondary smoke as a basis for a cause of action for battery); Thomas G. Fischer, Annotation, *Employer’s Liability to Employee for Failure To Provide Work Environment Free from Tobacco Smoke*, 63 A.L.R. 4th 1021 (1988) (discussing employer liability for second-hand smoke in the workplace).

³⁵ See *infra* Part III.D.

³⁶ “[I]n negligence cases, the duty is always the same—to conform to the legal standard of reasonable conduct in the light of the apparent risk. What the defendant must do, or must not do, is a question of the standard of conduct required to satisfy the duty.” KEETON ET AL., *supra* note 24, at 356.

duces snowpack, or of a car company whose products do the same thing?

The duty of care analysis will be similar, although not identical, for tort actions based on theories other than negligence. For cases based on products liability, for example, the duty is to avoid selling a defective product or one that is unaccompanied by an adequate warning.³⁷ For nuisance, the obligation is not to interfere unreasonably or knowingly with the use and enjoyment of another's property, and for public nuisance it is not to contribute unreasonably or knowingly to an interference with the public's resources.³⁸ In each case, the determination of a breach of duty can be analyzed in terms of the reasonableness of the defendant's conduct (or of its product design), which in turn can be analyzed through a risk-utility (i.e., cost-benefit) analysis of the underlying conduct (or product) and the foreseeable resulting harms.³⁹ Also relevant to each of the tort actions is the availability of alternative approaches, technologies, or products that could reduce the foreseeable risk.

II. CLIMATE-BASED TORT CASES

This Part introduces climate change litigation generally and summarizes the tort-based climate actions brought thus far. We first review the potential parties in a climate change lawsuit. We then describe how each of the climate lawsuits to date has sought to satisfy the duty of care requirement.

³⁷ See *infra* Part IV. For the basic parameters of products liability claims, see RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. §§ 1-2 (1998).

³⁸ See *infra* Part V. For the basic parameters of nuisance claims, see RESTATEMENT (SECOND) OF TORTS §§ 821B-D (1979).

³⁹ See DAVID G. OWEN, PRODUCTS LIABILITY LAW § 8.4 (2005) ("The risk-utility test for establishing design defectiveness is unaffected by whether the underlying theory of recovery is negligence, strict liability in tort, or even implied warranty, because the necessary balance between a particular design feature's safety, costs, and effect on product utility remains the same."); see also *Banks v. ICI Ams., Inc.*, 450 S.E.2d 671, 674 n.3 (Ga. 1994) ("[T]he determination of whether a product was defective (involving the reasonableness of a manufacturer's design decisions), which is a basic inquiry for strict liability purposes, generally will overlap the determination of whether the manufacturer's conduct was reasonable, which is a basic inquiry for negligence purposes . . ."); *Phillips v. Kimwood Mach. Co.*, 525 P.2d 1033, 1039 (Or. 1974) ("[W]hether the doctrine of negligence . . . or strict liability is being used to impose liability, the same process is going on in each instance, *i.e.*, weighing the utility of the article against the risk of its use.").

A. *Potential Defendants in Climate Change Cases*

Three broad categories of potential defendants could be the target of climate tort actions. The first includes those oil, gas, and coal companies and other *producers of fossil fuels* whose combustion directly increases greenhouse gas emissions. One study estimates that one oil company, ExxonMobil (and its corporate predecessors), has contributed approximately “five per cent of global, man-made, climate changing carbon dioxide emissions over the last 120 years.”⁴⁰ The second category includes direct *users of fossil fuels* that cause greenhouse gas emissions.⁴¹ This is potentially an enormous category, of course, and includes every citizen who drives a car or Boy Scout troop that sings around a campfire. On the other hand, a relatively small number of utilities contribute a substantial portion of total U.S. emissions. According to the complaint in *Connecticut v. American Electric Power*, the five largest fossil fuel burning utilities are not only the five largest emitters of carbon dioxide in the United States but account for approximately 10% of *all* anthropogenic carbon dioxide emissions in the country.⁴² The last category includes those *companies that manufacture or market products whose use contributes to climate change*. The paradigmatic defendants in this category are automobile companies.

Suits against each of these parties raise interesting duty issues. Car makers, oil companies, utilities, and others all have a duty to behave reasonably and avoid the unreasonable imposition of harm on others, of course, but what is the nature of this duty? With respect to car companies, for example, is it unreasonable to produce cars that fully comply with existing regulatory requirements? Have the impacts of auto emissions on the climate been so foreseeable in the past that a reasonable car company should have accounted for them in its design? Or is it sufficient that car companies have been conforming to general industry norms and customs? Indeed, given the consistently

⁴⁰ Press Release, Friends of the Earth, ExxonMobil’s Contribution to Global Warming Revealed (Jan. 29, 2004), *available at* http://www.foe.co.uk/resource/press_releases/exxonmobils_contribution_t_28012004.html.

⁴¹ A further category might include the government, for taking inadequate action to address climate change. *See, e.g.*, *Korsinsky v. EPA*, No. 05 Civ. 859(NRB), 2005 WL 2414744 (S.D.N.Y. Sept. 29, 2005); *see also infra* note 52 and accompanying text (discussing *Korsinsky*). Such an approach is also the basis for a petition filed by the Inuit against the U.S. government to the Inter-American Commission on Human Rights. Inuit Petition, *supra* note 14.

⁴² Complaint at 1, *Connecticut v. Am. Elec. Power*, 406 F. Supp. 2d 265 (S.D.N.Y. 2005) (No. 04 Civ. 5669(LAP)) [hereinafter Connecticut Complaint].

strong consumer demand for SUVs and cars with powerful engines, could a car company even have stayed in business if it produced only cars with low greenhouse gas emissions? Looking to the future, when will foreseeability and design options have progressed enough that the duty of car companies should evolve? Does the consistent lobbying of some automobile companies against national fuel emissions standards, or their opposition to California's emissions standards in court, have relevance to their potential liability? Similar questions could be posed of fossil fuel producers, utilities, and other potential defendants.

B. Potential Plaintiffs in Climate Change Litigation

The potential plaintiffs could also be divided into several categories. As the science of climate change develops, an increasing number of potential plaintiffs may be able to show harm from climate change impacts. Some of these may be property owners, such as farmers who are experiencing reduced access to water because of smaller snow-packs or coastal homeowners whose houses have been damaged by increased storm activity.⁴³ These property-owning plaintiffs may be able to base their claims in nuisance law. Others may only be users of resources—for example commercial fisherman, ski operators, or others with no direct property interest in the impacted resource they use—who nonetheless may suffer direct harm to their economic well-being. Still others' economic interests may be harmed because of disruptive reverberations in the economy. Finally, as we have already seen, state attorneys general may bring public nuisance claims on behalf of their citizens when a state's natural resources are harmed or the public health or well-being is affected.⁴⁴ We may also see health-based cases at some point if, for example, an extreme heat wave were to cause significant deaths or added health care costs in a state.⁴⁵ Tort law might treat each of these plaintiffs differently. It might allow only those with

⁴³ See, e.g., *Connecticut v. Am. Elec. Power Co.*, 406 F. Supp. 2d at 267-68 (discussing a suit brought on behalf of 77 million people for the "public nuisance" of global warming).

⁴⁴ David Grossman provides an excellent and detailed examination of potential climate change defendants and plaintiffs. Grossman, *supra* note 23, at 9-33.

⁴⁵ See, e.g., Christine Dell'Amore, *CDC: Climate Change a Health Threat*, SCIENCE DAILY, Dec. 4, 2006, <http://www.sciencedaily.com/upi/index.php?feed=Science&article=UPI-1-20061204-20520400-bc-ecowellness-climaterisk.xml> (quoting Dr. Howard Frumkin, Director of the CDC's National Center for Environmental Health, as remarking that "[c]limate change is perhaps the largest looming public health challenge we face, certainly in the environmental health field").

a property interest or only state attorneys general in states with particularized injuries to bring public nuisance claims, or, in the case of those suffering only indirect economic losses, it might allow no claim at all.

Depending on the mix of plaintiffs and defendants from the groups listed above, we might expect to see four plausible theories of liability in climate-related claims: negligence, products liability, nuisance, and public nuisance. This Article will review the duty and breach of duty in the context of each of these theories in Part III. Before assessing the potential of future claims, however, we first briefly review the tort-based climate cases that have already been filed.

C. *Climate-Based Tort Cases Filed Thus Far*

1. *Connecticut v. American Electric Power*

In *Connecticut v. American Electric Power*, eight states and the City of New York filed suit against five large fossil fuel burning utilities (allegedly the five largest emitters of greenhouse gases in the United States) and the Tennessee Valley Authority.⁴⁶ The complaint alleged that these utilities together emit 650 million tons of carbon dioxide, which is “approximately ten percent of all anthropogenic carbon dioxide emissions in the United States.”⁴⁷ The action was filed under federal common law and state law, charging public nuisance. The bulk of the complaint focused on climate change and the alleged harms from the defendants’ greenhouse gas emissions both in the past and the future.⁴⁸ The only obvious references to the utilities’ duty of care appear at the end of the complaint:

Defendants, by their emissions of carbon dioxide from the combustion of fossil fuels at electric generating facilities, are knowingly, intentionally or negligently creating, maintaining or contributing to a public nuisance—global warming—injurious to the plaintiffs and their citizens and residents.

⁴⁶ *Connecticut v. Am. Elec. Power Co.*, 406 F. Supp. 2d at 267 (naming the parties in the case). A related complaint was brought by three private land trusts against the same defendants. Complaint, *Connecticut v. Am. Elec. Power Co.*, 406 F. Supp. 2d 265 (No. 04 Civ.5670(LAP)).

⁴⁷ Connecticut Complaint, *supra* note 42, at 26.

⁴⁸ The claimed damages included, for example, decline of average annual snowfall in New England from 1953-1994, and increased loss of life from prolonged heat waves in the future. For a list of harms and potential harms, see *id.* at 28-42.

Defendants' emissions of carbon dioxide, by contributing to global warming, constitute a substantial and unreasonable interference with public rights in the plaintiffs' jurisdictions, including, *inter alia*, the right to public comfort and safety, the right to protection of vital natural resources and public property, and the right to use, enjoy, and preserve the aesthetic and ecological values of the natural world.

....

Defendants could generate the same amount of electricity while emitting significantly less carbon dioxide by employing readily available processes and technologies.

Defendants know or should know that their emissions of carbon dioxide contribute to global warming and to the resulting injuries and threatened injuries to the plaintiffs, their citizens and residents, and their environment.⁴⁹

The complaint made similar allegations under the law of each state where the utilities' plants are located, changing the wording to reflect the definition of public nuisance in each state.⁵⁰ The district court in *Connecticut v. American Electric Power* never reached the duty of care issue; it dismissed the case as presenting a nonjusticiable political question.⁵¹ The case has been appealed and is pending in the Second Circuit.

2. *Korsinsky v. United States EPA*

In *Korsinsky v. United States EPA*, the plaintiff, appearing pro se, sued the federal Environmental Protection Agency (EPA), the New York State Department of Environmental Protection and the New York City Department of Environmental Protection based on a public nuisance theory.⁵² The plaintiff alleged that the defendants contributed to climate change both by emitting carbon dioxide and by failing to implement measures that would reduce carbon dioxide. According to the court, much of the plaintiff's complaint was taken verbatim from the complaint in *Connecticut v. American Electric Power*, described

⁴⁹ *Id.* at 43-44.

⁵⁰ *Id.* at 45-49. Thus, for example, the complaint states that, for plants located in Texas, the defendant utilities "have engaged and continue to engage in intentional and/or negligent conduct that unreasonably interferes with rights common to the general public and are therefore liable under the common law of public nuisance of the State of Texas." *Id.* at 48.

⁵¹ 406 F. Supp. 2d at 274.

⁵² *Korsinsky v. EPA*, No. 05 Civ. 859(NRB), 2005 WL 2414744, at *1 (S.D.N.Y. Sept. 29, 2005).

above. The plaintiff sought an injunction preventing the defendants from continuing to pollute and requiring them to use the plaintiff's own invention to reduce GHG emissions. The case was dismissed for lack of standing because of a failure to allege a specific injury. The plaintiff had alleged that he was more sensitive to pollution than the general public and that he had developed a fear of pollution. The court argued that the injuries were either conjectural, in the case of the sensitivity to pollution, or not related to the remedies the plaintiff sought, in the case of the fear of pollution.⁵³

3. *Comer v. Murphy Oil*

Comer v. Murphy Oil was filed in April 2006.⁵⁴ Ned Comer and thirteen other individuals harmed by Hurricane Katrina brought an action against nine oil companies, thirty-one coal companies, and four chemical companies. The plaintiffs proposed a range of causes of action, including nuisance, negligence, unjust enrichment, civil conspiracy, fraudulent misrepresentation and concealment, and trespass. The claim for public and private nuisance alleged:

Defendants have willfully, wrongfully, unreasonably, unwarrantably and unlawfully used their property and conducted their business to mine, drill, manufacture, release, vent, and/or combust substances in such a way as to produce massive amounts of greenhouse gasses.

The Defendants' behavior and greenhouse gas emissions result in material annoyance, inconvenience, discomfort, injury, and/or hurt to the public and the Plaintiffs in particular⁵⁵

The claims for negligence addressed the duty issue directly, alleging that:

The Defendants had and continue to have a duty to conduct their business in such a way as to avoid unreasonably endangering the environment, public health, and public and private property, as well as the citizens of the State of Mississippi.

The Defendants breached their duties by emitting substantial quantities of greenhouse gases, knowing that such emissions would unreasona-

⁵³ *Id.* at *2.

⁵⁴ See Third Amended Complaint, *Comer v. Murphy Oil, U.S.A.*, No. 1:05-CV-00436-LTS-RHW (S.D. Miss. Apr. 18, 2006) [hereinafter *Comer Complaint*]; see also *Comer v. Nationwide Mut. Ins. Co.*, No. 1:05 CV 436 LTD RHW, 2006 WL 1066645, at *3 (S.D. Miss. Feb. 23, 2006) (dismissing without prejudice the claims against insurance companies and mortgage providers, but preserving the claims against the oil and chemical company defendants).

⁵⁵ *Comer Complaint*, *supra* note 54, at 16.

bly endanger the environment, public health, and public and private property interests.⁵⁶

The *Comer* case is currently pending a decision on the defendant's motion to dismiss.

4. *California v. General Motors Corp.*

California v. General Motors is the most recent climate tort action, filed in September 2006.⁵⁷ Brought by the California Attorney General, the suit charges that General Motors (GM) and five other major motor vehicle manufacturers committed a federal common law and state law public nuisance. According to the complaint, the defendants' vehicle emissions in the United States contribute approximately "nine percent of the world's carbon dioxide emissions," twenty percent of U.S. emissions, and thirty percent of emissions from California.⁵⁸ As the text below suggests, California alleges that, by manufacturing products defendants knew would contribute to climate change, they have breached a duty not to unreasonably interfere with public welfare. In its complaint, the state makes the following claims:

2. . . . Defendants have for many years produced millions of automobiles that collectively emit massive quantities of carbon dioxide in the United States and have thus contributed to an elevated level of carbon dioxide in the atmosphere. . . .⁵⁹

5. Damages caused by global warming are cognizable, ongoing, and increasing. Defendants are aware of the impacts and have chosen to continue to produce products that generate enormous quantities of carbon dioxide, to the detriment of California.⁶⁰

59. Defendants' emission of carbon dioxide and other greenhouse gases, by contributing to global warming, constitutes a substantial and unreasonable interference with public rights in California's jurisdiction, including, among other things, public comfort and safety, natural resources and public property, and aesthetic and ecological values.⁶¹

61. Defendants know or should have known, and know or should know, that their emissions of carbon dioxide and other greenhouse gases contribute to global warming and to the resulting injuries and

⁵⁶ *Id.* at 18.

⁵⁷ California Complaint, *supra* note 21.

⁵⁸ *Id.* at 2, 9.

⁵⁹ *Id.* at 2.

⁶⁰ *Id.* at 3.

⁶¹ *Id.* at 12.

threatened injuries to California, its citizens and residents, environment, and economy.⁶²

California primarily seeks monetary damages for expenses and damages incurred in connection with global warming. The case is currently pending a decision on the defendants' motion to dismiss.

III. DUTY OF CARE IN CLIMATE ACTIONS BASED ON NEGLIGENCE

As cases evolve from simple car accidents to more complicated negligence actions, how do courts go about determining whether the duty of care has been breached? For our purposes, we will examine four broad approaches: (1) the social utility analysis reflected in Learned Hand's *BPL* formula, (2) multifactor balancing tests, which reflect additional factors beyond *BPL*, (3) industry custom, and (4) overriding policy concerns. Each of these is analyzed below in the context of climate change litigation.

A. Risk-Utility Analysis (*BPL*)

One frequently used method for analyzing whether a defendant has acted negligently is to compare the costs of avoiding the negligent behavior with the likely damages caused by the activity. Judge Learned Hand's famous *BPL* formula, sometimes known as the "Calculus of Negligence," provides the classic example of this approach in determining whether or not to impose a duty. In *United States v. Carroll Towing Co.*, Hand proposed that tort liability for negligence should be imposed when the burden of preventing injury is less than the product of the magnitude of the injury and its likelihood ($B < P \times L$).⁶³ The main insight of this heuristic is that the duty to prevent harm is dependent on comparing the costs of avoiding damage or preventing harm with the expected damages from the activity. As stated by the *Restatement (Second) of Torts*,

[w]here an act is one which a reasonable man would recognize as involving a risk of harm to another, the risk is unreasonable and the act is negligent if the risk is of such magnitude as to outweigh what the law re-

⁶² *Id.* at 13.

⁶³ 159 F.2d 169, 174 (2d Cir. 1947) ("[T]he owner's duty, as in other similar situations, to provide against resulting injuries is a function of three variables: (1) The probability that she will break away; (2) the gravity of the resulting injury, if she does; (3) the burden of adequate precautions.").

gards as the utility of the act or of the particular manner in which it is done.⁶⁴

In determining the reasonableness of a certain action, a defendant cannot emphasize only the costs she personally faces, but must also consider the external social costs of her activity. Where the costs of avoiding large amounts of potential damages would be reasonable, a defendant has a duty to incur those costs. Where such costs would be unreasonable in light of the potential risk, the defendant is under no such duty. Under this view, a principle purpose of tort law is to maximize social utility, because where the costs of accidents exceed the costs of preventing them, the law will impose liability.⁶⁵

In the climate change context, scientific developments over the past decade have shifted, and continue to shift, each element of the *BPL* formula in the direction of liability. The identifiable risks of climate change are becoming better understood, and most of them have become more likely with greater consequences than was thought even a decade ago. In addition, new technologies are lowering the costs of pollution control equipment, carbon storage, fuel switching, and renewable and other energy alternatives.

Consider, for example, the changing views expressed by the *Economist* magazine over the past decade. In 1995, the *Economist* argued that the uncertainty over both the costs and benefits of global warming (because some areas of the world might benefit from a warmer climate), combined with the effect of discounting future costs, counseled against taking significant action to respond to climate change. The pessimistic prediction that global warming would reduce the world's income by 20% a century hence, it was argued, simply meant that "the world economy expands a little more slowly than otherwise," since "the world economy could, if recent growth continues, be over 300% bigger in 2095 than today's—and, therefore, that much better able to bear the costs of coping with climate change."⁶⁶ Asking the hard questions, such as why people should sacrifice today for a

⁶⁴ RESTATEMENT (SECOND) OF TORTS § 291 (1965).

⁶⁵ See *Pruitt v. Allied Chem. Corp.*, 523 F. Supp. 975, 978 (E.D. Va. 1981) (noting that denying liability for the Kepone pollution of the Chesapeake Bay would not serve the goal of social utility); *Wildwood Mink Ranch v. United States*, 218 F. Supp. 67, 75 (D. Minn. 1963) ("The standard of conduct which is the basis of the law of negligence is determined by balancing the risk and the probability and extent of the harm against the expediency of the course of conduct pursued."); *Md. Cas. Co. v. City of Jackson*, 493 So. 2d 955, 960 n.3 (Miss. 1986) (discussing, but not applying, Hand's analysis).

⁶⁶ *Stay Cool*, *ECONOMIST*, Apr. 1, 1995, at 11.

problem whose extent and cost remain uncertain, the *Economist* argued that

[t]here are more pressing environmental concerns such as urban smog, the spread of disease and inadequate sanitation in poor countries. Unlike global warming, these cause enormous suffering for millions of people now. And it would cost less to alleviate or even eliminate them than to reduce sharply the world's output of greenhouse gases.⁶⁷

But, eleven years later, in a special survey devoted to climate change, the *Economist* concluded just the opposite:

Since . . . five years ago, the science has tended to confirm the idea that something serious is happening. In the 1990s, satellite data seemed to contradict the terrestrial data that showed temperatures rising. The disparity puzzled scientists and fuelled scepticism. The satellite data, it turned out, were wrong: having been put right, they now agree with terrestrial data that things are hotting [sic] up. Observations about what is happening to the climate have tended to confirm, or run ahead of, what the models predicted would happen. . . .

This survey will argue that although the science remains uncertain, the chances of serious consequences are high enough to make it worth spending the (not exorbitant) sums needed to try to mitigate climate change.⁶⁸

If the *Economist* were a jury, it would have just flipped its position on climate liability after eleven years. This switch becomes more understandable by looking at each of the elements in Hand's *BPL* formula.

1. The Likelihood (*P*) and Severity of the Damage (*L*)

As suggested by the *Economist*, an emerging scientific consensus now broadly accepts that climate change is happening, is caused by human activities, and is resulting in specific injuries or will do so in the foreseeable future. For example, the Intergovernmental Panel on Climate Change (IPCC), the international body charged with periodically reviewing and reporting on the state of climate change science, concluded as early as 2001 that "most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations."⁶⁹ "Likely" is defined by the IPCC to mean

⁶⁷ *Id.*

⁶⁸ *The Heat is On*, *ECONOMIST*, Sept. 9, 2006, at 3, 6.

⁶⁹ INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE [IPCC], WORKING GROUP I, CLIMATE CHANGE 2001: THE SCIENTIFIC BASIS 10 (J.T. Houghton et al. eds., 2001)

there is a confidence level of between 66%-90%.⁷⁰ In its most recent 2007 report, the IPCC's level of certainty increased to "very likely" (i.e., greater than 90%) that human-caused increases in greenhouse gases (GHGs) were the cause of observed global warming.⁷¹

According to the IPCC, it is also "unequivocal" that the planet is now warming.⁷² Long-term climate data suggest that the planet's average surface air temperature has increased significantly since the late nineteenth century. Moreover, average global temperatures are now expected to be much higher much sooner than was predicted even a decade ago. A 2006 National Academy of Sciences report confirmed that the last few decades of the twentieth century were the warmest in the past 400 years and likely over the past 1100 years.⁷³ Eleven of the past twelve years are the warmest years on record.⁷⁴ In all, the planet has warmed by an estimated 0.76°C (1.3°F) since the mid-1800s, with warming likely over every continent except Antarctica.⁷⁵ According to the IPCC, global average temperatures are estimated to rise an additional 1.1°C to 6.4°C by the year 2100, depending on the underlying assumptions about future climate policies and the magnitude of feedback loops.⁷⁶ Such a rate of warming is very likely to have been without precedent for at least the last 10,000 years.⁷⁷

So what if the planet's temperature increases? The key issue is whether that temperature increase has an impact on human health and the environment. In 2001, the IPCC concluded that climate change was *already* having a discernible impact on many different environmental systems:

[hereinafter IPCC, 2001 SCIENTIFIC BASIS].

⁷⁰ *Id.* at 2 n.7.

⁷¹ IPCC, WORKING GROUP I, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 10 (2007), available at http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_SPM.pdf [hereinafter IPCC, 2007 PHYSICAL SCIENCE BASIS].

⁷² *Id.* at 5.

⁷³ NAT'L RESEARCH COUNCIL, NAT'L ACADEMIES, SURFACE TEMPERATURE RECONSTRUCTIONS FOR THE LAST 2,000 YEARS 3 (2006).

⁷⁴ IPCC, 2007 PHYSICAL SCIENCE BASIS, *supra* note 71, at 5.

⁷⁵ *Id.* at 5, 11; see also James Hansen et al., *Earth's Energy Imbalance: Confirmation and Implications*, 308 SCIENCE 1431, 1432 (2005) (estimating a 0.6°C to 0.7°C increase in global temperature since 1880); J. Hansen et al., NASA, Goddard Institute for Space Studies, GISS Surface Temperature Analysis: Global Temperature Trends: 2005 Summation (Dec. 15, 2005), <http://data.giss.nasa.gov/gistemp/2005> (plotting the warming trend in the global mean surface temperature since 1880).

⁷⁶ IPCC, 2007 PHYSICAL SCIENCE BASIS, *supra* note 71, at 13 tbl.SPM-3.

⁷⁷ *Id.* at 5.

Available observational evidence indicates that regional changes in climate, particularly increases in temperature, have already affected a diverse set of physical and biological systems in many parts of the world. Examples of observed changes include shrinkage of glaciers, thawing of permafrost, later freezing and earlier break-up of ice on rivers and lakes, lengthening of mid- to high-latitude growing seasons, poleward and altitudinal shifts of plant and animal ranges, declines of some plant and animal populations, and earlier flowering of trees, emergence of insects, and egg-laying in birds

. . . In most cases where changes in biological and physical systems were detected, the direction of change was that expected on the basis of known mechanisms. The probability that the observed changes in the expected direction (with no reference to magnitude) could occur by chance alone is negligible.⁷⁸

In the six years between the third and fourth IPCC reports, substantial additional evidence has confirmed a variety of negative impacts from climate change that are both widespread and profound.⁷⁹ As of 2001, satellite data show an estimated 10% loss in the extent of global snow cover since the 1960s, and ground observations suggest a reduction of about two weeks in the annual duration of lake and river ice cover in the middle and high latitudes of the northern hemisphere during the last century.⁸⁰ In 2004, the Arctic Climate Impact Assessment (ACIA) found that the Arctic was warming much more rapidly than anticipated—at nearly twice the rate of the rest of the planet.⁸¹ In Alaska and Western Canada, average winter temperatures have risen by as much as 4°F to 7°F (3°C to 4°C) over the past 50 years.⁸² The ACIA reported that, by 2100, half of the Arctic's summer sea ice and a significant portion of the Greenland Ice Sheet will have melted.⁸³ These estimates may have been too benign, as two years later the Arctic winter sea ice reached an all-time low in March 2006, with approximately 300,000 km² less than in the previous year, perhaps re-

⁷⁸ Compare IPCC, WORKING GROUP II, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION, AND VULNERABILITY 2 (2007), available at <http://www.ipcc.ch/spm13apr07.pdf>, with IPCC, WORKING GROUP II, CLIMATE CHANGE 2001: IMPACTS, ADAPTATION, AND VULNERABILITY 3 (James J. McCarthy et al. eds., 2001).

⁷⁹ For a summary of potential impacts from climate change, see DAVID HUNTER, JAMES SALZMAN & DURWOOD ZAELKE, INTERNATIONAL ENVIRONMENTAL LAW & POLICY 639-45 (3rd ed. 2006).

⁸⁰ IPCC, 2001 SCIENTIFIC BASIS, *supra* note 69, at 30.

⁸¹ SUSAN JOY HASSOL, ARCTIC CLIMATE IMPACT ASSESSMENT: IMPACTS OF A WARMING ARCTIC 8 (2004).

⁸² *Id.* at 12.

⁸³ *Id.* at 30, 33.

flecting the record high global temperatures of 2005.⁸⁴ At the current rate, some scientists now predict that the Arctic Ocean could be ice free as early as 2030.⁸⁵

The Antarctic appears to be in similar condition. The Antarctic ice sheets are melting at a rate of approximately 150 km³ per year (plus or minus 80km³), which is roughly the total U.S. water consumption over three months and is projected to result in a 0.4 mm rise in sea level each year.⁸⁶

In addition to sea level rise from reduction in polar ice caps, other significant impacts from climate change include reduced snowpack and resulting water scarcity, regional changes in the type and extent of forest cover, increased desertification, biodiversity loss, loss of permafrost, ocean acidification, and increased frequency and intensity of storm events, among others.⁸⁷ The 2007 IPCC report concludes that various impacts, including heat waves, droughts, heavy rainfalls, tropical storms, and storm surges range from “more likely than not” to “likely” to be attributable to human-induced climate change, with the probabilities for all such events increasing over the next century.⁸⁸

What then are the global costs of climate change—the *L* in the *BPL* formula? Various estimates exist and provide vastly different numbers. Most analysts put the costs at somewhere between 0% and 3% of global GDP. Nordhaus, in a widely cited analysis, has estimated the global costs at approximately 2.4% of global GDP or approximately \$30 per ton of carbon.⁸⁹ More recently, a study commissioned by the U.K. government—known as the *Stern Review* and released in October 2006—based its estimates on more recent higher estimates of global temperature increases. The *Stern Review* places the costs of climate change under business-as-usual scenarios at 5% of global GDP, with more pessimistic assumptions putting the loss at 20% of GDP by

⁸⁴ Nat'l Snow & Ice Data Ctr., *Winter Sea Ice Fails To Recover, Down to Record Low*, NDIC NEWS, Apr. 5, 2006, http://nsidc.org/news/press/20060404_winterrecovery.html.

⁸⁵ David Adam, *Meltdown Fear as Arctic Ice Cover Falls to Record Winter Low*, GUARDIAN UNLIMITED, May 15, 2006, <http://www.guardian.co.uk/science/story/0,,1774815,00.html?gusrc=rss>.

⁸⁶ EIntl. & Energy Study Inst., *Climate Change News—March 3, 2006*, <http://www.eesi.org/publications/Newsletters/CCNews/3.3.06%20CCNews.htm>.

⁸⁷ For a comprehensive table setting out the current and potential impacts of climate change, see HUNTER ET AL., *supra* note 79, at 641-43.

⁸⁸ IPCC, 2007 PHYSICAL SCIENCE BASIS, *supra* note 71, at 8, 9 tbl.SPM-2.

⁸⁹ WILLIAM D. NORDHAUS & JOSEPH BOYER, *WARMING THE WORLD: ECONOMIC MODELS OF GLOBAL WARMING* (2000).

the end of the century.⁹⁰ Assuming a global GDP of roughly \$20 trillion, the estimated annual impacts range from \$500 billion to \$4 trillion.⁹¹

Those who follow the climate change debate have become accustomed to long lists of potential impacts (and in fact may have become rather inured to them), but tort litigation forces the courts, defendants, and others to focus on these impacts more closely, particularly as they relate to specific plaintiffs or categories of plaintiffs.⁹² The IPCC's willingness to state that increases in temperature are more than 90% likely to be caused by human activities and that such increases are already having discernible impacts not only supports causation in a tort case, but also responds generally to the *BPL* formula. The likelihood is high and the potential impacts are severe. The IPCC's practice of bounding its statements with probabilities is also helpful to litigants in climate change cases.

Although the IPCC's periodic reviews of the climate change science and the economic estimates of total costs are important, the growing research on particularized impacts in specific geographic regions is just as important for specific tort cases. Thus, for example, both the Connecticut and California complaints necessarily emphasize impacts specific to their states or regions.

The complaint in *Connecticut v. American Electric Power*, for example, highlights regional impacts, such as reduced snowpack and ice; increased loss of life and public health threats from heat-related illnesses and smog; impacts on the San Francisco Bay, Jamaica Bay National Wildlife Refuge, and other coastal resources from storm surges

⁹⁰ See NICHOLAS STERN, *THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW*, at xv (2007). A prepublication version of the *Stern Review* is available at http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm.

⁹¹ These macro-estimates of future impacts from climate change are controversial and could either under- or overestimate actual costs significantly. For example, most of these estimates fail to consider impacts of climate change on animals. See Wayne Hsiung & Cass R. Sunstein, *Climate Change and Animals*, 155 U. PA. L. REV. 1695, 1739-40 (2007) (noting the failure of most analysts to include loss of animals in costs of climate change and placing the worldwide value of such loss at between \$1.1 and \$2.8 trillion annually); see also Kate Galbraith, *The Trillion-Dollar Question*, GRIST, Nov. 16, 2005, <http://www.grist.org/news/maindish/2006/11/16/galbraith> (describing different estimates for the cost of climate change).

⁹² See, e.g., David Hunter, *The Implications of Climate Change Advocacy for International Environmental Law-Making*, in *ADJUDICATING CLIMATE CHANGE: SUB-NATIONAL, NATIONAL AND SUPRA-NATIONAL APPROACHES* (William C.G. Burns & Hari M. Osofsky eds., forthcoming 2007).

and permanent sea level rise;⁹³ lower water levels in the Great Lakes;⁹⁴ increased temperatures in the upper surfaces of the Great Lakes;⁹⁵ and rapid declines in forest resources, including New York's Adirondack State Park.⁹⁶

Similarly, the complaint in *California v. General Motors* described the following harms from climate change:

Right now, global warming is harming California, its environment, its economy, and the health and well-being of its citizens. . . . Human-induced global warming has, among other things, reduced California's snow pack (a vital source of fresh water), caused an earlier melting of the snow pack, raised sea levels along California's coastline, increased ozone pollution in urban areas, increased the threat of wildfires, and cost the State millions of dollars in assessing those impacts and preparing for the inevitable increase in those impacts and for additional impacts.⁹⁷

The California complaint subsequently details the impacts of global warming and specifies costs California is already incurring to respond to global warming. These impacts include, for example, a decline in snowpack in the Sierra Nevadas due to an increase in average winter temperatures; the costs of rebuilding levees to prevent sea water infiltration and other impacts of sea level rise from affecting the Sacramento Bay-Delta; increased floods from earlier spring runoffs; and beach preservation efforts to reverse increased beach erosion from sea level rise.⁹⁸

As these complaints indicate, unlike even a decade ago, strong evidence today links climate change to specific anticipated impacts at the local or state level. This understanding supports moving the debate over climate policy from general policy debates to case-specific adjudications over identifiable harms. As these types of regional impacts become better known and studied and buttressed by the stronger consensus findings expected to be reflected in the Fourth IPCC Assessment, the causal link between human activities, increased temperatures, changing climate, and specific impacts to identifiable litigants will be more clearly demonstrated. Put another way, the probability (and thus foreseeability) of specific damage caused by cli-

⁹³ Connecticut Complaint, *supra* note 42, at 30-33.

⁹⁴ *Id.* at 34-36.

⁹⁵ *Id.* at 36-37.

⁹⁶ *Id.* at 38.

⁹⁷ California Complaint, *supra* note 21, at 1-2.

⁹⁸ *Id.* at 10-12.

mate change is increasingly being documented. This will not only allow for stronger arguments on causation but will also satisfy two prongs of the *BPL* formula—the probability of harm (*P*) and the severity of the harm (*L*)—and, thus, will strengthen plaintiffs’ cases for a breach of the duty of reasonable care.

2. Burden or Cost of Avoiding Harm (*B*)

At the same time the probability of serious injury from climate change is increasing, the costs of reducing carbon emissions are also decreasing. Over time, the efficiency of the economy is increasing, as measured by the carbon intensity or amounts of carbon emitted per dollar of GDP produced. From 1990 to 2002, for example, carbon intensity was reduced 17% in the United States and 15% on average among the twenty-five countries with the highest emissions levels.⁹⁹ Carbon intensity is dependent on fuel mix and energy-use efficiency. Particularly in the absence of regulatory mandates, declines in carbon intensity suggest that either through fuel switching, new methodologies, new technologies, or similar changes, the economy is becoming increasingly carbon efficient.

Related trends can be seen throughout the energy sector. The costs of alternative energy sources, such as wind and solar power, are dropping steadily and are becoming increasingly competitive. Costs of wind power have declined substantially—more than 80% over the past twenty years.¹⁰⁰ Installed costs of solar power have dropped 5% per year over the past decade.¹⁰¹ Similarly, in the automobile industry, new technologies, such as hybrid vehicles, have increased efficiency at affordable costs. Fuel switching is also available to the transport system, with a growing percentage of road transport being run by natural gas (3%) or biofuels (0.5%).¹⁰²

Clearly, many efficient technologies now exist and are increasingly cost effective. One survey of seventy-four companies from eighteen sectors in eleven countries, for example, found GHG emission reductions of up to 60% with total gross cost *savings* of \$11.6 billion (mostly

⁹⁹ KEVIN A. BAUMERT ET AL., NAVIGATING THE NUMBERS: GREENHOUSE GAS DATA AND INTERNATIONAL CLIMATE POLICY 25, 26 & fig.5.1 (2005).

¹⁰⁰ John Carey et al., *Alternate Power: A Change Is in the Wind*, BUS. WK., July 4, 2005, at 36, 37; see also AM. WIND ENERGY ASSOC., THE MOST FREQUENTLY ASKED QUESTIONS ABOUT WIND ENERGY 6 (2002), <http://www.awea.org/pubs/documents/FAQ2002%20-%20web.pdf>.

¹⁰¹ Carey et al., *supra* note 100, at 37.

¹⁰² BAUMERT ET AL., *supra* note 99, at 63.

because of reduced energy costs).¹⁰³ In fact, considerable progress on addressing climate change can be achieved simply through the dissemination and “scaling up” of technologies and practices that are already well known. Princeton researchers Stephen Pacala and Robert Socolow, for example, have devised a portfolio of what they call “stabilization wedges”—technological or policy innovations that would make significant progress toward reducing GHG emissions.¹⁰⁴ To achieve an overall goal of stabilizing GHG emissions at levels “less than double the pre-industrial concentration,” Pacala and Socolow estimated that, in fifty years, the global economy will have to emit seven billion tons of carbon per year less than what current trends suggest is a “business-as-usual trajectory.”¹⁰⁵ They divide the needed reductions in GHG emissions into seven equal “stabilization wedges,” each representing one billion tons of reductions per year in carbon emissions by 2054. They then list fifteen policy options that could yield the equivalent of a “stabilization wedge” of reductions (i.e., a one-billion-ton reduction per year).¹⁰⁶ Each of Pacala and Socolow’s wedges involves technologies *already commercialized* somewhere in the world. These wedges include reliance on alternative energy fuels such as wind power and photovoltaics, nuclear power, and other carbon-free fuels; carbon capture and storage technologies; and increased efficiency of fossil fuel use.

What, then, are the costs of addressing climate change? Estimates have varied, although most put the costs of stabilizing GHG emissions at safe levels at up to 1% of the global economy.¹⁰⁷ This is a staggering amount, except when it is compared to the estimated costs of climate change. As noted above, most estimates put the costs of climate change at just under 3% of the global economy (three times as much), with more recent estimates ranging from 5% to 20%.¹⁰⁸

¹⁰³ CLIMATE GROUP, *supra* note 8, at 3.

¹⁰⁴ Stephen Pacala & Robert Socolow, *Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies*, 305 SCIENCE 968, 968 (2004); see also Robert H. Socolow & Stephen W. Pacalaw, *A Plan To Keep Carbon in Check*, SCI. AM., Sept. 2006, at 50, 50-57 (describing fifteen stabilization wedges).

¹⁰⁵ Pacala & Socolow, *Stabilization Wedges*, *supra* note 104, at 968.

¹⁰⁶ *Id.* at 968-69.

¹⁰⁷ See Energy Info. Admin., Comparing Cost Estimates for the Kyoto Protocol (1998), <http://www.eia.doe.gov/oiaf/kyoto/cost.html> (“All the studies project irreducible losses to the economy that small (less than 1 percent GDP in 2010 and 2020) . . .”).

¹⁰⁸ *Supra* text accompanying notes 89-90.

For purposes of analyzing a specific climate change claim, the *BPL* formula may be less about global costs and benefits and more about the costs and benefits present in a specific case. The complaints filed thus far have recognized this, focusing on the steps that are available to the specific defendants to reduce their climate impact. Thus, for example, in the *Connecticut v. American Electric Power* complaint, the attorneys general allege:

Defendants have available to them practical, feasible and economically viable options for reducing carbon dioxide emissions without significantly increasing the cost of electricity to their customers. These options include changing fuels, improving efficiency, increasing generation from zero- or low-carbon energy sources such as wind, solar, and gasified coal with emissions capture, co-firing wood or other biomass in coal plants, employing demand-side management techniques, altering the dispatch order of their plants, and other measures.¹⁰⁹

Later, the attorneys general assert that “[d]efendants could generate the same amount of electricity while emitting significantly less carbon dioxide by employing readily available processes and technologies.”¹¹⁰

An incomplete, though instructive, back-of-the-envelope method to assess costs is to price the emissions reductions sought in the climate complaints. The Connecticut complaint, for example, seeks an injunction to require the utility companies to cap their emissions (allegedly 650 million tons per year) and then to reduce them by some set amount each year. If we assume reductions of 7% (arbitrarily set at the level of reduction to which the United States would have committed under the Kyoto Protocol¹¹¹), then companies would be asked to reduce their emissions by 45 million tons each year. If one uses current carbon market prices in Europe and the United States, this would cost the utilities in total from \$180 to \$450 million per year (based on the oversimplified assumption that the current range of carbon costs—\$4 per ton in the Chicago Climate Exchange to \$18 per ton in the European Climate Exchange—would remain un-

¹⁰⁹ Connecticut Complaint, *supra* note 42, at 2.

¹¹⁰ *Id.* at 44. Although the Connecticut and California complaints are based on public nuisance theories (and not negligence), the complaints are nonetheless instructive for negligence-based analyses.

¹¹¹ See Kyoto Protocol to the United Nations Framework Convention on Climate Change, Annex B, Dec. 11, 1997, *available at* <http://unfccc.int/resource/docs/convkp/kpeng.pdf>. Note that the Kyoto Protocol requires reductions from a 1990 baseline. We have not attempted to adjust for any increase in the utilities' baseline emissions since 1990.

changed).¹¹² If divided equally among the five Connecticut defendants, the cost per defendant would have been \$36 to \$162 million.

Similar calculations could also be made with respect to the defendant automobile companies named in the California complaint. According to the complaint, the defendants' automobile emissions in California amount to just under 300 million tons per year. Assuming that a reasonable automobile manufacturer would meet the 4% annual increase in fuel efficiency recommended by the Energy Security Leadership Council,¹¹³ the costs would be \$48 to \$120 million in the first year (assuming again that offsets were purchased as opposed to reductions in emissions).¹¹⁴ Estimates vary on what the costs would be for meeting the increased efficiency standards, with some suggesting that the costs of efficient vehicles would be lower than the average vehicle costs in 2010,¹¹⁵ while others price the welfare costs associated with increased fuel efficiency standards at \$3.6 billion per year (to obtain a 10% decrease in fuel consumption).¹¹⁶

We should make it clear that these estimates are based on several oversimplified assumptions (e.g., market price of carbon will not

¹¹² The price of carbon in the European market has fluctuated substantially, ranging from 1 to 33 euros per ton. The price for 2007 carbon credits crashed because of an unexpected surplus. Emmanuel Angeley, *No Cheers in Carbon Market as Kyoto Protocol Heads for Second Birthday*, ENERGY DAILY, Feb. 14, 2007, http://www.energy-daily.com/reports/No_Cheers_In_Carbon_Market_As_Kyoto_Protocol_Heads_For_Second_Birthday_999.html. We have used the vintage 2008 price as of February 16, 2007. See European Climate Exchange, <http://www.europeanclimateexchange.com> (last visited May 1, 2007) (providing historic market data for carbon credits). The U.S. carbon price is based on the Chicago Climate Exchange's price quote for a ton of carbon. See Chicago Climate Exchange, <http://www.chicagoclimatex.com> (last visited May 1, 2007).

¹¹³ ENERGY SEC. LEADERSHIP COUNCIL, RECOMMENDATIONS TO THE NATION ON REDUCING U.S. OIL DEPENDENCE 8 (2006), available at http://www.secureenergy.org/reports/ESLC_Oil_Report.pdf; see also Fuel Economy Reform Act, S. 3694, 109th Cong. § 4(a)(2)(C) (2006) (enacted) (requiring fuel efficiency standards to be increased by 4% per year between 2009 and 2011).

¹¹⁴ Note that computing the total social cost for fuel-efficiency increases is complex, because consumers would save money from lower fuel usage. For example, over twenty years, a 4% per-year improvement in fuel efficiency would save consumers approximately \$1.4 trillion at the pump by 2028. Press Release, Sen. Joseph R. Biden, Jr., Senators Laud Energy Security Leadership Council Call for Increase in Fuel Economy Standards (Dec. 13, 2006) (on file with author).

¹¹⁵ Am. Council for an Energy-Efficient Econ., Vehicle Fuel Economy Standards: Big Energy Savings at a Modest Cost, <http://www.aceee.org/energy/cape.htm> (last visited May 1, 2007).

¹¹⁶ CONG. BUDGET OFFICE, THE ECONOMIC COSTS OF FUEL ECONOMY STANDARDS VERSUS A GASOLINE TAX 16 (2003), available at <http://www.cbo.gov/showdoc.cfm?index=4917&sequence=1&from=0>.

change in the face of increased demand), but they do provide first-order estimates for the costs of avoiding the negligent behavior (i.e., emissions beyond Kyoto-level reductions). The point is not to develop a precise estimate of the compliance costs, but to show that a *BPL* inquiry is possible and that the likely costs of avoidance may in some cases be less than the likely damages from climate change. Under Hand's formula, a defendant's failure to take those steps could be considered a breach of her duty to act reasonably under the circumstances.

More importantly, trends in carbon intensity and in the declining cost of renewables and other green technologies mean that the cost of addressing climate change is declining over time. This suggests that, in future cases, the burden of avoiding harm will be lower than today, making the imposition of liability more likely.

B. *Multifactor Test*

Despite the attractive simplicity of the *BPL* calculus, in practice, no simple formula exists to determine the duty of care. Rather, according to Prosser and Keeton, courts generally balance a range of considerations:

It is therefore not surprising to find that the problem of duty is as broad as the whole law of negligence, and that no universal test for it ever has been formulated. . . . "[D]uty" is not sacrosanct in itself, but is only an expression of the sum total of those considerations of policy which lead the law to say that the plaintiff is entitled to protection.

. . . .

. . . [A]s our ideas of human relations change the law as to duties changes with them.¹¹⁷

Dissatisfied with such a vague formulation, Prosser and Keeton go on to list factors that courts have considered in determining the duty of care, including convenience of administration, capacity of parties to bear the loss, preventing future injuries, moral blame attached to the wrongdoer, and other considerations. Courts have come up with additional factors, such as this list from a 1981 California case, where the court held that the duty turns on

(1) foreseeability of harm to plaintiff; (2) degree of certainty that plaintiff suffered injury; (3) closeness of connection between defendant's

¹¹⁷ KEETON ET AL., *supra* note 24, at 357-59 (footnotes omitted).

conduct and injury suffered; [(4)] moral blame attached to defendant's conduct; (5) policy of preventing future harm; (6) extent of burden to the defendant and the consequences to the community of imposing a duty to exercise care with resulting liability for breach; and (7) availability, cost, and prevalence of insurance for the risk involved.¹¹⁸

Several of these factors are essentially the same as those found in the *BPL* analysis above, but others require additional analysis.

1. Foreseeability of Harm to Plaintiff

As suggested by the discussion above regarding the likelihood of severe climate impacts, the foreseeability of harm from carbon emissions is becoming clearer over time.¹¹⁹ Most scientific studies now predict rising temperatures and direct impacts from them—such as reduced snowpack, glaciers, and polar ice caps—which are easily understood and, thus, easily considered foreseeable impacts. The indirect types of harm resulting from the interaction between rising temperatures and other factors are arguably less foreseeable, but even these are now widely anticipated. Examples include tropical storms, hurricanes, and their resulting storm surges.¹²⁰

If many of these general impacts are currently foreseeable, two questions remain less clear. Are any *specific* injuries foreseeable—for example the impacts of specific storm surges or hurricanes—and *when* did such foreseeability arise? Courts will need to answer both questions in order to impose liability on defendants who are not currently taking steps to mitigate their climate impacts or did not begin taking concrete actions until well after the resulting injury was foreseeable. Although a jury could reasonably find that the injury from climate change generally has been foreseeable for a decade or more,¹²¹ as noted above, the ability to attribute specific weather events or other current impacts to climate change varies considerably depending on the circumstances.

¹¹⁸ *Vu v. Singer Co.*, 538 F. Supp. 26, 29 (N.D. Cal. 1981).

¹¹⁹ See *supra* text accompanying note 68.

¹²⁰ The IPCC concluded that it is “more likely than not” that human-induced climate change has already contributed to such events and that more such human events are “likely” or “very likely” in the future. IPCC, 2007 PHYSICAL SCIENCE BASIS, *supra* note 71, at 9 tbl.SPM-2; see also Sandra Fleishman, *Sea Change in Insurers' Coastal Coverage*, WASH. POST, Dec. 30, 2006, at F1 (reporting that insurers are declining to insure coastal homes because of “predictions that more strong hurricanes will strike the coast”).

¹²¹ See *infra* text accompanying note 124 (providing a timeline of global warming predictions and observations).

2. Degree of Certainty That Plaintiff Suffered Harm

This is the *P* in the *BPL* formula discussed in Part III.A.1 above. As was noted above, the probability of damages occurring due to climate change is being increasingly documented over time, which will strengthen a plaintiff's ability to show that she was likely to be harmed.

3. Closeness of Connection Between Defendant's Conduct and Injury Suffered

Although included in the factors relating to a breach of duty, this factor is better considered as either one of proximate causation or just an additional aspect of the foreseeability of harm discussed above. Climate change impacts can be remote in both time and geography from where the emissions occur. Moreover, any single defendant's current emissions mix in the atmosphere with the emissions from the climate-altering activities of other parties. A particular defendant's contribution to climate change will usually be the cause of only a relatively small part of the damage.¹²² Complicating matters even further is that today's climate changes are caused by a mixture of the defendant's current emissions and past emissions. This factor is a problematic one for climate plaintiffs, although the issue is probably best analyzed in terms of proximate causation.¹²³

4. Moral Blame Attached to Defendant's Conduct

The moral blame attached to the defendant's conduct relates to factors such as the defendant's knowledge, at the time of the defendant's actions, of the potential impacts of the defendant's conduct; discrepancies between the defendant's conduct and the conduct of similarly situated companies; and the degree to which the defendant's conduct was reckless or intentionally dismissive of potential risks. Viewed in this light, the relative moral blame that can be attached to a set of defendants is likely to change over time. Conduct and products

¹²² *But see* Press Release, *supra* note 40 (calculating that ExxonMobil and its corporate ancestors have caused approximately 5% of global emissions over the past 120 years).

¹²³ Prosser and Keeton are explicit about the convergence between duty analysis and proximate causation: "There is little analysis of the problem of duty in the courts. Frequently it is dealt with in terms of what is called 'proximate cause,' usually with resulting confusion. In such cases, the question of what is 'proximate' and that of duty are fundamentally the same" KEETON ET AL., *supra* note 24, at 358.

linked to significant GHG emissions in the 1970s or 1980s would likely be viewed differently in 2006. The perspective on such practices and products changes as science clarifies the threat GHG emissions present to the planet's climate. Although no precise date can be set for when a company's failure to begin to respond to climate change becomes "immoral" or "unreasonable," a timeline of key dates can be helpful in understanding where such a date might be placed by the courts—or, more precisely, by juries.

Figure 1: Climate Change Law and Policy Timeline¹²⁴

Year	Events
1827	Jean-Baptiste Fourier suggests the existence of an atmospheric "greenhouse" effect keeping the Earth warmer than it would otherwise be.
1890s	Swedish scientist Svante Arrhenius and American P.C. Chamberlain independently argue that increasing concentrations of atmospheric carbon dioxide from the burning of fossil fuels could lead to global warming.
1957	U.S. oceanographer Roger Revelle warns that people are conducting a "large-scale geophysical experiment" on the planet by releasing GHGs. Colleague David Keeling establishes the first continuous monitoring of atmospheric carbon dioxide levels and finds regular annual increases.
1979	The First World Climate Conference calls on governments "to foresee and prevent potential man-made changes in climate."
1985	The first major international conference on the greenhouse effect at Villach, Austria, warns that GHGs will "in the first half of the next century, cause a rise of global mean temperature which is greater than any in man's history" and that sea levels could rise by up to a meter.
1987	The warmest year on record. The 1980s are the warmest decade recorded to date, with seven of the eight warmest years recorded up to 1990.

¹²⁴ Figure 1 was adapted, with minor edits, from Green House Network, Climate Change: Timeline, available at <http://www.greenhousenet.org/resources/timeline.html> (last visited May 1, 2007). An entry has been added for 2005 by the authors.

- 1988 Dr. James Hansen of NASA tells a congressional hearing that “global warming is at hand.” A meeting of climate scientists in Toronto subsequently calls for 20% cuts in global carbon dioxide emissions by the year 2005. The U.N. sets up the IPCC to analyze and report on scientific findings.
- 1990 The IPCC’s first report finds that the planet has warmed by 0.5°C in the past century. The IPCC warns that only strong measures to halt rising greenhouse gas emissions will prevent serious global warming.
- 1992 The U.N. Framework Convention on Climate Change, signed by 154 nations in Rio, seeks to prevent “dangerous” warming from greenhouse gases and sets an initial nonbinding target of reducing emissions from industrialized countries to 1990 levels by the year 2000.
- 1995 The IPCC’s second report concludes that current warming “is unlikely to be entirely natural in origin” and that “the balance of evidence suggests a discernible human influence on global climate.” The report predicts global warming by the year 2100 will be between 1°C and 3.5°C.
- 1999 Scientists, reconstructing the global climate for the last 1000 years, using weather records, tree rings, coral, and ice-core readings, declare that the decade of the 1990s is the hottest in at least the last millennium.
- 2002 The United States’s Climate Action Report 2002 warns of the substantial disruption of snow-fed water supplies, the loss of coastal and mountain ecosystems, and more frequent heat waves. The trilateral North American Commission for Environmental Cooperation calls for “immediate action” to tackle greenhouse gases. 2002 is the second hottest year ever recorded.
- 2005 The Kyoto Protocol enters into force, requiring most industrialized countries to make cuts in their GHG emissions. Hurricane Katrina devastates New Orleans and two separate studies link global warming to the increased intensity and frequency of hurricanes.

To argue that a defendant should be morally blamed for its contribution to climate change, and thus that conduct ignoring climate change impacts has been unreasonable, arguably requires placing the defendant’s conduct in the context of what was known or suspected

about climate change at the time. Perhaps a plan to expand oil development or coal-fired utilities or to market inefficient SUVs was not blameworthy or “unreasonable” in 1990. But what about 2000? Or 2005? Given the emerging understanding of climate change, determining what an appropriate response should have been at any specific time is difficult. It is, in fact, a subjective judgment about reasonableness—one that usually is left, in the tort context, to juries. Although a judge might declare allegations of defendants’ conduct before 1990 to be non-negligent as a matter of law, after that point the determination would seem to be better left to juries. And certainly a reasonable jury could determine that a company (such as TXU, discussed later in this Article) that openly plans to increase its dependence on coal and anticipates significantly expanded and unmitigated climate impacts is behaving unreasonably given the state of knowledge in 2007.

Contributing to an analysis of the moral blameworthiness in many tort cases is the degree of the defendant’s recklessness or intention in undertaking the risky activity. In the case of climate change, almost all of the potential corporate defendants are acting deliberately or intentionally in ways they know contribute to climate change. Most utilities, energy companies, and automobile manufacturers have either made public pronouncements or taken policy steps that show they are aware of climate change threats and of their contribution to the problem.¹²⁵

Moreover, at least some GHG emissions are likely an inherent outcome of the defendant’s activity (for example, emissions from automobiles or from utilities). For a negligence theory, at least, the key inquiry may be what level of emissions is reasonable—or at what point did it become (or will it become) unreasonable to expand GHG emissions or other climate-changing activities without taking effective mitigation steps. In this regard, the issue of moral blameworthiness may be made in reference to the specific defendant’s behavior as compared to industry custom.¹²⁶ For example, is the defendant’s greenhouse gas intensity (i.e., the amount of emissions per unit of output) significantly higher than those of other similar defendants in the industry? A host of other factors may also be relevant to future inquiries into the moral blameworthiness or unreasonableness of a defendant’s climate-changing activities, including the following:

¹²⁵ See Connecticut Complaint, *supra* note 42, at 44 (alleging that defendant utilities knew or should have known of the risks posed by GHG emissions).

¹²⁶ For a discussion of the application of industry custom, see *infra* Part III.C.

- Marketing a product (for example, an automobile) that is particularly inefficient.
- Planning a large expansion of electricity generation from coal-fired power plants without budgeting for any mitigation steps.
- Taking preventive measures in foreign operations (where they may be subject to climate-related regulations) while continuing to operate without such measures here.¹²⁷
- Making public statements or issuing policies that appear climate friendly but do not reflect actual operations.¹²⁸
- Reducing research and development budgets or slowing deployment of more carbon-efficient technologies or products.
- Issuing or promoting misinformation about climate change that the company knows or reasonably should have known is false.¹²⁹
- Withholding studies or information that would increase our understanding of climate change.
- Destroying climate change related documents.¹³⁰

¹²⁷ Oleszkiewicz & Sanders, *supra* note 23 at 2369 (“[A]s legal requirements become a reality for defendants with operations in jurisdictions outside the United States, plaintiffs will have additional opportunities to point to discrepancies in a defendant’s U.S. and foreign operations and to demonstrate that change is possible.”).

¹²⁸ *Compare* Advertisement, ExxonMobil, Let’s Talk About Climate Change, N.Y. TIMES, Feb. 14, 2007, at A7 (acknowledging global warming and its impact on ecosystems, and presenting ExxonMobile as a partner in the global efforts to develop policy responses), with Clifford Krauss & Jad Mouawad, *Exxon Chief Cautions Against Rapid Actions To Cut Carbon Emissions*, N.Y. TIMES, Feb. 14, 2007, at C3 (reporting (in the very same paper) ExxonMobil’s statement that it continues to oppose broad policy responses to climate change).

¹²⁹ At least until recently, ExxonMobil both refused to acknowledge global warming and provided financial support to several organizations that strongly oppose any response to climate change. See ExxposeExxon, *Why ExxonMobile?*, <http://www.exxposeexxon.com/whyexxon.html> (last visited May 1, 2007) (publicizing ExxonMobil’s poor environmental record).

¹³⁰ Consider in this regard, the advice given to potential climate defendants by Oleszkiewicz & Sanders:

Despite the uncertainties, it may not be too early to prepare for the possibility of litigation. Next steps for potential defendants may include a preliminary risk assessment of their exposure to litigation and potential defenses, an evaluation of public statements to date regarding greenhouse gas emissions and climate change, an assessment of any disconnect between public or official policies and operations, and the implementation of an internal document management program to review greenhouse gas and climate change related documents consistent with already existing document retention policies.

Oleszkiewicz & Sanders, *supra* note 23 at 2372.

Although it may be impossible to say for certain whether a jury would consider the behavior mentioned above unreasonable under today's circumstances, such behavior arguably becomes less reasonable over time as our understanding of the impacts of climate change develops.

5. Policy of Preventing Future Harm

Tort law is partly designed to deter unreasonably risky conduct. Tort liability not only deters the behavior of specific defendants, but also of similarly situated defendants. Preventing or mitigating future climate change impacts has, in fact, been a key motivation for the lawsuits that have been filed thus far. The state attorneys general and land trusts in *Connecticut v. American Electric Power* have not sought any compensatory damages, but only to enlist the court's injunctive powers to help reduce future climate impacts by reducing defendants' emissions. Granting the relief sought in *Connecticut v. American Electric Power* would not only appreciably reduce future GHG emissions from the specific defendants, but it would also reverberate significantly through other industries and even in other countries. In fact, just the filing of these climate-based tort cases is already having a deterrent effect, as concerns over "litigation risk" are increasingly shaping deliberations over corporate climate policies.¹³¹

6. Extent of Burden to the Defendant and the Consequences to the Community of Imposing a Duty To Exercise Care with Resulting Liability for Breach

This factor is in essence the *B in the Hand* formula and is discussed above.¹³² As noted previously, while some estimates of the costs of addressing climate change are high, those costs are decreasing over

¹³¹ See, e.g., John Carey & Lorraine Woellert, *Global Warming: Here Come the Lawyers*, BUS. WK., Oct. 30, 2006, at 34, 36 (quoting a corporate lawyer who states that that, in the wake of recently filed lawsuits, he now "advises corporate clients that they need to take 'reasonable' steps to pare back emissions to reduce their legal exposure"). The preventative impact of climate-based litigation can be seen in the indirect effect of *Northwest Environmental Defense Center v. Owens Corning Corp.*, 434 F. Supp. 2d 957 (D. Or. 2006). Although the case was not a tort action, Owens Corning scrapped its planned polystyrene manufacturing facility after losing a standing challenge to an action brought by environmental groups partly on the grounds that the facility would contribute substantially to climate change. Katherine Trevison, *Owens Corning Backs Out of Gresham Plant*, OREGONIAN, May 9, 2006, at D1.

¹³² See *supra* Part III.A.2.

time. In addition, some estimates indicate that, however high the costs of addressing climate change might be, the costs of inaction may be higher.

7. Availability, Cost, and Prevalence of Insurance for the Risk Involved

Some courts consider the availability of insurance for risks as a means of spreading the costs of tort liability. Thus, for example, if a demolition company caused injury to a neighboring building, the availability of insurance would be relevant as a way of shifting the costs of that particular injury to the entire industry (through the premium rates charged by the insurance company). The availability of insurance for the plaintiffs to cover their losses may also be relevant.¹³³

The insurance industry has long been conscious of the significant impact that climate change may have on its business. For many years, insurance companies have taken climate change into account in determining insurance coverage and premiums. To insurance companies, at least, the future impacts of climate change are foreseeable and serious. This is making some insurance for climate-related impacts more difficult to obtain or more expensive. For example, many insurance companies are reducing their coverage for new home buyers in coastal areas susceptible to hurricanes.¹³⁴

C. Industry Custom

An alternative approach to analyzing negligence compares the defendant's activity to the industry's customary practice.¹³⁵ As the *Restatement (Second)* describes, customs and common practices, while not

¹³³ For further discussion of how this consideration pertains to the effects of climate change, see generally Michael G. Faure, *Insurability of Damage Caused by Climate Change: A Commentary*, 155 U. PA. L. REV. 1875 (2007); Howard C. Kunreuther & Erwann O. Michel-Kerjan, *Climate Change, Insurability of Large-scale Disasters, and the Emerging Liability Challenge*, 155 U. PA. L. REV. 1795 (2007).

¹³⁴ See Fleishman, *supra* note 120 (reporting that insurers are declining to insure coastal homes because of "predictions that more strong hurricanes will strike the coast"); *Reaping the Whirlwind*, ECONOMIST, Sept. 9, 2006, at 9, 10 (describing a withdrawal by insurance providers from hurricane-prone markets); *Morning Edition: Allstate Pulls Back from Insuring Coastal Homes* (NPR radio broadcast Dec. 11, 2006), available at <http://www.npr.org/templates/story/story.php?storyId=6607675> (indicating that threats from increased storm damage due to climate change have caused Allstate to discontinue homeowner's insurance policies in several mid-Atlantic states).

¹³⁵ A comparison to industry custom or practice is also relevant to moral blameworthiness. See *supra* text accompanying notes 125-130.

controlling, should be taken into account unless a reasonable person would not follow them:

Evidence of the custom is admissible, and is relevant, as indicating a composite judgment as to the risks of the situation and the precautions required to meet them, as well as the feasibility of such precautions, the difficulty of any change in accepted methods, the actor's opportunity to learn what is called for, and the justifiable expectation of others that he will do what is usual, as well as the justifiable expectation of the actor that others will do the same. If the actor does what others do under like circumstances, there is at least a possible inference that he is conforming to the community standard of reasonable conduct¹³⁶

One can readily see why this doctrine might be significant for climate defendants. All the major car companies, for example, rely on internal combustion engines and sell relatively inefficient sports utility vehicles. Setting the duty of care at the standard of uniform industry practice, however, is not automatic.

No group of individuals and no industry or trade can be permitted, by adopting careless and slipshod methods to save time, effort, or money, to set its own uncontrolled standard at the expense of the rest of the community. If the only test is to be what has always been done, no one will ever have any great incentive to make any progress in the direction of safety.¹³⁷

Thus, compliance with custom may only be effective as a defense if the custom is itself reasonable.

Moreover, industry customs and standards are not static. They evolve over time as technological and scientific understandings shift. As an example, consider the case of crash barriers on roads in Washington. In 1928, in *Davison v. Snohomish County*,¹³⁸ the Washington Supreme Court ruled that a municipality was under “no duty to erect barriers sufficient to prevent automobiles traveling at a high rate of speed from crashing through.”¹³⁹ The automobile was just coming into widespread use and many roads, which had been designed with the horse and buggy in mind, were not designed to protect against automobile accidents. The court noted that barriers sufficiently strong to keep cars from running off of a bridge were not technically

¹³⁶ RESTATEMENT (SECOND) OF TORTS § 295A cmt. b (1965).

¹³⁷ *Id.* at cmt. c; *see also* *The T.J. Hooper*, 60 F.2d 737, 740 (2d Cir. 1932) (dismissing custom as being dispositive in determining the proper standard of care).

¹³⁸ 270 P. 422 (Wash. 1928).

¹³⁹ *Bartlett v. N. Pac. Ry. Co.*, 447 P.2d 735, 737 (Wash. 1964) (describing the holding in *Davison*).

feasible at the time.¹⁴⁰ Forty years later, because engineering and other technology had made it more feasible and cost effective to add guard rails, the Washington Supreme Court expressly found the lack of such barriers to be the basis for negligence and ruled, referencing the earlier case, that “ideas of the court, expressed 40 years ago . . . [are not] necessarily authoritative on the engineering and financial phases of the same problem today.”¹⁴¹

In the climate context, the duty expected from those who emit carbon may also be changing, particularly as new technologies become available. In the future, inquiries into the negligence of defendants may focus on their relative climate impact when compared to others in the same industry. According to Innovest’s Carbon Disclosure Project, every industry sector has leaders and laggards with respect to climate change. Although not a direct indicator, Innovest’s CarbonBeta analysis evaluates each company’s sensitivity to future carbon regulation and then compares it to that of other companies within the same industry sector. The results show a significant disparity within industry groups. For example, the most exposed North American electrical utilities will face twenty times as much cost (measured as a percentage of operating income) as the least exposed company, under certain uniform assumptions about future regulation of GHGs.¹⁴² Relative exposure to carbon regulation risk suggests differences in the companies’ approach to GHGs—for example, differences in fuel mix, carbon efficiency, or product mix. The analysis suggests that alternative approaches to reducing GHG emissions (i.e., the approaches taken by companies with the lowest exposure to future GHG regulation) exist within each industry group. The factors that lead to differences in GHG-regulation risk may also be factors in finding that companies with relatively more carbon risk have acted “unreasonably”—that is, have not kept up with industry standards.

As one example, current practices and future plans of utilities vary greatly.¹⁴³ Some, like American Electric Power (AEP), have been

¹⁴⁰ *Davison*, 270 P. at 423-24.

¹⁴¹ *Bartlett*, 447 P.2d at 737.

¹⁴² See INNOVEST, CARBON DISCLOSURE PROJECT 2005, at 7 (2005), available at <http://www.cdproject.net/reports.asp>. The comparative ratios for other industries are 8 to 1 for the international electrical utilities, 11 to 1 for mining, and 4 to 1 for oil and gas. *Id.*

¹⁴³ See DOUGLAS G. COGAN, CORPORATE GOVERNANCE AND CLIMATE CHANGE: MAKING THE CONNECTION: SUMMARY REPORT 26 (2006), http://www.ceres.org/pub/docs/Ceres_corp_gov_and_climate_change_0306.pdf (ranking electric power producers based on their corporate governance responses to climate change).

lauded for their transparency with respect to GHG emissions, recent reductions in emissions, and clear plans for future investment in carbon-neutral technologies.¹⁴⁴ Others, like TXU, at least until recently, refused to take significant proactive steps to even report, let alone redress, carbon emissions and are making plans to emit substantial, unabated GHG emissions in the future. As reported in the *Washington Post*:

Not every energy company is planning to curb greenhouse gas emissions in the near future. TXU Corp. is planning to spend \$10 billion to build 11 new coal-fired power plants, which would more than double the company's carbon dioxide emissions, from 55 million tons to 133 million tons a year. That increase in emissions is more than the total carbon dioxide pollution emitted in all of Maryland or by 10 million Cadillac Escalade sport-utility vehicles.¹⁴⁵

Because of its brazen approach to GHGs, TXU was targeted for aggressive environmental campaigning.¹⁴⁶ TXU's approach, when compared to the current actions of other utilities, might also have been found to constitute a violation of the duty not to create unreasonable risks for others. TXU's position as a laggard in the industry may recently have changed, however, when a group of outside investors, as part of a \$45 billion takeover of TXU, agreed with environmentalists to scrap eight of the proposed power plants and to reduce their total GHG emissions to 1990 levels by 2020.¹⁴⁷

Similarly, an argument can be made that U.S. automobile companies have been slower than Japanese companies, notably Toyota, to introduce fuel-efficient cars based on hybrid technologies. The fleets of passenger automobiles from the largest U.S. manufacturers contain

¹⁴⁴ See *id.* (giving AEP the top score for corporate governance response to climate change). AEP reportedly reduced carbon dioxide equivalent emissions by 13% between 2000 and 2004. THE CLIMATE GROUP, *supra* note 8, at 6.

¹⁴⁵ Steven Mufson & Juliet Eilperin, *Energy Firms Come to Terms with Climate Change*, WASH. POST, Nov. 25, 2006, at A1. Coal is significantly less efficient than natural gas, which emits 40% less greenhouse gases for a given amount of energy. Major strategies for addressing climate change involve either switching fuels away from coal or widespread adoption of carbon capture and storage. See BAUMERT ET AL., *supra* note 99, at 46; see also Pacala & Socolow, *Stabilization Wedges*, *supra* note 104, at 970 tbl.1 (summarizing currently feasible carbon-reducing energy strategies).

¹⁴⁶ See Lisa Lee, *Green Group Asks Banks Not To Finance TXU Coal Plants*, REUTERS, Dec. 14, 2006, available at http://ran.org/media_center/news_article/?uid=2210 (describing Rainforest Action Network's campaign to prevent private banks from financing TXU's planned expansion).

¹⁴⁷ Steven Mufson & David Cho, *Energy Firm Accepts \$45 Billion Takeover: Buyers Made Environmental Pledge*, WASH. POST, Feb 26, 2007, at A4.

far fewer high-mileage vehicles than those of the largest Japanese manufacturers.¹⁴⁸ General Motors, which is expected to have the lowest average fuel efficiency among major car manufacturers through 2011, continues to market particularly inefficient cars such as the Hummer, and lobbies aggressively against increases in federal fuel-efficiency standards.¹⁴⁹ Taken together, such factors could leave GM more vulnerable to liability than Toyota or Honda.

Nor, for that matter, are all oil and coal companies the same. Some, like British Petroleum, are clearly moving faster in acknowledging the gravity of climate change and in researching and developing alternative energy supplies. British Petroleum was an industry leader in acknowledging the impacts of climate change as early as 1997. While other oil and coal companies continued to finance climate change skeptics and to oppose actively any emissions caps, British Petroleum became a relatively progressive voice early in climate politics. One decade later, there is a plausible argument that those industry members yet to take the same steps as British Petroleum, that underinvest in the research and development of alternatives, finance opposition to the regulation of carbon, and support efforts to obfuscate the public's understanding of climate science, are not meeting current industry standards.

D. *The Unforeseeable Plaintiff and Policy Limitations on Duty*

As suggested in the Introduction's brief discussion of *Palsgraf*, courts have held that the duty to act with reasonable care does not extend to plaintiffs who were not among the categories of persons that foreseeably could have been harmed. Judge Cardozo found that Mrs. Palsgraf was not within the foreseeable zone of risk created by the defendant conductor's negligent effort to help another passenger on to the train. Thus, Mrs. Palsgraf, standing at the other end of the platform, was owed no duty, and, as a result, no liability was found.

At first glance, climate change claims would seem to give rise to numerous unforeseen plaintiffs. The impact of climate change is

¹⁴⁸ See DON MACKENZIE, AUTOMAKER RANKINGS 2007: THE ENVIRONMENTAL PERFORMANCE OF CAR COMPANIES 19 tbl.6 (2007), available at http://www.ucsusa.org/clean_vehicles/vehicles_health/automaker-rankings-2007.html (follow "Full Text of Report" hyperlink) (summarizing the percentage of the largest auto manufacturers' fleets with a fuel economy of thirty or more miles per gallon).

¹⁴⁹ Justin Hyde, *Lutz: Fuel Rules Could Doom U.S. SUV, Truck Sales*, DETROIT FREE PRESS, Dec. 27, 2006, at 1A ("More than any other automaker, GM has fought [fuel efficiency standards] . . .").

global and may cause both general and particular damages throughout the world as a result of the activities of potential defendants. In light of the emerging science and publicity around various climate impacts, however, even the most distant plaintiffs, whose wheat fields dry up for lack of rain or whose ski resorts close for lack of snow, can arguably no longer be labeled “unforeseeable.” Today, GHG emissions are known to put wheat farmers and others at risk (whereas a train conductor’s push on one passenger would still not put a distant passenger at foreseeable risk). In short, as our understanding of climate change impacts increases, injury around the globe has become more foreseeable, including injuries felt more acutely by some plaintiffs (e.g., ski resort operators) than others. No matter how geographically distant the plaintiffs may be, they are foreseeably in the zone of impact of the defendants’ activities. The foreseeable zone of impact in the context of climate change, a global tort, is *global*, and the duty owed by defendant contributors to climate change arguably extends to damaged plaintiffs everywhere. This presents a daunting problem of scale for the tort system. But does it follow that tort law should treat a duty to everyone as a duty to no one?

Another approach focuses on when *not* to impose a duty for explicit policy reasons. Even if the defendant owes a duty of care to a party and has breached that duty, courts may decline to recognize the duty out of policy concerns.¹⁵⁰ In most of these cases, the courts reject liability out of concern that the scale of liability will be so large as to run counter to public policy—either because it could destroy an industry or could result in an endless scope of liability. For purposes of understanding climate-related claims, these policy-based limitations on duty may be helpfully evaluated in two categories—those relating to extending liability to a large group of potentially distant plaintiffs (what we call the “omnipresent plaintiff” problem) and those relating to purely economic losses.

1. The Omnipresent Plaintiff and Global Environmental Torts

Courts have denied liability in some cases out of an apparent concern that damages, or the number of potential plaintiffs, may be so great as to make the cases inappropriate for tort adjudication—either because the burden on defendants would be too great or because a

¹⁵⁰ Goldberg & Zipursky, *supra* note 22, at 718. This is sometimes described as a “no duty” doctrine.

response is better left to the legislature. Thus for example, in *Strauss v. Belle Realty Co.*,¹⁵¹ concern over bankrupting Consolidated Edison, a public utility, persuaded the court to refuse to impose liability for a tenant injured from tripping when he lost electricity. As Goldberg and Zipursky describe,

[t]he driving force behind the decision was . . . the court's concern about the burden that would be imposed on New York's major electrical supplier if it permitted ordinary negligence liability for all the harm that was caused by the blackout. "No duty" is simply a conclusory label for that policy rationale.¹⁵²

In a different context, a number of courts have refused to extend liability to third parties harmed by handguns, holding that these suits are not justiciable and are better resolved by legislatures.¹⁵³

In the climate change context, we expect that courts may at first blush believe that the scale and range of damages are too great to impose a duty on defendants. As suggested above, however, a closer analysis of climate change might lead courts to reconsider. To be sure, if all the damages inflicted by climate change were imposed on the underlying companies, one could expect significant bankruptcies of utilities, energy providers, and other companies critical to the economy. However, such outcomes may be mitigated in ways other than dismissing the entire lawsuit. For example, courts could limit liability to the percentage of climate change attributable to the defendants in the case. Moreover, the limits of any defendant's negligence, and thus its liability, could be constrained to the extent that it has developed carbon-efficient operations. Liability could also be bounded by determining a baseline of what levels of emissions would be "reasonable" under the circumstances. Emissions below that baseline would entail no liability. Potential defendants could thus avoid liability in the future by investing in climate-friendly operations or technologies.

¹⁵¹ 482 N.E.2d 34 (N.Y. 1985).

¹⁵² Goldberg & Zipursky, *supra* note 22, at 719.

¹⁵³ *E.g.*, *Bloxham v. Glock, Inc.*, 53 P.3d 196, 200 (Ariz. Ct. App. 2002); *City of Chi. v. Beretta U.S.A. Corp.*, 821 N.E.2d 1099, 1148 (Ill. 2004); *Hamilton v. Beretta U.S.A. Corp.*, 750 N.E.2d 1055, 1068 (N.Y. 2001); *see also Connecticut v. Am. Elec. Power Co.*, 406 F. Supp. 2d 205, 271-74 (S.D.N.Y. 2005) (assessing the justiciability of a public nuisance suit for global warming, and ultimately dismissing the claims).

2. Economic Losses

Courts have also frequently found that no duty exists in cases brought by plaintiffs who have suffered only economic loss without any physical damage to a proprietary interest.¹⁵⁴ In *Louisiana ex rel. Guste v. M/V Testbank*, for example, the Fifth Circuit Court of Appeals addressed the limits of liability for a massive pentachlorophenol (PCP) spill in the Mississippi River Gulf Outlet.¹⁵⁵ The U.S. Coast Guard closed the outlet to navigation for nearly a month and temporarily suspended fishing, crabbing, shrimping, and other activities over a 400-hundred-square-mile area. The impacts of the spill rippled through the Louisiana economy, and a wide variety of affected parties filed suit.¹⁵⁶

The court upheld claims on behalf of those who had suffered a direct physical loss to their own property, as well as those people, including fishers, shrimpers, and crabbers, who directly exploited the now-damaged ecosystem. The court dismissed other plaintiffs' claims that were based solely on indirect economic losses emanating from contracts or other business relationships that might have been affected by closure of the water way. The court wrote:

Review of the foreseeable consequences of the collision of the [two ships] demonstrates the wave upon wave of successive economic consequences and the managerial role plaintiffs would have us assume. The vessel delayed in St. Louis may be unable to fulfill its obligations to haul from Memphis, to the injury of the shipper, to the injury of the buyers, to the injury of their customers. Plaintiffs concede, as do all who attack the requirement of physical damage, that a line would need to be drawn—somewhere on the other side, each plaintiff would say¹⁵⁷

Although the majority of courts continue to follow the bright-line rule that plaintiffs owe no duty to those whose only injury is economic loss, others adopt a less restrictive view and analyze such cases as presenting only a question of proximate cause and the foreseeability of economic injury.¹⁵⁸

¹⁵⁴ See, e.g., *Robins Dry Dock & Repair Co. v. Flint*, 275 U.S. 303, 308-09 (1927).

¹⁵⁵ 752 F.2d 1019 (5th Cir. 1985).

¹⁵⁶ *Id.* at 1020-21.

¹⁵⁷ *Id.* at 1028; see also P.S. Atiyeh, Note, *Economic Loss in the United States*, 5 OXFORD J. LEGAL STUD. 485, 488-90 (1985) (discussing the court's policy concerns in *Testbank*).

¹⁵⁸ See, e.g., *People Express Airlines, Inc. v. Consol. Rail Corp.*, 495 A.2d 107, 112-18 (N.J. 1985).

The “economic loss doctrine” is obviously relevant to climate change cases. Just as in *Testbank*, the reverberations of climate change through local and regional economies are, and will be, substantial. A severe drought that destroys the Great Plains wheat crop may affect bread makers, restaurants, and truckers. Tort law would typically draw the bounds of liability around only those whose economic losses resulted from a physical loss—in this example the wheat farmer—and not those whose economic losses arise only through contract or other financial relationships, such as the bread maker. Although liability can be bounded by concepts of proximate cause, it can also be bounded in terms of duty: by concluding that the defendants’ duty does not extend through the relationships of the economy to plaintiffs who have suffered no direct physical injury.

Although application of the economic loss doctrine may, in fact, limit the types of plaintiffs who can bring a climate-related tort suit, it may perversely embolden courts to find liability where there is a physical harm. Courts facing climate change complaints may initially view them as unmanageable and limitless, given that so many people and interests are affected either directly or indirectly by climate change. Courts might recognize, however, that the economic loss doctrine already provides a convenient and reasonable approach to setting limits on climate claims. Wheat farmers could bring their claims, but bread makers would be barred.

IV. PRODUCTS LIABILITY CLAIMS

In products liability cases, liability is premised either on allegations that a product is defective or that there has been a failure to warn of a foreseeable injury. Product defects are further divided into two categories: manufacturing defects and design defects. Each of these bases for products liability is discussed in turn below.¹⁵⁹

A. *Manufacturing Defect*

Manufacturing defects are those that occur because the particular product was manufactured incorrectly—for example, because something went wrong on the production line or imperfections weakened the material from which the product was made. In such cases, a particular car or other product is determined to be flawed when com-

¹⁵⁹ For a discussion of products liability claims in the climate context, see Grossman, *supra* note 23, at 42-46.

pared to the exact same car or product. Where such a manufacturing defect is found, most courts apply strict liability to the defendant.

Manufacturing defect theories are unlikely to form the basis for any climate litigation, because climate litigation will not be premised on one flawed or unsafe product, but rather on the unreasonableness of whole product lines (such as gasoline or SUVs).

B. Design Defect

To succeed in a suit premised on design defect, a plaintiff must show that the product as designed is unreasonably dangerous and causes avoidable harm. The manufacturer's duty in product design cases usually turns on the reasonable foreseeability of the product's potential risks, the product's benefits, and the costs of alternative, less risky designs. According to the *Restatement (Third) of Torts*, a product

is defective in design when the foreseeable risks of harm posed by the product could have been reduced or avoided by the adoption of a reasonable alternative design by the seller or other distributor, or a predecessor in the commercial chain of distribution, and the omission of the alternative design renders the product not reasonably safe.¹⁶⁰

The inquiry into the “reasonable” safety of a product is essentially a risk-utility comparison between alternative designs—equivalent to the risk-utility inquiry made under a negligence theory.¹⁶¹ In other words, a defect exists where the costs of a safer alternative product design are less than the foreseeable avoidable injuries.¹⁶² Society values some risk in products—for example, faster cars may be less safe but a risk-utility balance might still favor cars that go faster than twenty miles per hour. Yet we could imagine an automobile design—say a Formula One race car—that would be deemed unsafe when marketed for regular driving on public roads.

¹⁶⁰ RESTATEMENT (THIRD) OF TORTS: PROD. LIAB. § 2(b) (1998).

¹⁶¹ See *Phillips v. Kimwood Mach. Co.*, 525 P.2d 1033, 1039 (Or. 1974) (“[W]hether the doctrine of negligence . . . or strict liability is being used to impose liability, the same process is going on in each instance, *i.e.*, weighing the utility of the article against the risk of its use.”). For general discussions of the risk-utility analysis performed in design defect cases, see Michael D. Green, *The Schizophrenia of Risk-Benefit Analysis in Design Defect Litigation*, 48 VAND. L. REV. 609 (1995); David G. Owen, *Risk-Utility Balancing in Design Defect Cases*, 30 U. MICH. J.L. REFORM 239 (1997); and Paul Rheingold, *The Risk/Utility Test in Product Cases*, 18 TRIAL LAW. Q. 49 (1987).

¹⁶² See generally David G. Owen, *Toward a Proper Test for Design Defectiveness: “Micro-Balancing” Costs and Benefits*, 75 TEX. L. REV. 1661 (1997) (seeking to clarify the nature of this balancing test).

The question raised by climate change is not whether some automobiles are designed to be too fast for our roadways, but whether they are designed to be too inefficient. It is not the miles per hour, but the miles per gallon that would be questioned in a climate change context. Thus, if cars that carry four people can do so with 40 or more miles per gallon, would an alternative design (of a Humvee, for example) that gets less than ten miles per gallon ever be considered to pose an unreasonable risk to third parties?

The key to demonstrating a design defect is to show that a reasonable alternative exists that could make the product safer. At least as of today, a reasonably safer design arguably exists for most cars in the form of hybrid technology. The design is known to most manufacturers and would reduce emissions from most classes of vehicles, with little or no loss of performance. Thus, this is not a case where an alternative design is impractical or unavailable. The remaining question is whether the costs of requiring hybrid technology (or an equivalent alternative technology) outweigh the societal benefits of reducing the emissions that cause climate change.¹⁶³

The requirement that the risk be foreseeable in cases based on either a design defect or a failure to warn does not seem to be a substantial bar to bringing a claim—at least not in the future. As noted above, some of the risks of climate change are clear now, and we expect more risks to be clearer in the future. Moreover, manufacturers in products liability cases may be liable for the foreseeable impacts of

¹⁶³ Some courts review a larger number of factors in determining a design defect than those mentioned in the simple risk-utility analysis described above. These factors typically include the following: (1) the usefulness (or utility) of the product to the user and society; (2) the likelihood that the product will cause injury and the seriousness of that injury; (3) the availability of a safer substitute product that provides the same utility; (4) the manufacturer's ability to make the product safe without destroying its utility or making it too expensive; (5) the user's ability to avoid the risk of injury by the exercise of care in using the product; (6) the user's anticipated awareness of the dangers inherent in the product, either because of general knowledge or because of product warnings; and (7) the manufacturer's ability to spread the loss by passing the costs on through the market price or through insurance. *See, e.g.,* Akee v. Dow Chem. Co., 272 F. Supp. 2d 1112, 1132 (D. Haw. 2003); Labelle v. Philip Morris, Inc., 243 F. Supp. 2d 508, 515 n.4 (D.S.C. 2001); Smith v. Mack Trucks, Inc., 819 So. 2d 1258, 1263 (Miss. 2002); *see also* John W. Wade, *On the Nature of Strict Tort Liability for Products*, 44 MISS. L.J. 825, 837-38 (1973) (proposing the consideration of these additional factors). These expanded factors would not significantly change the analysis from the simpler cost-benefit analysis described in the text. *Cf. supra* text accompanying note 117 (discussing the inherent difficulty of precisely defining the scope of duty in the negligence context).

their products, even to third parties who are not specifically using the product. Thus, an Ohio court in a handgun case concluded:

A duty of care for the protection of a plaintiff against an unreasonable risk of injury is owed to all people “to whom injury may reasonably be anticipated[.]” A concern arises with less foreseeable plaintiffs when a defendant breaches a duty to one group of plaintiffs and also causes injury as a result to another group of plaintiffs to whom a foreseeable risk of injury might or might not have been created at the time of the original negligent act. Under Ohio tort law, “[t]he existence of duty largely depends on the foreseeability [sic] of the injury.” . . . In this matter, the question is whether a reasonably prudent gun manufacturer should have anticipated an injury to the Plaintiffs as a probable result of manufacturing, marketing, and distributing a product with an alleged negligent design.¹⁶⁴

The plaintiff shot with the gun was not the product’s user, but rather the third-party victim of the product’s use. Similarly, extending the duty in a climate change claim based on a design-defect theory may depend on the analysis of the foreseeability of third-party victims injured by the product’s use.¹⁶⁵

C. Failure To Provide Adequate Warnings

In a “duty to warn” case, the plaintiffs must show a breach of a duty to warn of the dangers of the product—based on the assumption that a proper warning would have prevented the harm—and that the lack of warning made the product unsafe for use. According to the *Restatement (Third) of Torts*, a product is

defective because of inadequate instructions or warnings when the foreseeable risks of harm posed by the product could have been reduced or avoided by the provision of reasonable instructions or warnings by the seller or other distributor, or a predecessor in the commercial chain of distribution, and the omission of the instructions or warnings renders the product not reasonably safe.¹⁶⁶

In a case concerning the contamination of wells by the gasoline additive MTBE, the court addressed the application of the duty to warn in cases brought by third parties.¹⁶⁷ The plaintiff’s harm was suf-

¹⁶⁴ *White v. Smith & Wesson*, 97 F. Supp. 2d 816, 828-29 (N.D. Ohio 2000) (quoting *Gedeon v. E. Ohio Gas Co.*, 190 N.E. 924, 926 (1934) and *Commerce & Indus. Ins. Co. v. City of Toledo*, 543 N.E.2d 1188, 1192 (1989)).

¹⁶⁵ For further discussion of plaintiff foreseeability, see *supra* Part III.D.

¹⁶⁶ RESTATEMENT (THIRD) OF TORTS: PROD. LIAB., § 2(c) (1998).

¹⁶⁷ *In re Methyl Tertiary Butyl Ether (“MTBE”) Prod. Liab. Litig.*, 175 F. Supp. 2d

ferred as a result of gas spills and MTBE leaching into groundwater, not the specific use of gas by the plaintiff. Nonetheless, the court explained:

In cases brought against manufacturers and suppliers for injuries resulting from the use of hazardous materials or other unreasonably dangerous products, courts have generally held that such manufacturers owe a duty to warn foreseeable users of the latent dangers of the product. Some courts have also held that the duty to warn extends to “third persons exposed to a foreseeable and unreasonable risk of harm by the failure to warn.”¹⁶⁸

Thus, as in design-defect claims, the fact that climate change plaintiffs are not the intended users of the product would not by itself bar a claim based on a failure to warn. Whether the duty to warn extends to such third-party victims would depend on the analysis of the foreseeability of the injury to such third parties. Once again, as climate impacts become clearer, so too does the foreseeability of injury from carbon-emitting products.

V. NUISANCE AND PUBLIC NUISANCE CLAIMS

Most of the tort cases thus far have been brought primarily on public nuisance grounds, which present different, and likely smaller, burdens for establishing liability than do claims based on negligence theories. Unlike negligence actions that focus on the unreasonable conduct of the defendant, nuisance claims require an unreasonable interference with private property or, in the case of public nuisance, rights common to the general public. Private nuisance is defined as an activity that substantially and unreasonably interferes with the use and enjoyment of land.¹⁶⁹ Public nuisance is defined as “an unreasonable interference with a right common to the general public.”¹⁷⁰

In both types of actions, the focus is on the nature, severity, and reasonableness of the interference. In the context of pollution, for example, the defendants may not be negligent in the creation of pollution—pollution is frequently an inevitable byproduct of reasonable

593 (S.D.N.Y. 2001).

¹⁶⁸ *Id.* at 625 (citations omitted) (quoting *McLaughlin v. Mine Safety Appliances Co.*, 181 N.E.2d 430, 433 (1962)).

¹⁶⁹ *See* RESTATEMENT (SECOND) OF TORTS § 821D (1979) (defining “private nuisance”); *see also* *Gussack Realty Co. v. Xerox Corp.*, 224 F.3d 85, 93 (2d Cir. 2000) (clarifying that the interference must be “substantial” and “unreasonable” to constitute a private nuisance).

¹⁷⁰ RESTATEMENT (SECOND) OF TORTS § 821B(1) (1979).

conduct. In this sense, utilities or automobile manufacturers are intentionally causing harm to neighboring property owners. The issue becomes whether the extent of pollution and its impact on the neighbors (or, in public nuisance, on the public's interests) are unreasonable. The defendant's negligence or fault need not be shown; the plaintiff must show only that the interference is unreasonable under the circumstances.¹⁷¹

A. Nuisance

As noted above, the basis of liability in nuisance is that an intentional activity (for example, pollution) leads to an unreasonable interference in another's property interest (or, in the case of public nuisance, to a public interest). As Justice Cardozo observed,

[n]uisance as a concept of the law has more meanings than one. The primary meaning does not involve the element of negligence as one of the essential factors. One acts sometimes at one's peril. In such circumstances, the duty to desist is absolute whenever conduct, if persisted in, brings damage to another. Illustrations are abundant. One who emits noxious fumes or gases day by day in the running of his factory may be liable to his neighbor though he has taken all available precautions. He is not to do such things at all, whether he is negligent or careful.¹⁷²

If Cardozo had had the last word, climate change cases based on nuisance would be straightforward. Defendants would owe a duty not to interfere with others' use and enjoyment of their property. Under this approach, the defendant utilities in *Connecticut v. American Electric Power*, to the extent they could be shown to have harmed the interest of private landowners due to their contribution to climate change, would be clearly liable. However, more modern approaches to nuisance, particularly involving pollution, have required the interference to be both intentional and "unreasonable."¹⁷³ This reasonableness inquiry is often an inquiry into the relative social utility of the defendant's activity that leads to the nuisance as compared to the value of

¹⁷¹ Where there is no intent to conduct the activity that leads to the nuisance, a nuisance claim can still be based on negligence by the defendant—for example, negligently failing to avoid the nuisance or negligently creating the conditions that cause the nuisance.

¹⁷² *McFarlane v. City of Niagara Falls*, 160 N.E. 391, 391-92 (N.Y. 1928) (citations omitted); see also *Morgan v. High Penn Oil Co.*, 77 S.E.2d 682, 688 (N.C. 1953) (noting—in the context of a claim regarding the emission of noxious gases—that a private nuisance may be created in the absence of negligence).

¹⁷³ See RESTATEMENT (SECOND) OF TORTS § 822 (1979).

the property interest (or public right) that is harmed by the defendant's activity. Thus, in *Boomer v. Atlantic Cement Co.*, the New York Court of Appeals refused to enjoin a nuisance (air pollution) caused by a cement company, finding that:

The cement making operations of defendant have been found by the court at Special Term to have damaged the nearby properties of plaintiffs in these two actions. . . . The total damage to plaintiffs' properties is, however, relatively small in comparison with the value of defendant's operation and with the consequences of the injunction which plaintiffs seek.¹⁷⁴

Similarly, in allowing the continued operation of a large cattle feedlot against allegations of nuisance by the neighboring homeowners, the Idaho Supreme Court found in *Carpenter v. Double R Cattle Co.* that:

[I]n a nuisance action seeking damages the interests of the community, which would include the utility of the conduct, should be considered in the determination of the existence of a nuisance. . . .

The State of Idaho is sparsely populated and its economy depends largely upon the benefits of agriculture, lumber, mining and industrial development. To eliminate the utility of conduct and other factors listed by the trial court from the criteria to be considered in determining whether a nuisance exists . . . would place an unreasonable burden upon these industries.¹⁷⁵

Although the *Boomer* and *Carpenter* cases differ in their ultimate treatment of plaintiffs' claims,¹⁷⁶ they both reflect the social-utility approach found in many pollution-related nuisance cases.¹⁷⁷ This approach has been captured by the *Restatement*: "An intentional invasion of another's interest in the use and enjoyment of land is unreasonable

¹⁷⁴ *Boomer v. Atl. Cement Co.*, 257 N.E.2d 870, 871-72 (N.Y. 1970); see also Daniel A. Farber, *The Story of Boomer: Pollution and the Common Law*, in ENVIRONMENTAL LAW STORIES 7 (Richard J. Lazarus & Oliver A. Houck eds., 2005) (analyzing the continued relevance of *Boomer*).

¹⁷⁵ 701 P.2d 222, 227-28 (Idaho 1985).

¹⁷⁶ In *Boomer*, the plaintiffs were denied an injunction but awarded damages, while in *Carpenter* the plaintiffs were denied any remedy.

¹⁷⁷ See, e.g., *Smith v. Staso Milling Co.*, 18 F.2d 736, 738 (2d Cir. 1927) ("The very right on which the injured party stands in such cases is a quantitative compromise between two conflicting interests."); *Copart Indus., Inc. v. Consol. Edison Co.*, 362 N.E.2d 968 (N.Y. 1977) (Fuchsberg, J., dissenting) (applying the social-utility reasoning from *Boomer*).

if . . . the gravity of the harm outweighs the utility of the actor's conduct"¹⁷⁸

The social-utility inquiry in a nuisance claim tracks closely Judge Learned Hand's *BPL* formula for negligence. Thus, the trends in climate science that have demonstrated the increasingly grave consequences of climate change, on the one hand, and the emergence of new and more cost-effective technologies to avoid climate change, on the other, would push a social-utility analysis toward liability in nuisance actions just as it would in actions based on negligence.¹⁷⁹ As the potential economic and social costs of climate change mount, and as the costs of addressing carbon emissions decline (or, at most, rise at a lower rate), the relative social utility, and thus the reasonableness, of nuisance-creating activities also declines. At some point, we would expect this social-utility inquiry to tip toward a finding of liability.

Nuisance (and public nuisance) cases relating to climate change will also raise questions of whether a duty not to harm landowners is geographically limited to some extent. In the quintessential nuisance claim, one neighbor's emissions harm the neighboring landowner's fields. In contrast, climate change litigation may present plaintiffs and defendants who are geographically quite distant. Courts could dismiss such cases on the theory that no duty is owed to plaintiffs so distant (or, alternatively, that the emissions were not the proximate cause of the damage), but in general courts are increasingly likely to avoid such a formulaic approach in favor of a more general discussion of the foreseeability of the plaintiff. As discussed above, even distant plaintiffs could be viewed as foreseeable, given the global nature of climate change.¹⁸⁰

B. *Public Nuisance*

The analysis is largely similar, although not identical, for public nuisance. Courts frequently invoke a social-utility balancing test in evaluating those claims, as well. According to the *Restatement*:

Circumstances that may sustain a holding that an interference with a public right is unreasonable include the following:

¹⁷⁸ RESTATEMENT (SECOND) OF TORTS § 826 (1979).

¹⁷⁹ See *supra* Part III.A.

¹⁸⁰ See *supra* Part III.D.

(a) Whether the conduct involves a significant interference with the public health, the public safety, the public peace, the public comfort or the public convenience, or

(b) whether the conduct is proscribed by a statute, ordinance or administrative regulation, or

(c) whether the conduct is of a continuing nature or has produced a permanent or long-lasting effect, and as the actor knows or has reason to know, has a significant effect upon the public right.¹⁸¹

Given the widespread, serious, and long-lasting impacts that are increasingly attributed to climate change, it does not seem a stretch to argue that it constitutes a “significant interference” with the public’s welfare.¹⁸² Indeed, the commentary to the *Restatement* section notes that “[s]ome courts have shown a tendency . . . to treat significant interferences with recognized aesthetic values or established principles of conservation of natural resources as amounting to a public nuisance.”¹⁸³ The significance of the interference in a public nuisance may be analyzed just as the unreasonableness of the interference in a private nuisance action (i.e., with reference to the relative benefits of the activity creating the public nuisance as compared to the damage caused by the nuisance).¹⁸⁴

Demonstrating the breach of duty for a public nuisance case is significantly easier than for cases premised on either negligence or products liability. Under many formulations, a public nuisance can be demonstrated where the defendant “knowingly contributes to” a public nuisance. This requires that the defendant have knowledge that its actions may lead to the nuisance—for example, climate change—but it does not require that the underlying conduct be measured against any objective standard of reasonableness.

This relatively low burden of proving that defendants are knowingly contributing to climate change surely played a part in the decision of the attorneys general to base their climate claims on theories

¹⁸¹ RESTATEMENT (SECOND) OF TORTS § 821B(2).

¹⁸² See Matthew F. Pawa & Benjamin A. Krass, *Global Warming as a Public Nuisance: Connecticut v. American Electric Power*, 16 FORDHAM ENVTL. L. REV. 407, 439-49 (2005) (analyzing the legal basis for a public nuisance claim based on global warming); see also *Illinois v. City of Milwaukee*, 406 U.S. 91, 104-05 (1972) (discussing environmental damage as a basis for public nuisance suits under federal common law). But see Bruce Ledewitz & Robert D. Taylor, *Law and the Coming Environmental Catastrophe*, 21 WM. & MARY ENVTL. L. & POLY REV. 599, 615 (1997) (asserting that nuisance law cannot serve as the basis for imposing liability for global warming).

¹⁸³ RESTATEMENT (SECOND) OF TORTS § 821B cmt. e (1979).

¹⁸⁴ See *supra* Part III.A (discussing utility balancing in the context of negligence).

of public nuisance. In *Connecticut v. American Electric Power*, for example, the complaint alleges that each defendant *knowingly* contributed to climate change and cites as support particular steps or pronouncements each defendant has made to address climate change.¹⁸⁵ In this way, modest steps to study climate change or to reduce emissions were actually used *against* the utilities to show that they knew and acknowledged climate change would have significant adverse impacts. The same is true in the California Complaint.¹⁸⁶

The public nuisance cases have an additional advantage with respect to the required proof of the defendant's conduct. In some jurisdictions, the defendant's conduct need only "contribute" to a nuisance; it need not be the sole or even a primary cause of the nuisance. Even a relatively small contribution can be sufficient for a finding of joint and several liability.¹⁸⁷ Thus, the fact that the defendant utilities in *Connecticut v. American Electric Power* or the defendant automobile manufacturers in *General Motors Corp.* contribute only 2.3%¹⁸⁸ and 9.0%¹⁸⁹ of global CO₂ emissions, respectively, does not bar suit. Under the plaintiffs' theory of the case, the obligation is not to contribute—even slightly—to the nuisance.¹⁹⁰ In addition, the states' claims of public nuisance are not premised on any one specific weather event, so they may not be required to show that climate change has resulted in a specific hurricane or drought—just that, generally, over time climate change may have certain impacts (e.g., declines in snowpack, more intense storms, and warmer temperatures).

Although public nuisance cases do present some distinct advantages, they also present some obstacles peculiar to public nuisance. The broad, public nature of the interests that lie at the heart of the public nuisance suits likely influenced the district court's invocation of the political question doctrine in the *AEP* case. In addition, to invoke

¹⁸⁵ Connecticut Complaint, *supra* note 42.

¹⁸⁶ California Complaint, *supra* note 21.

¹⁸⁷ *Woodyear v. Schaefer*, 57 Md. 1, 9-10 (1881); *see also* *People v. Gold Run Ditch & Mining Co.*, 4 P. 1152, 1158 (Cal. 1884) (applying the holding of *Woodyear*); *Pawa & Krass*, *supra* note 182, at 450-55 (applying these and other cases to an analysis of joint and several liability in the context of a nuisance case for global warming).

¹⁸⁸ *See* Connecticut Complaint, *supra* note 42, at 26 (estimating the defendants' combined annual CO₂ emissions at 650 million tons); BAUMERT ET AL., *supra* note 99, at 4 (reporting global annual output of CO₂ emissions at 28 billion tons).

¹⁸⁹ California Complaint, *supra* note 21, at 3. Note also that CO₂ emissions represent only 77% of the global warming potential of all GHG emissions. BAUMERT ET AL., *supra* note 99, at 6.

¹⁹⁰ *See* *Pawa & Krass*, *supra* note 182, at 450-55.

public nuisance as a theory, private plaintiffs will have to prove particularized damages that are different than those suffered by the general public. The private land trusts that joined the *AEP* case, for example, alleged specific harms to their particular properties; the court has yet to evaluate their claims of particularized injury.¹⁹¹

CONCLUSION

As this Article has explained, establishing both the duty of care and the class of persons to whom that duty extends will be fundamental to any successful climate litigation in tort. Yet these issues have been largely overlooked to date. Our analysis suggests that changes over time in our understanding of climate change impacts are increasing the foreseeable costs of GHG emissions. At the same time, alternatives to inefficient technologies or practices are increasingly well known, and the avoidance costs are declining. This suggests that the relative risk-utility balance of climate-changing activities is shifting, and with that shift comes an increased likelihood that a defendant's activities or products will be found to present an unreasonable risk of foreseeable injury. Whether under theories of negligence, nuisance, or products liability, such trends in the risk-utility ratio are moving toward a finding of liability.

The focus on duty also helps us to look beyond a sector-wide approach to defendants—for example, all utilities, oil and gas producers, or automobile manufacturers—to a focus on those companies within a sector that are lagging behind the industry leaders in responding to climate change. Although initial tort actions have been suits against broad groups of utilities or automobile manufacturers with little differentiation, the next generation of tort cases may take a more nuanced approach to naming defendants. In the future, those companies whose approach to climate change is behind that of others in their industry run the risk of being singled out in tort actions. Inquiries into the reasonableness of a company's operations or products turn into inquiries about how they compare to those of others. In this way, today's industry laggards may be tomorrow's climate defendants.

¹⁹¹ For a discussion of the problems associated with standing, see RESTATEMENT (SECOND) OF TORTS § 821C & cmt. a (1979); *see also* *Massachusetts v. EPA*, 127 S. Ct. 1438 (2007) (holding that state governments have standing to sue); *Korsinsky v. EPA*, No. 05 Civ. 859(NRB), 2005 WL 2414744, at *2-3 (S.D.N.Y. Sept. 29, 2005) (dismissing the claim because the plaintiff's alleged injuries based on sensitivity to pollution and fear of pollution were not sufficiently imminent).