

Climate Science in the Courts

A Review of U.S. and International Judicial Pronouncements

by Maria L. Banda



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ABBREVIATIONS

APA	Administrative Procedure Act
AR	Administrative Record
AR4	IPCC's Fourth Assessment Report (2007)
AR5	IPCC's Fifth Assessment Report (2014)
BACT	Best available control technology
BiOp	Biological Opinion
BLM	U.S. Bureau of Land Management
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
CARB	California Air Resource Board
CO ₂	Carbon dioxide
DOJ	U.S. Department of Justice
EA	Environmental Assessment
ECHR	European Convention on the Protection of Human Rights and Fundamental Freedoms
ECtHR	European Court of Human Rights
EIA	Environmental Impact Assessment
EISA	Energy Independence and Security Act
EPA	Environmental Protection Agency
ERISA	Employee Retirement Income Security Act
ESA	Endangered Species Act
EU	European Union
F&R	Findings and Recommendation
FEIS	Final Environmental Impact Statement
FOIA	Freedom of Information Act
FRCP	Federal Rules of Civil Procedure
FWS	U.S. Fish and Wildlife Service
GHG	greenhouse gas
GWP	Global warming potential
HFCs	Hydrofluorocarbons
ICAO	International Civil Aviation Organization

IEA	International Energy Agency
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
LCFS	Low-carbon fuel standard
MRPC	Model Rules of Professional Conduct
NASA	National Aeronautics and Space Administration
NDC	Nationally Determined Contribution
NEMA	South Africa’s National Environmental Management Act
NEMS	National Energy Modeling System
NEPA	National Environmental Policy Act
NHTSA	National Highway Traffic Safety Administration
NMFS	National Marine Fisheries Service
NRC	National Research Council
NYAG	Office of the Attorney General of the State of New York
ppm	Parts per million
PSLRA	Private Securities Litigation Reform Act
RFS	Renewable fuel standard
RGGI	Regional Greenhouse Gas Initiative
RMP	Resource Management Plan
ROD	Record of Decision
SR	IPCC Special Report
UN	United Nations
UNEP	UN Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
USFS	U.S. Forest Service
USGCRP	U.S. Global Change Research Program

ABSTRACT

Climate change has been the subject of considerable political controversy in the United States, and climate skepticism—or doubts about the basics of climate science—have not been uncommon in the public debate. At the same time, U.S. courts in several recent high-profile cases, including *Juliana v. United States* and *City of Oakland v. BP p.l.c.*, have expressly accepted as authoritative the science behind climate change, including its conclusions that the climate is warming, that human activity is driving the observed and anticipated changes, and that those changes will have a variety of adverse impacts in the United States and globally.

Given the nature of the public debate, this report seeks to determine whether these decisions are representative of a broader trend in the judiciary or whether they are outliers. It does so by examining judicial pronouncements in different climate-related proceedings since 2015, including in civil, administrative, constitutional, and criminal law matters, in the United States and in a dozen foreign jurisdictions. The report’s main conclusions are fourfold. First, the report finds that today a vast judicial agreement exists on the causes, extent, urgency, and consequences of climate change. This finding holds true across U.S. federal and state courts, across different types of proceedings, and across jurisdictions. This is a major shift since the early climate lawsuits when climate skepticism was still commonplace among judges and litigants. Second, the report finds that the parties, including the U.S. federal government, appear to agree on basic climate science even where they may dispute its legal implications. Third, the report finds that the U.S. judicial experience has been similar to the experience in other countries, where courts have been reviewing much of the same scientific evidence and making many of the same findings of climate facts. In this sense, climate science has acted as the ultimate *lingua franca* across courts. Finally, as the report shows, the judicial consensus on climate science has not translated into judicial intervention. Courts, especially in the United States, have generally exercised restraint and deferred to the representative branches of government to devise solutions to the climate challenge. The report concludes with a discussion of whether, and how, this judicial consensus might inform public understanding of, and debate about, climate change.

INTRODUCTION

Climate change and climate science have been the subject of a great deal of discussion and political controversy in the United States, often along partisan lines.¹ “Politicians, journalists, academics, and ordinary Americans,” as Justice Samuel Alito wrote in a recent matter, “discuss and debate various aspects of climate change daily—its causes, extent, urgency, consequences, and the appropriate policies for addressing it.”²

Indeed, the topic has proven much more controversial in the United States than in many other countries.³ Climate skepticism, or doubts about the basic findings of climate science,⁴ has been common,⁵ although a growing majority of Americans now believe that climate change is happening, think that it is human-caused, and are worried about its impacts.⁶ These beliefs are consistent with the findings of the latest U.S. *National Climate Assessment*,⁷ which determined that climate change is increasingly harming American communities, the economy, and the environment.⁸

¹ See Moira Fagan & Christine Huang, *A Look at How People Around the World View Climate Change*, PEW RES. CTR. (Apr. 18, 2019), <https://www.pewresearch.org/fact-tank/2019/04/18/a-look-at-how-people-around-the-world-view-climate-change/>. See also Alan Crawford, *Here's How Climate Change Is Viewed Around the World*, BLOOMBERG (June 25, 2019), <https://www.bloomberg.com/news/features/2019-06-26/here-s-how-climate-change-is-viewed-around-the-world>.

² See *Competitive Enter. Inst. v. Mann*, 589 U.S. ___, at * 7 (Nov. 25, 2019) (Alito, J., dissenting from denial of certiorari). See also *Defenders of Wildlife v. Jewell*, 176 F. Supp. 3d 975, 1000 (D. Mont. 2016) (“The listing decision in this case involves climate science, and climate science evokes strong reactions.”).

³ See *supra* note 1.

⁴ For basic findings of climate science, see, e.g., U.S. GLOBAL CHANGE RESEARCH PROGRAM, THE FOURTH NATIONAL CLIMATE ASSESSMENT VOL. II: CLIMATE SCIENCE SPECIAL REPORT (2017), science2017.globalchange.gov (evaluating current findings on climate science and projecting major trends to 2100) [hereinafter USGCRP CLIMATE SCIENCE SPECIAL REPORT].

⁵ WORLD ECON. FORUM, GLOBALIZATION 4.0: THE HUMAN EXPERIENCE (2019), http://www3.weforum.org/docs/WEF_globalization4_Jan18.pdf (finding that as many as 17% of respondents surveyed in North America expressed little to no trust in climate science). See also A. LEISEROWITZ ET AL., CLIMATE CHANGE IN THE AMERICAN MIND (Yale Program on Climate Change Comm. & George Mason Univ.: Nov. 2019), <https://climatecommunication.yale.edu/publications/climate-change-in-the-american-mind-november-2019/> (reporting a range of survey data, including that 59% of Americans believe that climate change is mostly human-caused; that only 55% of Americans believe that most scientists think that climate change is happening; and that only 22% understand the strong level of consensus among scientists).

⁶ Abel Gustafson et al., *A Growing Majority of Americans Think Global Warming Is Happening and Are Worried*, YALE PROGRAM ON CLIMATE CHANGE COMM. (Feb. 21, 2019), <https://climatecommunication.yale.edu/publications/a-growing-majority-of-americans-think-global-warming-is-happening-and-are-worried/> (finding that a majority of respondents worldwide trust climate science).

⁷ See *id.*

⁸ See U.S. GLOBAL CHANGE RESEARCH PROGRAM (USGCRP), THE FOURTH NATIONAL CLIMATE ASSESSMENT VOL. II: IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES (Nov. 2018), <https://www.globalchange.gov/browse/reports> (concluding that “the evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans’ physical, social, and economic well-being are rising.”).

These findings are also reflected in several recent high-profile U.S. court decisions, including the U.S. Court of Appeals for the Ninth Circuit’s ruling in *Juliana v. United States*, in which the court described the evidence of climate change and its impacts as “copious,” “compelling,” and “substantial.”⁹ In *City of Oakland v. BP p.l.c.*, U.S. District Court Judge William Alsup expressly “accept[ed] the science behind global warming” (and so did the litigants),¹⁰ while U.S. District Court Judge John F. Keenan observed in *City of New York v. BP p.l.c.* that “[c]limate change is a fact of life, as is not contested by Defendants.”¹¹ While the complaints in each of these proceedings were ultimately dismissed on standing, justiciability, or legislative displacement grounds, climate science was not in dispute.

How representative are these decisions of how the courts and litigants generally have been dealing with questions of climate science? Are they isolated examples of acceptance of climate science by the judicial branch and by certain parties, or are they part of a broader trend? This is the basic question that this report seeks to answer.

As this report finds, based on a review of U.S. and foreign case law, there is a vast judicial agreement on the causes, extent, urgency, and consequences of climate change. Today, courts are treating as valid and authoritative the science that says that the climate is warming, that human activity is driving the observed and anticipated changes, and that those changes will have a variety of adverse impacts in the United States and globally.

Climate skepticism, frequently witnessed in public debate, is therefore not on display before the courts. At least since the U.S. Supreme Court’s seminal decision in *Massachusetts v. EPA* in 2007,¹² judicial proceedings have revealed considerable consistency on climate science both among the litigants themselves and the courts. The causes, extent, urgency, and consequences of climate change—the basic kinds of questions that are answered by climate science—are commonly accepted by the parties and are accepted without serious question by the courts. In the administrative law setting in particular, U.S. courts have largely relied on the federal agencies’ own extensive evidence of climate science.¹³

What is most often in dispute in U.S. courts are the threshold legal issues, such as the legal doctrines of standing and political question, as well as the courts’ competence to fashion a remedy vis-à-vis the political branches. On those issues, plaintiffs have infrequently prevailed. Other thorny legal questions involving attribution, fault, and responsibility are also yet to be fully adjudicated. With respect to factual matters, however, judges have been deciding climate facts across a range of proceedings and issues, often engaging with minute details of climate science. That said, there remain also areas in which courts have struggled with scientific uncertainty relating to specific climate impacts,

⁹ See *Juliana v. United States*, No. 18-36082, slip op. at 14–15, 19 (9th Cir. Jan. 17, 2020). See *infra* § III.C.1.a, pp. 59 et seq.

¹⁰ See *City of Oakland v. BP p.l.c.*, 325 F. Supp. 3d 1017, 1022 (N.D. Cal. 2018). See *infra* § III.A.1.a.

¹¹ See *City of New York v. BP P p.l.c.*, 325 F. Supp. 3d 466, 474–75 (S.D.N.Y. 2018). See *infra* § III.A.1.c.

¹² *Massachusetts v. EPA*, 549 U.S. 497 (2007). See *infra* p. 11.

¹³ See, e.g., *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41 (D.D.C. 2019). See *generally infra* § III.B.1–3.

such as projecting future habitat vulnerability, modelling the survival potential of a threatened species, or tying localized impacts to climate change.¹⁴ In those cases, judges have generally applied the same approach as in dealing with other areas of scientific uncertainty. In administrative law cases, courts have generally deferred to agency expertise. On the whole, as the report finds, the judiciary has exercised considerable restraint in climate litigation, deferring to the representative branches of government.

In terms of its scope, the report covers primarily U.S. climate-related proceedings, but it also examines some of the leading cases from non-U.S. jurisdictions that have made findings of climate facts. Today, the expanding field of “climate law” comprises a wide range of disputes before judicial, administrative, and arbitral institutions, and it includes claims that address climate change both directly and indirectly.¹⁵ The report reviews a variety of such cases where claims about climate science have been advanced, including in civil litigation, administrative law proceedings, constitutional and public trust petitions, and criminal trials.¹⁶ The courts’ acceptance of basic climate science is consistent across all of these proceedings. In this sense, climate science has acted as the ultimate *lingua franca* across jurisdictions.

While hundreds of climate-related lawsuits have been filed worldwide over the past decade, this report focuses on judicial pronouncements since 2015 through to early 2020. The timeframe coincides with a groundswell of international action on climate change, including negotiation of the 2015 Paris Agreement on Climate Change¹⁷ and numerous other agreements and resolutions,¹⁸ as well

¹⁴ See, e.g., *WildEarth Guardians v. Jewell*, 738 F.3d 298, 309 (D.C. Cir. 2013) (noting that “current science does not allow for the specificity demanded” by environmental plaintiffs); *Citizens for a Healthy Cmty. v. U.S. Bureau of Land Mgmt.*, 377 F. Supp. 3d 1223, 1239 (D. Colo. 2019) (accepting agency’s argument about the impossibility of “attribute[ing] a particular climate impact in any given region to GHG emissions from a particular source” because, “at the time, government agencies did not have standardized protocols or specific levels of significance by which they could quantify climate impacts.”). See generally *infra* § III.

¹⁵ See generally Maria L. Banda & Scott Fulton, *Litigating Climate Change in National Courts: Recent Trends and Developments in Global Climate Law*, 47 ELR 10121 (Feb. 2017). See also Brian Preston, *The Evolving Role of Environmental Rights in Climate Change Litigation*, 2 CHINESE J. ENVTL. L. 131 (2018); UN ENVIRONMENT, *THE STATUS OF CLIMATE CHANGE LITIGATION: A GLOBAL REVIEW* (2017); HARI OSOFSKY & JACQUELINE PEEL, *CLIMATE CHANGE LITIGATION: REGULATORY PATHWAYS TO CLEANER ENERGY* (2015); *GLOBAL CLIMATE CHANGE AND U.S. LAW* (Jody Freeman & Michael B. Gerrard eds., 2014).

¹⁶ See *infra* § III.

¹⁷ Paris Agreement, U.N. Framework Convention on Climate Change, Rep. of the Conf. of the Parties on Its Twenty-First Session, Addendum, U.N. Doc. FCCC/CP/2015/10/Add.1 (Jan. 29, 2016).

¹⁸ This has included, inter alia, (a) issuance of the 2015 U.S.-China Joint Presidential Statement on Climate Change, see *U.S.-China Joint Presidential Statement on Climate Change*, THE WHITE HOUSE, OFF. OF THE PRESS SEC’Y, (Sept. 25, 2015), <https://obamawhitehouse.archives.gov/the-press-office/2015/09/25/us-china-joint-presidential-statement-climate-change> (reaffirming “shared conviction that climate change is one of the greatest threats facing humanity and that their two countries have a critical role to play in addressing it” and “determination to move ahead decisively to implement domestic climate policies, to strengthen bilateral coordination and cooperation, and to promote sustainable development and the transition to green, low-carbon, and climate-resilient economies.”); (b) adoption of the 2016 Kigali Amendment to the Montreal Protocol on Substances That Deplete the Ozone Layer, see Amendment to the Montreal Protocol on

as a wide range of domestic measures and reports, such as the release of the *Fourth National Climate Assessment* in the United States in 2018. It also includes advances in climate science itself, reflected in the *Special Report on Global Warming of 1.5°C* by the Intergovernmental Panel on Climate Change (IPCC) in 2018.¹⁹

The report is structured as follows. Part I briefly reviews the judicial processes that typically apply to climate cases in the United States, as well as the professional responsibility rules governing counsel in U.S. courts. Part II looks at some of the early U.S. climate cases, including the proceedings in *Massachusetts v. EPA*, in which skepticism about climate science was still commonplace. With that background, Parts III and IV turn to the focus of this report—recent judicial pronouncements on climate science. Part III reviews U.S. jurisprudence in which judges have been presented with climate science, including in civil claims, administrative law cases, constitutional claims, and criminal trials. Part IV examines how the U.S. courts' foreign counterparts have been deciding climate facts in some of the leading cases in the same categories of disputes. The report concludes with a discussion of whether, and how, this judicial consensus might inform public understanding of, and debate about, climate change.

I. UNDERSTANDING JUDICIAL PROCESS IN CLIMATE CASES AND HOW JUDGES DECIDE FACTS

What is special about judicial process as a system for crunching truth? A number of distinctive features of judicial process enable courts to separate truth from fiction and push judicial process towards the best view of operative facts, which are equally applicable in climate cases. When counsel and litigants spar in the courtroom, they are expected to ground their arguments in concrete evidence, not belief or opinion. Counsel owe duties of candor to the court that are policed under standards of conduct and bar association rules. In the United States, judicial decisions, with the exception of decisions by the Supreme Court, are subject to appeal—a system of checks and balances that at once

Substances That Deplete the Ozone Layer, Kigali, Oct. 15, 2016, C.N.872.2016.TREATIES-XXVII.2.f.; *see also* Montreal Protocol on Substances That Deplete the Ozone Layer, opened for signature Sept. 16, 1987, S. Treaty Doc. No. 100-10, 1522 U.N.T.S. 29; (c) adoption of a new global market-based measure to control emissions from international aviation by the International Civil Aviation Organization (ICAO) in 2016, *see Historic Agreement Reached to Mitigate International Aviation Emissions*, INT'L CIV. AVIATION ORG. (Oct. 6, 2016), <https://www.icao.int/Newsroom/Pages/Historic-agreement-reached-to-mitigate-international-aviation-emissions.aspx>; (d) publication of the report of the Financial Stability Board's Taskforce for Climate-Related Financial Disclosure (TCFD) in 2017, *see* FIN. STABILITY BD.'S TASK FORCE FOR CLIMATE-RELATED FIN. DISCLOSURE, FINAL REPORT: RECOMMENDATIONS OF THE TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES (2017); and (e) adoption of an initial strategy to reduce emissions from ships by the International Maritime Organization (IMO) in 2018, *see UN Body Adopts Climate Change Strategy for Shipping*, INT'L MAR. ORG. (Apr. 13, 2018), <http://www.imo.org/en/MediaCentre/PressBriefings/Pages/06GHGinitialstrategy.aspx>.

¹⁹ INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, SPECIAL REPORT ON GLOBAL WARMING OF 1.5°C (Oct. 2018): An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty, <https://www.ipcc.ch/sr15/>. *See also* USGCRP CLIMATE SCIENCE SPECIAL REPORT at 34 (discussing advances in scientific understanding and scientific approach since the last report).

both encourages fidelity to facts and allows for correction of judicial error.²⁰ This section provides a high-level overview of several of those elements in the U.S. judicial system, including (1) standards of conduct and professional responsibility rules, (2) adversarial nature of the process, (3) judicial review, (4) standards for expert testimony in science-heavy cases, and (5) other tools that judges can resort to in technically-complex cases (Section A), before turning to factual advocacy in climate cases (Section B).

A. U.S. Judicial Process

1. Standards of Conduct and Professional Responsibility Rules

Standards of conduct and professional responsibility rules provide an initial filter for false claims, screening out specious factual assertions from being presented to the court. Lawyers are duty-bound to scrub misleading information from filings and evidence. For example, Rule 11 of the Federal Rules of Civil Procedure (FRCP) requires, under threat of sanctions, that attorneys appearing before the court certify that their factual contentions “have evidentiary support”²¹ and that their denials of factual contentions “are warranted on the evidence.”²²

This rule is reinforced by professional responsibility rules. Rule 3.1 of the Model Rules of Professional Conduct (MRPC), for example, provides that a lawyer will not “assert or controvert an issue” in a proceeding “unless there is a basis in law and fact for doing so that is not frivolous.”²³ Similarly, a lawyer must not make “a false statement of fact or law” to a tribunal, or fail to correct “a false statement of material fact or law” previously made to the tribunal.²⁴ A lawyer may also not offer evidence to the tribunal that the lawyer knows to be false and may refuse to offer evidence that the

²⁰ Most fact-finding itself, however, is not typically subject to appeal. “Traditionally, decisions on ‘questions of law’ are ‘reviewable de novo,’ [while] decisions on ‘questions of fact’ are ‘reviewable for clear error.’” *Highmark Inc. v. Allcare Health Mgmt. Sys., Inc.*, 134 S. Ct. 1744, 1748 (2014) (quoting *Pierce v. Underwood*, 487 U.S. 552, 558 (1988)). *See also* Fed. R. Civ. P. 52(a)(6) (“Findings of fact . . . must not be set aside unless clearly erroneous, and the reviewing court must give due regard to the trial court’s opportunity to judge the witnesses’ credibility.”); *Anderson v. City of Bessemer*, 470 U.S. 564, 575 (1985) (“[R]eview of factual findings under the clearly-erroneous standard—with its deference to the trier of fact—is the rule, not the exception.”).

²¹ Fed. R. Civ. P. 11(b)(3) (“By presenting to the court a pleading, written motion, or other paper—whether by signing, filing, submitting, or later advocating it—an attorney or unrepresented party certifies that to the best of the person’s knowledge, information, and belief, formed after an inquiry reasonable under the circumstances: . . . (3) the factual contentions have evidentiary support or, if specifically so identified, will likely have evidentiary support after a reasonable opportunity for further investigation or discovery”).

²² *Id.* at 11(b)(4) (“ . . . (4) the denials of factual contentions are warranted on the evidence or, if specifically so identified, are reasonably based on belief or a lack of information.”).

²³ MODEL RULES OF PROF’L CONDUCT R. 3.1 (2018) (Meritorious Claims & Contentions) (“A lawyer shall not bring or defend a proceeding, or assert or controvert an issue therein, unless there is a basis in law and fact for doing so that is not frivolous, which includes a good faith argument for an extension, modification or reversal of existing law. . . .”).

²⁴ *Id.* R. 3.3(a)(1) (Candor Toward the Tribunal).

lawyer reasonably believes to be false.²⁵ While the lawyer for each side is responsible for its clients' pleadings and other documents prepared for litigation, "litigation documents ordinarily present assertions by the client, or by someone on the client's behalf, and not assertions by the lawyer."²⁶ However, once a lawyer makes an assertion purporting to be on their own knowledge—as in an affidavit by the lawyer or a statement in open court—that assertion may be made only when the lawyer "knows the assertion is true or believes it to be true on the basis of a reasonably diligent inquiry."²⁷

As the MRPC commentary explains, a lawyer acting as an advocate in an adjudicative proceeding has an obligation to present the client's case with "persuasive force."²⁸ That duty, however, is qualified by the lawyer's duty of candor to the tribunal.²⁹ As officers of the court, lawyers have "special duties . . . to avoid conduct that undermines the integrity of the adjudicative process."³⁰ Consequently, "the lawyer must not allow the tribunal to be misled by false statements of law or fact or evidence that the lawyer knows to be false."³¹

2. The Adversarial Process

The adversarial process, by design, drives the presentation of opposing factual claims in their most compelling light, provided evidentiary integrity, as discussed above, is observed. As one trial court recently noted, "a trial is the most reliable forum to put the Plaintiffs to their proof, contest their evidence, and submit any reliable and admissible scientific evidence to the contrary. A trial is conducted in a public forum, evidence must be presented under oath, and it is subject to cross-examination."³² By engaging in discovery and trial, defendants can "tender their own scientific evidence . . . if they desire to challenge Plaintiffs' evidence or [other defendants'] admissions"³³

²⁵ *Id.* R. 3.3(a)(3) ("(a) A lawyer shall not knowingly: . . . (3) offer evidence that the lawyer knows to be false. If a lawyer, the lawyer's client, or a witness called by the lawyer, has offered material evidence and the lawyer comes to know of its falsity, the lawyer shall take reasonable remedial measures, including, if necessary, disclosure to the tribunal. A lawyer may refuse to offer evidence, other than the testimony of a defendant in a criminal matter, that the lawyer reasonably believes is false.").

²⁶ *Id.* R. 3.3 cmt. 3.

²⁷ *Id.*

²⁸ *Id.* R. 3.3 cmt. 2.

²⁹ *Id.*

³⁰ *Id.*

³¹ *Id.* However, these duties as generally interpreted may be in tension, especially in the environmental context. *See, e.g.,* Tom Lininger, *Green Ethics for Lawyers*, 57 B.C.L. REV. 61 (2016) (arguing that current ethical rules provide insufficient incentives for lawyers to minimize harm to the environment and proposing a comprehensive set of amendments to MRPC).

³² *See* Juliana v. United States, No. 6:15-CV-1517-TC (D. Or. June 28, 2017) (order granting intervenors' motions to withdraw). *See also infra* p. 63.

³³ *Id.*

3. Judicial Review

Ultimately, judicial review is designed to filter out weak or false evidence and ensure that only meritorious claims succeed. The certainty that associates with judicial determinations of facts depends to some degree on the nature of the matter before the court. In the climate context in the United States, as relevant here, the court will generally be operating in one of following four settings,³⁴ each of which is discussed in more detail in Section III below:

a. Civil, Tort-Based Suits. In civil, tort-based suits, the courts generally resolve questions of fact based on a “preponderance of the evidence” (i.e., which of competing factual narratives is more likely than not). On this standard, which is also sometimes referred to as the “balance of probabilities,” the trier-of-fact must be satisfied that a particular fact or event was more likely than not to have occurred (i.e., a +50% probability). This can be contrasted with the more exacting “clear-and-convincing” standard of proof, under which the plaintiff must prove that a particular fact or event is substantially more likely than not to be true.³⁵ Where judges are determining the more compelling view of the facts, judicial factual determinations have particular heft.

b. Challenges to Administrative Decisions by Implementing Agencies. In administrative law proceedings, the applicable standard of proof is the “substantial evidence” standard (i.e., the evidence must reasonably support a particular conclusion). The court will ordinarily review the record of decision that was before an agency at the time of an administrative decision, and determine whether, based on that record, the agency’s decision was rational. Under the U.S. Administrative Procedure Act (APA),³⁶ a court must “hold unlawful and set aside” an agency action that is “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.”³⁷ Factual findings made during formal rulemaking or adjudicatory proceedings are reviewed under a “substantial evidence” test,³⁸ under which the agency’s findings will be upheld if they are supported by “such relevant evidence as a reasonable mind might accept as adequate to support a conclusion.”³⁹

³⁴ In the U.S. legal system, plaintiffs have the choice of jury or bench trials in certain civil cases. *See, e.g.*, Lynn Langton & Thomas H. Cohen, *Civil Bench and Jury Trials in State Courts* (2005), BUREAU OF JUS. STAT. SPECIAL REP. (Oct. 2008) (reviewing statistics), <https://www.bjs.gov/content/pub/pdf/cbjtsc05.pdf>. In criminal matters, the defendant generally has the right to a jury trial. *See* Fed. R. Crim. Proc. 23.

³⁵ As one scholar noted, “[t]hree common formulae are proof by a preponderance of the evidence (i.e., 50.0001% persuaded), by clear and convincing evidence (i.e., a fair bit more than that), or beyond a reasonable doubt (i.e., virtually certain).” Peter L. Strauss, “*Deference*” Is Too Confusing—Let’s Call Them “*Chevron Space*” and “*Skidmore Weight*,” 112 COLUM. L. REV. 1143 (2012).

³⁶ 5 U.S.C. §§551 et seq.

³⁷ 5 U.S.C. §706(2)(A).

³⁸ 5 U.S.C. §706(2)(E).

³⁹ *Universal Camera Corp. v. NLRB*, 340 U.S. 474, 477 (1951) (quoting *Consolidated Edison Co. v. NLRB*, 305 U.S. 197, 229 (1938)). The difference in the required supporting evidence between these two standards for administrative review is seen as nominal. *See Assoc. of Data Processing Serv. Orgs., Inc. v. Bd. of Govs. of the Fed. Res. Sys.*, 745 F.2d 677, 684 (D.C. Cir. 1984).

To permit meaningful judicial review, an agency must “disclose the basis” of its action.⁴⁰ When it comes to scientific information, agencies are expected to rely on the best available science.⁴¹ In reviewing agency action, a court is ordinarily limited to evaluating the agency’s contemporaneous explanation in light of the existing administrative record.⁴² In this context, the court is not compelled to conclude which view of the facts is superior, but rather need only determine that the factual conclusions upon which an administrative decision was based were not irrational.⁴³ Nonetheless, in resolving administrative challenges, courts often offer fairly clear and dispositive views on factual questions. Accordingly, factual determinations in these cases need to be reviewed case-by-case to assess the definitiveness of judicial views on the operative facts.

Judicial review under the arbitrary and capricious standard is “deferential.”⁴⁴ Courts generally defer to the reasonable factual determinations of expert agencies on highly technical questions. When a court defers outright on this basis, it may not be making its own factual determination but rather defaulting to the agency’s view. This said, in assessing whether the expert agency’s views are reasonable, the court can move fairly far along the certainty continuum. So, here again, a contextualized reading of a court’s decision is needed. Certainly, in circumstances in which a court rejects an expert agency’s technical determination as unreasonable, the court is offering a fairly decisive view of the facts.

c. Constitutional Claims. In constitutional claims, courts will apply different standards of review for different powers and rights protected by the Constitution and even with respect to different groups

⁴⁰ *Burlington Truck Lines, Inc. v. United States*, 371 U.S. 156, 167–69 (1962) (internal quotation marks omitted); *see also* *SEC v. Chenery Corp.*, 318 U.S. 80, 94 (1943) (“[T]he orderly functioning of the process of review requires that the grounds upon which the administrative agency acted be clearly disclosed and adequately sustained.”).

⁴¹ *See, e.g.*, *Custer Cty. Action Ass’n v. Garvey*, 256 F.3d 1024, 1034 (10th Cir. 2001) (internal quotation marks and citation omitted) (stating that “agencies must take a hard look at the environmental consequences of proposed actions utilizing public comment and the best available scientific information”); *City of Dallas, Tex. v. Hall*, 562 F.3d 712, 720 (5th Cir. 2009) (“Properly analyzing the risks of an action requires an agency to use updated information or data; reliance on out-of-date or incomplete information may render the analysis of effects speculative and uncertain, warranting the preparation of an EIS.”).

⁴² *See, e.g.*, *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519, 549 (1978). *See also* *SEC v. Chenery Corp.*, 318 U.S. 80, 87 (1943) (“The grounds upon which an administrative order must be judged are those upon which the record discloses that its action was based”).

⁴³ *See, e.g.*, *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 513–14 (2009) (citation omitted) (the reviewing court cannot “substitute its judgment for that of the agency,” and should “uphold a decision of less than ideal clarity if the agency’s path may reasonably be discerned”). *See also* *Motor Vehicle Mfrs. Assn. of United States, Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (courts will invalidate agency determinations that fail to “examine the relevant data and articulate a satisfactory explanation for its action including a ‘rational connection between the facts found and the choice made.’”).

⁴⁴ *See* *National Assn. of Home Builders v. Defenders of Wildlife*, 551 U.S. 644, 658 (2007). *See also* *State Farm*, 463 U.S. at 43 (explaining that the scope of review is “narrow,” and the “court is not to substitute its judgment for that of the agency.”). Deferential review of the agency’s discretionary choices and reasoning under the arbitrary-and-capricious standard can be contrasted with the court’s plenary review of the agency’s interpretation and application of the law. *See* §§706(A)–(D) (court must review agency action to ensure that it complies with all “constitutional,” “statutory,” and “procedur[al]” requirements, and is otherwise “in accordance with law”).

of claimants.⁴⁵ For example, equal protection and due process claims that involve violations of a fundamental right “must be evaluated through the lens of strict scrutiny.”⁴⁶ Again, the courts’ examination of such claims is aided by a well-developed factual record.⁴⁷

d. Criminal Proceedings. Finally, in the rare circumstance in which climate science is at issue in criminal proceedings, courts apply the strictest evidentiary standard (beyond a reasonable doubt (i.e., virtually certain)) as a predicate for a conviction.

4. Judicial Assists in Technically Complex Cases

In many circumstances,⁴⁸ tools are available to courts to enhance judicial understanding of highly technical matters, including experts and special masters appointed by the court, and the taking of judicial notice of authoritative reports and information in the public domain. With such tools available, judicial assessment is not necessarily limited by the quality or completeness of evidence brought forward by advocates themselves.

For example, courts have appointed special masters or court-appointed experts to perform a variety of pre- and post-trial functions,⁴⁹ which are regulated by Federal Rule of Civil Procedure 53.⁵⁰ Masters with expert knowledge of patents, for example, can aid in the court’s interpretation of patent claims.⁵¹ Courts review the master’s findings de novo,⁵² but initial determination by a master can make the judicial process more effective and timely than disposition by the judge acting alone.⁵³ Courts can also rely on a post-trial master where, for instance, a complex decree requires complex policing, or

⁴⁵ See, e.g., Aziz Huq, *Tiers of Scrutiny in Enumerated Powers Jurisprudence*, 80 U. CHI. L. REV. 575 (2013). See also *City of Cleburne v. Cleburne Living Ctr., Inc.*, 473 U.S. 432, 439–42 (1985) (setting out three tiers of judicial review).

⁴⁶ See *Juliana v. United States*, 339 F. Supp. 3d 1062, 1103–04 (D. Or. 2018). See generally *infra* § III.C.1.a.

⁴⁷ See *id.*

⁴⁸ When a court’s review is confined to the administrative record of decision compiled by that agency when it made the decision, use of such tools may not be available. See, e.g., *Silver State Land, LLC v. Beaudreau*, 59 F. Supp. 3d 158, 172 (D.D.C. 2014) (internal citations omitted) (“Judicial notice is ‘typically an inadequate mechanism’ for a court to consider extra-record evidence in reviewing an agency action. Instead, a court may only consider an adjudicative fact subject to judicial notice that is not part of the administrative record if it qualifies for supplementation as extra-record evidence . . .”).

⁴⁹ See Thomas E. Willging et al., *Special Masters’ Incidence and Activity: Report to the Judicial Conference’s Advisory Committee on Civil Rules and Its Subcommittee on Special Masters*, FED. JUD. CTR. (Aug. 9, 2000).

⁵⁰ Fed. R. Civ. P. 53. Rule 53 also permits appointment of a trial master in an action to be tried to a jury, but only if the parties consent. *Id.* Appointment of a master must be the exception and not the rule. See *id.* (advisory committee’s note to 2003 amendment).

⁵¹ See *id.*

⁵² See *id.* at 53(g)(4).

⁵³ See *id.*

when a party has proved resistant or intransigent.⁵⁴ Courts have appointed special masters to oversee complex environmental cases, including multi-year litigation over environmental contamination. A special master was also appointed by the Supreme Court in *Florida v. Georgia*, a complex original jurisdiction proceeding over water apportionment.⁵⁵

Courts can also take judicial notice of relevant facts in specific circumstances. Under the Federal Rules of Evidence, courts may take judicial notice of “adjudicative” facts—the facts of the particular case—at any stage in the proceedings.⁵⁶ The “court may judicially notice a fact that is not subject to reasonable dispute because it: (1) is generally known within the trial court’s territorial jurisdiction; or (2) can be accurately and readily determined from sources whose accuracy cannot reasonably be questioned.”⁵⁷ The court may take judicial notice sua sponte, or it “must take judicial notice if a party requests it and the court is supplied with the necessary information.”⁵⁸ Courts have used this tool in climate cases, as discussed below.⁵⁹

5. Expert Testimony

Expert testimony, regardless of the nature of the proceeding, is subject to rigorous admissibility standards in U.S. courts.⁶⁰ In *Daubert v. Merrell Dow Pharmaceuticals*, the Supreme Court tasked trial judges with the responsibility of acting as gatekeeper to exclude unreliable expert testimony.⁶¹ The proponent has the burden of establishing that the pertinent admissibility requirements are met by a preponderance of the evidence.⁶² The purpose of *Daubert’s* gatekeeping requirement “is to make certain that an expert, whether basing testimony upon professional studies or personal experience,

⁵⁴ *Id.* (citing *Local 28, Sheet Metal Workers’ Int’l Assn. v. EEOC*, 478 U.S. 421, 481–82 (1986)).

⁵⁵ *See Florida v. Georgia*, 138 S. Ct. 2502, 2518 (2018). *See also* Report of the Special Master, *Florida v. Georgia*, 2017 WL 656655 (Feb. 14, 2017).

⁵⁶ Fed. R. Evid. 201(f). No rule deals with judicial notice of “legislative” facts (i.e., facts which have relevance to legal reasoning and the lawmaking process). *Id.* at 201(a). *See id.* (Notes of Advisory Committee on Proposed Rules). Judicial notice of matters of foreign law is addressed in Rule 44.1 of the Federal Rules of Civil Procedure and Rule 26.1 of the Federal Rules of Criminal Procedure.

⁵⁷ *Id.* at 201(b).

⁵⁸ *Id.* at 201(c).

⁵⁹ *See infra* p. 62.

⁶⁰ *See* Fed. R. Evid. 702 (Testimony by Expert Witnesses).

⁶¹ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993) (setting forth a non-exclusive checklist for trial courts to use in determining the reliability of scientific expert testimony, including (1) whether the expert’s technique or theory can be or has been tested; (2) whether the technique or theory has been subject to peer review and publication; (3) the known or potential rate of error of the technique or theory when applied; (4) the existence and maintenance of standards and controls; and (5) whether the technique or theory has been generally accepted in the scientific community). The gatekeeper function applies to all expert testimony, not just testimony based in science. *See Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

⁶² *See Bourjaily v. United States*, 483 U.S. 171 (1987).

employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field.”⁶³ However, as the Court in *Daubert* stated, “[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence.”⁶⁴

B. Factual Advocacy in Climate Cases

For purposes of assessing the weight of a judicial decision on climate change, in the absence of a clear contest on climate science in the advocacy presented to a court, the record before the court should be examined to assess the completeness of the facts before the court. If the record is robust, such that the court had information before it that either addressed the skeptical view or provided a basis for further judicial inquiry along these lines, then, whether or not a court engages in such further inquiry, its conclusions on climate facts should be seen as having considerable weight.

As noted above, in complex or technical cases where the court questions the adequacy of the advocacy or the quality of the factual record before it, the court has the ability to engage in its own inquiry through judicial notice sua sponte or the appointment of a special master or a court-appointed expert.⁶⁵ If the court chooses not to engage in such inquiry and proceeds to make findings of fact based on the evidence presented by the parties, this could be seen as signaling the absence of a serious question in the mind of the court about the underlying science. In short, here again, a contextual understanding of a judge’s decision is needed to assess its factual weight.

II. EARLY JUDICIAL PRONOUNCEMENTS ON CLIMATE SCIENCE IN U.S. COURTS

Before turning to the focus of this report—how the courts and the litigants have engaged with climate science in recent cases—it will be helpful to provide a brief overview of how climate science was treated in some of the early climate cases in the United States, which have set the tone for subsequent proceedings (reviewed below in Section III).

There has not always been judicial agreement on basic climate science, as the proceedings in the most famous U.S. climate case, *Massachusetts v. EPA*, demonstrate. There, the U.S. Court of Appeals for the District of Columbia (D.C.) Circuit held that the EPA had properly exercised the discretion to not regulate greenhouse gases (GHGs) under the Clean Air Act (CAA).⁶⁶ Judge A. Raymond Randolph, in his opinion announcing the court’s judgment, found that some of the evidence in the EPA’s lengthy administrative record “contradict[ed] petitioners’ claim that [GHG] emissions

⁶³ *Kumho*, 526 U.S. at 152.

⁶⁴ *Daubert*, 509 U.S. at 595.

⁶⁵ *See supra* § I.A.4 at pp. 9–10.

⁶⁶ *Massachusetts v. EPA*, 415 F.3d 50 (D.C. Cir. 2005).

from new motor vehicles have caused or will cause a significant change in the global climate.”⁶⁷ The opinion questioned the link between emissions and climate change, citing findings of the National Research Council (NRC).⁶⁸ In view of the deference granted to the EPA Administrator, as well as “the scientific uncertainty about the causal effects of [GHGs] on the future climate of the earth,” Judge Randolph concluded that the EPA was justified in its refusal to regulate emissions.⁶⁹ Judge David S. Tatel dissented, pointing to errors that he saw in his colleagues’ characterization of the scientific record.⁷⁰

⁶⁷ *Id.* at 55. Each of the three judges on the panel wrote a separate opinion, but two judges agreed “that the EPA Administrator properly exercised his discretion under §202(a)(1) in denying the petition for rule making.” *Id.* at 58. Judge David B. Sentelle believed petitioners had failed to “demonstrat[e] the element of injury necessary to establish standing under Article III.” *Id.* at 59 (Sentelle, J., opinion dissenting in part and concurring in judgment).

⁶⁸ As Judge Randolph stated:

“The [NRC] concluded that ‘a causal linkage’ between [GHG] emissions and global warming ‘cannot be unequivocally established.’ The earth regularly experiences climate cycles of global cooling, such as an ice age, followed by periods of global warming. Global temperatures have risen since the industrial revolution, as have atmospheric levels of [CO₂]. But an increase in [CO₂] levels is not always accompanied by a corresponding rise in global temperatures. For example, although [CO₂] levels increased steadily during the twentieth century, global temperatures decreased between 1946 and 1975. Considering this and other data, the [NRC] concluded that ‘there is considerable uncertainty in current understanding of how the climate system varies naturally and reacts to emissions of greenhouse gases.’ This uncertainty is compounded by the possibility for error inherent in the assumptions necessary to predict future climate change. And, as the [NRC] noted, past assumptions about effects of future [GHG] emissions have proven to be erroneously high.”

Id. at 57 (internal citations omitted). Notably, “unequivocal proof” is not the standard upon which facts are determined by the courts, nor is it, in most settings, a predicate for administrative action. *See id.* at 77 (Tatel, J., dissenting) (“But the CAA nowhere calls for proof. It nowhere calls for ‘unequivocal’ evidence. Instead, it calls for the Administrator to determine whether GHGs ‘contribute to air pollution which may reasonably be anticipated to endanger’ welfare. EPA never suggests that the uncertainties identified by the NRC Report prevent it from determining that GHGs ‘may reasonably be anticipated to endanger’ welfare.”).

⁶⁹ *Id.* at 57. However, Judge Randolph emphasized that the refusal to regulate need not be based solely on scientific evidence, but may also be informed by policy judgments. *Id.* at 58 (stating that “the EPA Administrator’s refusal to regulate [did not] rest[] entirely on scientific uncertainty, or that EPA’s decision represented an ‘open-ended invocation of scientific uncertainty to justify refusing to regulate’” and finding that a reviewing court “will uphold agency conclusions based on policy judgments” “when an agency must resolve issues ‘on the frontiers of scientific knowledge.’”) (internal citations omitted).

⁷⁰ *See, e.g., id.* at 63 (Tatel J., dissenting) (noting that Judge Randolph “erroneously read[]” the statement that “[t]he Northern Hemisphere as a whole experienced a slight cooling from 1946-75” “for the proposition that ‘global temperatures decreased between 1946 and 1975’”). *See also id.* (noting that “[a]lthough Judge Randolph seizes on this uncertainty—and portrays it as applying to global warming generally rather than to twentieth-century warming . . .—read in context, it appears little more than an application of the principle that, as the NRC Report later puts it, ‘[c]onfidence limits and probabilistic information, with their basis, should always be considered as an integral part of the information that climate scientists provide to policy and decision makers.’ Indeed, the NRC Report goes on to state that the ‘fact that the magnitude of the observed warming is large compared to natural variability as simulated in climate models is suggestive of such a linkage’ between GHG atmospheric concentration increases and twentieth-century temperature increases, though not ‘proof of it.’”) (internal citations omitted); *id.* at 66 (“[I]f anything, the order under review appears to support petitioners’

The Supreme Court famously overturned the D.C. Circuit’s decision in 2007.⁷¹ In a lengthy opinion, Justice Stevens, writing for the majority, reviewed the evidence before the court, including voluminous findings by Congress, the federal government, the EPA, the NRC, and the Intergovernmental Panel on Climate Change (IPCC) since 1959.⁷² The majority opinion is quite strong in its acceptance both that the climate is warming and that this phenomenon is partly man-made. As Justice Stevens wrote,

A well-documented rise in global temperatures has coincided with a significant increase in the concentration of [CO₂] in the atmosphere. Respected scientists believe the two trends are related. For when [CO₂] is released into the atmosphere, it acts like the ceiling of a greenhouse, trapping solar energy and retarding the escape of reflected heat. It is therefore a species—the most important species—of a “greenhouse gas.”⁷³

The Court further noted that, for purposes of Article III standing, “EPA’s steadfast refusal to regulate [GHG] emissions presents a risk of harm to Massachusetts that is both ‘actual’ and ‘imminent.’”⁷⁴ With respect to the injury requirement, the Court observed that

The harms associated with climate change are serious and well recognized. Indeed, the NRC Report itself—which EPA regards as an ‘objective and independent assessment of the relevant science,’ 68 Fed. Reg. 52930—identifies a number of environmental changes that have already inflicted significant harms, including “the global retreat of mountain glaciers, reduction in snow-cover extent, the earlier spring melting of rivers and lakes, [and] the accelerated rate of rise of sea levels during the 20th century relative to the past few thousand years”⁷⁵

The parties did not dispute that climate change was to a large extent anthropogenically caused. As the Court noted, “EPA does not dispute the existence of a causal connection between man-made [GHG]

standing. . . . EPA never denies the ‘substantial probability’ that injurious global warming is occurring. Quite to the contrary, EPA ‘agree[s] with the President that ‘we must address the issue of global climate change.’ . . . Because EPA nowhere challenges petitioners’ declarations, I see no reason to consider what we would do if it had done so.” (internal citations omitted); *id.* at 77 (“Indeed, looking at the NRC Report as a whole, I doubt EPA could credibly conclude that it needs more research to determine whether GHG-caused global warming ‘may reasonably be anticipated to endanger’ welfare. . . . The report also indicates that the projected consequences of global warming are serious. . . . [N]either EPA nor Judge Randolph acknowledges, let alone evaluates, these projected effects”).

⁷¹ See *Massachusetts v. EPA*, 549 U.S. 497 (2007).

⁷² See *id.* at 505–12.

⁷³ *Id.* at 505.

⁷⁴ *Id.* at 521.

⁷⁵ *Id.* (internal citations omitted). See also *id.* at 522 (discussing likely climate damage reported in an affidavit by a climate scientist, including, inter alia, sea-level rise, severe and irreversible changes to natural ecosystems, increase in the spread of disease, and increased storms). See also *id.* at 523 n.21 (“Petitioners maintain that the seas are rising and will continue to rise, and have alleged that such a rise will lead to the loss of Massachusetts’ sovereign territory. No one, save perhaps the dissenters, disputes those allegations.”); *id.* at 523 (concluding that, “at least according to petitioners’ uncontested affidavits—the rise in sea levels associated with global warming has already harmed and will continue to harm Massachusetts. The risk of catastrophic harm, though remote, is nevertheless real. That risk would be reduced to some extent if petitioners received the relief they seek.”).

emissions and global warming.”⁷⁶ Furthermore, the Court emphasized the importance of even incremental change in view of the gravity of the challenge.⁷⁷

The dissenting opinions, in contrast, noted the lack of scientific certainty of projected climate impacts,⁷⁸ as well as the U.S. government’s inability to meaningfully redress a global phenomenon like climate change.⁷⁹ Even so, they did not discount the possibility that change may be afoot, that GHGs are likely connected to the observed and anticipated change, and that the problem may indeed be significant.⁸⁰

The decision proved to be a turning point on climate policy in the United States,⁸¹ as well as deeply influential in the many climate-related suits that have followed. As the Supreme Court continued to grapple with climate-related issues in subsequent cases, it repeatedly declined invitations to upset its acceptance of basic climate science in *Massachusetts v. EPA* or subsequent agency findings on climate science.

In *American Electric Power Co. v. Connecticut (AEP)*, for example, the Supreme Court considered whether a group of States, the city of New York, and three private land trusts could advance

⁷⁶ *Id.* at 523.

⁷⁷ *See id.* at 525–26 (“Because of the enormity of the potential consequences associated with man-made climate change, the fact that the effectiveness of a remedy might be delayed during the (relatively short) time it takes for a new motor-vehicle fleet to replace an older one is essentially irrelevant. Nor is it dispositive that developing countries such as China and India are poised to increase [GHG] emissions substantially over the next century: A reduction in domestic emissions would slow the pace of global emissions increases, no matter what happens elsewhere.”).

⁷⁸ *See, e.g., id.* at 535 (Roberts, C.J., dissenting) (“I would reject these challenges as nonjusticiable. Such a conclusion involves no judgment on whether global warming exists, what causes it, or the extent of the problem.”); *id.* at 542 (Roberts, C.J., dissenting) (“[T]here is nothing in petitioners’ 43 standing declarations and accompanying exhibits to support an inference of actual loss of Massachusetts coastal land from 20th century global sea level increases. It is pure conjecture.”). *See also id.* at 560 (Scalia, J., dissenting) (“The Court’s alarm over global warming may or may not be justified, but it ought not distort the outcome of this litigation.”).

⁷⁹ *See, e.g., id.* at 543–44 (Roberts, C.J., dissenting) (noting that the Court “ignores the complexities of global warming” and that, “[b]ecause local [GHG] emissions disperse throughout the atmosphere and remain there for anywhere from 50 to 200 years, it is global emissions data that are relevant.”); *id.* at 545 (“[A]ny decreases produced by petitioners’ desired standards are likely to be overwhelmed many times over by emissions increases elsewhere in the world.”).

⁸⁰ *See, e.g., id.* at 535 (Roberts, C.J., dissenting) (“Global warming may be a ‘crisis,’ even ‘the most pressing environmental problem of our time.’ Pet. for Cert. 26, 22. Indeed, it may ultimately affect nearly everyone on the planet in some potentially adverse way, and it may be that governments have done too little to address it. It is not a problem, however, that has escaped the attention of policymakers in the Executive and Legislative Branches of our Government, who continue to consider regulatory, legislative, and treaty-based means of addressing global climate change.”). *See also id.* at 541 (“The very concept of global warming seems inconsistent with this particularization requirement [for Article III standing]. Global warming is a phenomenon ‘harmful to humanity at large,’ 415 F.3d, at 60 (Sentelle, J., dissenting in part and concurring in judgment), and the redress petitioners seek is focused no more on them than on the public generally—it is literally to change the atmosphere around the world.”).

⁸¹ Following the ruling, the EPA made the requisite determination, setting the stage for regulation of GHGs under the Clean Air Act. *See* Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66496, 66523, 66537 (Dec. 15, 2009) [hereinafter EPA Endangerment Finding].

federal common-law public nuisance claims against the five largest U.S. emitters.⁸² The Court determined that the federal Clean Air Act had displaced any federal common-law right to seek abatement of GHG emissions and, moreover, that the EPA, as the federal agency tasked with regulating emissions, had already taken the first steps to determine whether and how GHGs should be regulated.⁸³ In its analysis, the Court relied on the fact that EPA had taken a position on climate science,⁸⁴ without offering an independent view on the issue.⁸⁵ However, it also underscored that, if EPA did not set emissions limits, plaintiffs could petition for a rulemaking on the matter, and EPA's response would be subject to judicial review.⁸⁶

Then, in *Utility Air Regulatory Group v. EPA (UARG)*, the Supreme Court granted review of the D.C. Circuit's decision in *Coalition for Responsible Regulation*⁸⁷ upholding an EPA determination that the agency's regulation of GHG emissions from new motor vehicles triggered permitting requirements under the CAA for stationary sources.⁸⁸ The petitions for certiorari had also sought review of the D.C. Circuit's affirmation of EPA's endangerment finding that served as a predicate for the agency's regulation of GHG emissions under the CAA and the motor vehicles rule that in EPA's view triggered stationary source coverage.⁸⁹ That the Court declined to grant review on these challenges

⁸² See *American Electric Power Co. v. Connecticut (AEP)*, 564 U.S. 410, 415 (2011).

⁸³ *Id.* at 424.

⁸⁴ See, e.g., *id.* at 416–17 (internal citations omitted):

Responding to our decision in *Massachusetts*, EPA undertook [GHG] regulation. In December 2009, the agency concluded that [GHG] emissions from motor vehicles “cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare,” the Act’s regulatory trigger. The agency observed that “atmospheric [GHG] concentrations are now at elevated and essentially unprecedented levels,” almost entirely “due to anthropogenic emissions”; mean global temperatures, the agency continued, demonstrate an “unambiguous warming trend over the last 100 years,” and particularly “over the past 30 years.” Acknowledging that not all scientists agreed on the causes and consequences of the rise in global temperatures, EPA concluded that “compelling” evidence supported the “attribution of observed climate change to anthropogenic” emissions of [GHGs]. Consequent dangers of [GHG] emissions, EPA determined, included increases in heat-related deaths; coastal inundation and erosion caused by melting icecaps and rising sea levels; more frequent and intense hurricanes, floods, and other “extreme weather events” that cause death and destroy infrastructure; drought due to reductions in mountain snowpack and shifting precipitation patterns; destruction of ecosystems supporting animals and plants; and potentially “significant disruptions” of food production.

⁸⁵ *Id.* at 417 n.2 (“The Court, we caution, endorses no particular view of the complicated issues related to carbon-dioxide emissions and climate change.”).

⁸⁶ *Id.* at 425.

⁸⁷ *Coal. for Responsible Regulation, Inc. v. EPA*, 684 F.3d 102 (D.C. Cir. 2012), *aff’d in part, rev’d in part sub nom.* *Util. Air Regulatory Grp. v. EPA (UARG)*, 134 S. Ct. 2427 (2014).

⁸⁸ *Utility Air Regulatory Group v. EPA (UARG)*, 134 S. Ct. 2427 (2014).

⁸⁹ See Lyle Denniston, *Analysis: Greenhouse Gases Case*, SCOTUSBLOG (Oct. 16, 2013), <https://www.scotusblog.com/2013/10/analysis-greenhouse-gases-case/> (discussing petitions and the question under review).

is noteworthy, in that the net effect of limiting the question under review was to forego an opportunity to more fundamentally reconsider the holding and conclusions of *Massachusetts*. The Court ultimately struck down EPA’s stationary source interpretation,⁹⁰ with Justice Scalia writing for the majority, but, in so doing, did not call into question previously accepted climate facts in view of the agency’s own findings,⁹¹ and it sought to distinguish *Massachusetts*⁹² rather than undoing it.⁹³

The Supreme Court’s decision in *UARG* not to review the other elements of *Coalition for Responsible Regulation* preserved the reasoning and stature of a large core of the D.C. Circuit’s decision, including, importantly, its rather extensive examination of basic climate science. In that decision, the D.C. Circuit had described the “body of scientific evidence marshaled by EPA” as “substantial,” noting that

the scientific evidence of record included support for the proposition that [GHGs] trap heat on earth that would otherwise dissipate into space; that this ‘greenhouse effect’ warms the climate; that human activity is contributing to increased atmospheric levels of [GHGs]; and that the climate system is warming.⁹⁴

“Based on this scientific record,” the D.C. Circuit observed, “EPA made the linchpin finding: in its judgment, the ‘root cause’ of the recently observed climate change is ‘very likely’ the observed increase in anthropogenic [GHG] emissions.”⁹⁵

III. CLIMATE SCIENCE IN U.S. COURTS: RECENT DEVELOPMENTS

⁹⁰ See *UARG*, 134 S. Ct. at 2434.

⁹¹ See *id.* at 2436–37 (“In 2009, EPA announced its determination regarding the danger posed by motor-vehicle [GHG] emissions. EPA found that [GHG] emissions from new motor vehicles contribute to elevated atmospheric concentrations of [GHGs], which endanger public health and welfare by fostering global ‘climate change.’”) (citing EPA Endangerment Finding).

⁹² *Id.* at 2439 (internal citations omitted) (explaining that, in *Massachusetts*, the Court held that the CAA-wide definition of air pollutant “includes [GHGs] because it is all-encompassing; it ‘embraces all airborne compounds of whatever stripe.’ But where the term ‘air pollutant’ appears in the Act’s operative provisions, EPA has routinely given it a narrower, context-appropriate meaning.”). At the same time, the Court ruled that EPA may continue to treat GHGs as a pollutant subject to regulation for purposes of requiring “best available control technology” (BACT) for already-regulated sources. *Id.* at 2449. Alito, J., and Thomas, J., “believed *Massachusetts v. EPA* was wrongly decided at the time.” See *id.* (Alito, J., concurring in part and dissenting in part).

⁹³ However, Justice Breyer argued that the majority’s interpretation “chip[ped] away” at *Massachusetts*. See *id.* at 2454 (Breyer, J., concurring in part and dissenting in part). See also *id.* at 2455 (“The expert agency charged with administering the [CAA] has determined in its Endangerment Finding that [GHGs] endanger human health and welfare, and so sensible regulation of industrial emissions of those pollutants is at the core of the purpose behind the Act. The broad ‘no [GHG]’ exception that the Court reads into the statute unnecessarily undercuts that purpose. . . .”). Cf. Richard J. Lazarus, *The Opinion Assignment Power, Justice Scalia’s Un-Becoming, and UARG’s Unanticipated Cloud Over the Clean Air Act*, 39 HARV. ENVTL. L. REV. 37, 46 (2014) (discussing *UARG*’s impact on *Massachusetts*).

⁹⁴ *Coal. for Responsible Regulation*, 684 F.3d at 120.

⁹⁵ *Id.* See also *id.* at 121 (“To recap, EPA had before it substantial record evidence that anthropogenic emissions of [GHGs] ‘very likely’ caused warming of the climate over the last several decades.”).

In the time since these significant judicial pronouncements by the United States' highest courts, climate science has continued to evolve, and so has the response of litigants and courts.⁹⁶ Since then, U.S. courts have dealt with climate science in numerous cases, ranging from constitutional claims to the protection of endangered species.⁹⁷ What sets U.S. jurisprudence apart from many other jurisdictions is the quantity and quality of climate data that has been collected, analyzed, and published by the federal government itself over the years.

In carrying out their statutory duties, various federal administrative agencies have generated a vast amount of climate data, including modelling climatic impacts on snowcaps and fish species. For example, the National Aeronautics and Space Administration (NASA), an independent U.S. federal agency, “has been studying and recognizing climate change since at least 2008 and recognizes that studies publish in peer-reviewed scientific journals overwhelmingly recognize climate change trends and risks associated with the trends.”⁹⁸ The U.S. Global Change Research Program (USGCRP)—a cooperative effort of 13 agencies⁹⁹—has been issuing national climate assessments about the impacts of climate change in the United States. Courts have frequently relied on these assessments in their decision-making, not merely in the United States,¹⁰⁰ but also abroad.¹⁰¹ U.S. courts, the litigants, and federal agencies themselves have also frequently cited reports of the Intergovernmental Panel on Climate Change (IPCC) in their discussions of climate science.¹⁰²

As the discussion below makes clear, the administrative records before U.S. courts have been replete with evidence of causes and consequences of climate change and have been a key source of data on climate science. This evidence has also served to limit the scope of plausible arguments raised by federal defendants and other litigants in court: in view of the lengthy administrative records and

⁹⁶ See, e.g., *Juliana v. United States*, 339 F. Supp. 3d 1062, 1091 (D. Or. 2018) (“[C]limate science and our ability to understand the effects of climate change are constantly evolving.”).

⁹⁷ Most of the cases discussed in this report are available publicly in the climate change litigation database compiled by the Sabin Center for Climate Change Law at Columbia Law School and Arnold & Porter (<http://climatecasechart.com/>), the database compiled by the Environmental Law Alliance Worldwide (<https://elaw.org/resources>), as well as in the Lexis and Westlaw databases.

⁹⁸ *Fentress v. Exxon Mobil Corp.*, 304 F. Supp. 3d 569, 577 (S.D. Tex. 2018).

⁹⁹ The report was put together by a “team of more than 300 experts guided by a 60-member Federal Advisory Committee,” and then “extensively reviewed by the public and experts, including federal agencies and a panel of the National Academy of Sciences.” *Id.* (quoting U.S. National Climate Assessment: Climate Change Impacts in the United States (May 2014)).

¹⁰⁰ See, e.g., *San Juan Citizens All. v. U.S. Bureau of Land Mgmt.*, 326 F. Supp. 3d 1227, 1249–50 (D.N.M. 2018) (citing, inter alia, USGCRP, Climate Science Special Report: Fourth National Climate Assessment (2017)); *Fentress v. Exxon Mobil Corp.*, 304 F. Supp. 3d 569, 577 (S.D. Tex. 2018) (citing the Third National Climate Assessment); *AquAlliance v. U.S. Bureau of Reclamation*, 287 F. Supp. 3d 969, 1028 (E.D. Cal. 2018) (citing the Second National Climate Assessment).

¹⁰¹ See, e.g., *Gloucester Resources Ltd. v. Minister for Planning*, [2019] NSWLEC 7 (Austl.) (citing NOAA research).

¹⁰² See, e.g., *Living Rivers Council v. Cty. of Napa*, No. A154253, 2019 WL 4746753, at *28 n.12 (Cal. Ct. App. Sept. 30, 2019), *as modified on denial of reh'g* (Oct. 30, 2019) (“The IPCC is an intergovernmental body of the United Nations dedicated to providing the world with an objective, scientific view of climate change.”).

findings issued by the federal government, outright denials of climate science that are encountered in public debate are simply rare in a courtroom setting.

In short, as the discussion below shows, climate science is not being directly disputed in, or questioned by, U.S. courts. The growing evidence of climate change and the growing consensus around climate science has shifted the courts' engagement with this issue. This is not to say that plaintiffs seeking greater climate action necessarily prevail in U.S. courts—far from it, there are still considerable evidentiary and procedural hurdles in any given case, including questions of standing, causation, fault, and attribution, as well as uncertainties relating to particular climate impacts on particular ecosystems or claimants. However, as courts are grappling with these challenging issues, they are also deciding climate facts along the way with a remarkable degree of consistency.

This section reviews a range of disputes, as outlined in Section I above, where U.S. state and federal courts have engaged with climate science, including (a) civil/tort-based cases, (b) federal and statutory claims, (c) constitutional claims, (d) public trust doctrine, and (e) criminal proceedings. It describes how U.S. courts have assessed climate facts/science, which facts they have decided, and, where relevant, how they have approached expert evidence or reached factual conclusions. As the discussion shows, the courts' engagement with climate science has generally been detailed, comprehensive, and thoughtful.

A. Civil/Tort-Based Cases

Civil litigation over climate change has taken several different forms, including nuisance and defamation suits. Some of the more prominent examples in which the courts and litigants have engaged with climate science are discussed below.

1. Nuisance

In the United States, plaintiffs have filed a number of high-profile civil lawsuits against private entities seen as responsible for emissions, including energy and utility companies, borrowing a page from the mass tort playbook utilized in tobacco and asbestos litigation. A key challenge facing plaintiffs in this context has been proving causation: before a defendant can be held liable, the plaintiff must demonstrate that a specific defendant caused the harm in question. Litigants and courts have accepted the first link in the causal chain based on climate science—that anthropogenic GHG emissions cause climate change. The next causal link—proving that a particular defendant should be held accountable for a particular climate-induced harm—has proven more controversial. Specifically, the global nature

of climate change and multiple sources of emissions have made this burden difficult to meet,¹⁰³ though emerging attribution science may change that in the future.¹⁰⁴

The first-generation lawsuits in the U.S. attempted to impose climate liability on private entities on the theory of public nuisance under federal tort law. They were unsuccessful and never reached the merits.¹⁰⁵ As the Supreme Court held in *AEP*, nuisance claims under federal common law are displaced by federal statutory law, in particular the Clean Air Act.¹⁰⁶ However, the Supreme Court did not foreclose the availability of such claims under state common law or other federal law (such as federal securities law or ERISA, discussed below¹⁰⁷).

Launched nearly a decade later, the second-generation lawsuits have generally taken a different approach, basing claims on *state* nuisance law. Since 2017, state and local governments, as well as trade groups, have filed over a dozen suits against private energy companies seeking compensation for injuries allegedly caused by the companies' conduct.¹⁰⁸ Most of the suits claim that defendants violated state public nuisance laws by producing and selling fossil fuels that contribute to sea-level rise and other climate-related impacts.

¹⁰³ See generally *Banda & Fulton* at 10125, 10130. See also *Washington Env'tl. Council v. Bellon*, 732 F.3d 1131, 1143 (9th Cir. 2013) (discussing the difficulty of establishing a causal nexus "between Plaintiffs' localized injuries and the greenhouse effect"); *Barnes v. U.S. Dep't of Transp.*, 655 F.3d 1124, 1140 (9th Cir. 2011) (stating that local aviation activities accounting for 0.03% of U.S.-based GHG emissions do "not translate into locally-quantifiable environmental impacts given the global nature of climate change").

¹⁰⁴ See *Banda & Fulton* at 10130.

¹⁰⁵ See, e.g., *Connecticut v. American Elec. Power Co.*, 406 F. Supp. 2d 265 (S.D.N.Y. 2005); *Comer v. Murphy Oil USA*, No. 05-cv-436, 2007 WL 6942285 (S.D. Miss. Aug. 30, 2007); *Native Vill. of Kivalina v. ExxonMobil Corp.*, 663 F. Supp. 2d 863 (N.D. Cal. 2009). See also *California v. General Motors Corp.*, No. C06-05755 MJJ, 2007 WL 2726871 (N.D. Cal. Sept. 17, 2007) (rejecting nuisance suit by California against six car manufacturers for their alleged contributions to climate change impacts as a nonjusticiable political question). See generally *Banda & Fulton* at 10129 et seq.

¹⁰⁶ *AEP*, 564 U.S. at 425–28. See generally *supra* notes 82-86 and accompanying text.

¹⁰⁷ See *infra* § III.B.4.

¹⁰⁸ See *Cty. of San Mateo v. Chevron Corp.*, No. 17-cv-4929 (N.D. Cal.); *City of Imperial Beach v. Chevron Corp.*, No. 17-cv-4934 (N.D. Cal.); *Cty. of Marin v. Chevron Corp.*, No. 17-cv-4935 (N.D. Cal.); *Cty. of Santa Cruz v. Chevron Corp.*, No. 18-cv-450 (N.D. Cal.); *City of Santa Cruz v. Chevron Corp.*, No. 18-cv-458 (N.D. Cal.); *City of Richmond v. Chevron Corp.*, No. 18-cv-732 (N.D. Cal.); *City of Oakland v. BP p.l.c.*, No. 17-cv-6011 (N.D. Cal.); *City and Cty. of San Francisco v. BP p.l.c.*, No. 17-cv-6012 (N.D. Cal.); *Pacific Coast Fed. of Fishermen's Ass'n v. Chevron Corp.*, No. 3:18-cv-07477 (N.D. Cal.); *Mayor & Cty. Council of Baltimore v. B.P. p.l.c.*, No. 1:18-cv-02357-ELH (D. Md.); *King County v. BP p.l.c.*, No. 2:18-cv-00758-RSL (W.D. Wash.); *City of New York v. BP p.l.c.*, No. 18-cv-00182-JFK (S.D.N.Y.); *Bd. of Cty. Cmm'rs of Boulder Cty. v. Suncor Energy (U.S.A.) Inc.*, No. 18-cv-1672 (D. Colo.). A number of these actions have been joined.

The threshold issue in most of the second-generation cases has been whether state courts have jurisdiction to hear the claims, or whether such cases belong in federal court in view of *AEP*.¹⁰⁹ The courts have diverged significantly in their analysis of the jurisdictional issues.¹¹⁰ On the other hand, the underlying climate science—at least in the early stage of the proceedings—has not been in dispute, and courts have accepted a number of basic climate facts. Several key decisions are discussed below, including in the cases brought by the cities of Oakland and San Francisco, Baltimore, New York, and the state of Rhode Island.

In reviewing the discussion of climate science in this set of cases, it is important to note that the substantive adequacy of a complaint is irrelevant in assessing the district court’s subject-matter jurisdiction.¹¹¹ Nonetheless, it is noteworthy that no party or amicus took the opportunity to challenge or foreshadow future substantive disagreements with basic climate science in their pleadings to date.¹¹²

a. Oakland and San Francisco

The cities of Oakland and San Francisco sued five energy companies in September 2017 in a California state court on state-law theories of public nuisance, seeking damages for the projected costs of abating climate-induced sea level rise and other impacts. Defendants removed to federal court, and the court denied the cities’ motions to remand.¹¹³ In so doing, District Judge Alsup noted that

If ever a problem cried out for a uniform and comprehensive solution, it is the geophysical problem described by the complaints, a problem centuries in the making (and studying) with causes ranging

¹⁰⁹ Only one case (filed by New York City) was originally filed in federal court; all of the others were removed from state court by defendants, and plaintiffs moved to remand back to state court. *See* *City of New York v. BP p.l.c.*, 325 F. Supp. 3d 466 (S.D.N.Y. 2018).

¹¹⁰ *Compare* *California v. BP p.l.c.*, No. C 17-06011 WHA, 2018 WL 1064293 (N.D. Cal. Feb. 27, 2018), *appeal docketed sub nom.* *City of Oakland v. BP, p.l.c.*, No. 18-16663 (9th Cir. Sept. 4, 2018) (order denying motions to remand), *with* *State of Rhode Island v. Chevron Corp.*, No. 18-395 WES, 2019 WL 3282007 (D.R.I. July 22, 2019) (order granting motion to remand); *Mayor and City Council of Baltimore v. BP p.l.c.*, 388 F. Supp. 3d 538 (D. Md. 2019), *aff’d*, No. 19-1644 (4th Cir. Mar. 6, 2020) (granting motion to remand); *Cnty. of San Mateo v. Chevron Corp.*, 294 F. Supp. 3d 934 (N.D. Cal. 2018), *appeal docketed*, No. 18-15499 (9th Cir. May 27, 2018) (order granting motions to remand), *and* *Bd. of Cty. Comm’rs of Boulder Cty. v. Suncor Energy (U.S.A.) Inc.*, No. 18-CV-01672-WJM-SKC, 2019 WL 4200398 (D. Colo. Sept. 5, 2019) (order granting motion to remand).

¹¹¹ *See* *Bell v. Hood*, 327 U.S. 678, 682 (1946) (“Jurisdiction . . . is not defeated . . . by the possibility that the averments might fail to state a cause of action on which petitioners could actually recover.”). *See also* *California*, 2018 WL 1064293 at *3 (“Taking the complaints at face value”).

¹¹² *See infra* notes 142, 143, and 364 and accompanying text.

¹¹³ *See* *California v. BP p.l.c.*, No. C 17-06011 WHA, 2018 WL 1064293, at *2, *3 (N.D. Cal. Feb. 27, 2018) (order denying motions to remand) (explaining that nuisance claims addressing “the national and international geophysical phenomenon of global warming” are “necessarily governed by federal common law” and that a “patchwork of fifty different answers to the same fundamental global issue would be unworkable.”).

from volcanoes, to wildfires, to deforestation to stimulation of other [GHGs]—and, most pertinent here, to the combustion of fossil fuels.¹¹⁴

The court used several different tools to review climate science and made a number of findings of fact on the matter. Of particular relevance are the court’s use of an innovative climate tutorial, its consideration of amicus briefs, and its ultimate conclusions on climate science, as detailed below.

(i) Climate Tutorial

In the course of the proceedings, Judge Alsup invited counsel to conduct a two-part “tutorial” on the subject of global warming and climate change.¹¹⁵ The first part was to trace the history of scientific study of climate change.¹¹⁶ The second was to set forth the best science available today on “global warming, glacier melt, sea rise, and coastal flooding.”¹¹⁷ The parties were allowed to present evidence via experts or counsel.

While novel in the climate litigation context, tutorials on complex scientific issues have been used by judges in other settings,¹¹⁸ especially in patent and technology cases. Judge Alsup opened the tutorial by stating that “[t]his is not a trial. In these technology cases . . . we often have these tutorials so that the poor Judge can learn some science, and it helps to understand the science.”¹¹⁹ “[T]he purpose” is “to try to educate the Judge.”¹²⁰ As such, experts did not testify under oath, and they could not be cross-examined.¹²¹

The tutorial lasted five hours. The city plaintiffs presented their evidence through expert witnesses. Only one of the defendant companies chose to participate in the tutorial, and it presented evidence through counsel, who relied primarily on IPCC reports. The company noted areas of

¹¹⁴ *Id.* at *3.

¹¹⁵ See *California v. BP p.l.c.*, No. C 17-06011 WHA, at 1 (N.D. Cal. Feb. 27, 2018) (notice of tutorial). The court subsequently directed the parties to also address a list of other related questions. See *California v. BP p.l.c.*, No. C 17-06011 WHA, at 1 (N.D. Cal. Mar. 6, 2018) (notice of additional questions for the tutorial).

¹¹⁶ *Id.*

¹¹⁷ *Id.*

¹¹⁸ Judge Alsup himself had learned to code in Java for a dispute between Google and Oracle and ordered another tutorial on self-driving cars for a case between Uber and Waymo. See Sarah Jeong, *The Judge’s Code*, VERGE (Oct. 19, 2017), <https://www.theverge.com/2017/10/19/16503076/oracle-vs-google-judge-william-alsup-interview-waymo-uber>.

¹¹⁹ Transcript of Proceedings at 6:25–7:4, *California v. BP p.l.c.*, No. C 17-06011 WHA (N.D. Cal. Mar. 21, 2018) [hereinafter Tutorial Transcript].

¹²⁰ *Id.* at 7:9–7:10. Cf. *U.S. Ethernet Innovations, LLC v. Acer, Inc.*, No. C 10-03724 JW, 2010 WL 9934741, at *4 (N.D. Cal. Dec. 21, 2010) (stating that the purpose of a tutorial “is to allow each party to inform the Court about the background of the technical information which is involved in the case and the nature of the dispute” and generally “[s]tatements made during [a] tutorial may not be cited as judicial admissions against a party.”).

¹²¹ Tutorial Transcript at 9:1–9:3 (“[The experts] are not going to be under oath. This is not cross-examination. That will all come later if we get that far.”).

scientific uncertainty in the IPCC report and emphasized that questions like those before the court should not be resolved by courts. However, the company did not question the existence of climate change or its anthropogenic causes, rather conceding that “there’s no debate about climate science.”¹²²

The other four defendants, which had filed objections to the court’s jurisdiction, chose not to participate in the tutorial. After the tutorial, the court directed all four to “submit a statement explaining any disagreements with the statements” presented by the participating company.¹²³ The defendants’ subsequent brief written statements were all largely in line, generally accepting the IPCC’s assessment.¹²⁴

¹²² *Id.* at 82:1–82:12 (“[F]rom Chevron’s perspective there’s no debate about climate science. First, because Chevron accepts what this scientific body and includes scientists and others, but what the IPCC has reached consensus on in terms of science on climate change. But also because it won’t surprise the Court we believe the resolution of climate science issues aren’t going to be determinative here for all the reasons in our motion to dismiss. That’s for another day. From Chevron’s perspective there’s also no debate about another of the IPCC’s conclusions. And that’s climate change is a global issue that requires global engagement and global action.”).

¹²³ *California v. BP p.l.c.*, No. C 17-06011 WHA, (N.D. Cal. Mar. 21, 2018) (notice to defendants re tutorial). *Cf.* Tutorial Transcript at 185:18–185:22 (“ . . . I want to give an order to all the other defendants that if you agree [sic] with anything that [Chevron’s counsel] said you have one week from today to file a statement explaining each and every statement that you disagree with. Otherwise, I’m going to deem it that you agree You can’t get away with sitting there in silence and then later saying, ‘Oh, he wasn’t speaking for us.’”).

¹²⁴ For example, one defendant accepted a number of statements relating to basic climate science made during the tutorial. *See ExxonMobil’s Statement in Response to the Court’s March 21, 2018 Notice to Defendants re Tutorial at 2, California v. BP p.l.c.*, No. 3:17-cv-6011-WHA (N.D. Cal. Apr. 4, 2018), ECF No. 206 (accepting that “[t]he risk of climate change is clear, significant, and warrants comprehensive policies to understand and address the risk,” that “[t]he climate system is warming in part due to increased concentrations of [GHGs] in the atmosphere,” that “[h]uman activities, including the combustion of coal, oil, and natural gas—and driven largely by population size, economic activity, lifestyle, energy use, land use patterns, technology, and climate policy—have increased the concentration of [GHGs] in the atmosphere,” that “IPCC Assessment Reports provide contemporaneous analyses of existing climate science research” and constitute “a reference point for understanding how scientific knowledge and confidence regarding human influence on climate have evolved over the past 30 years.”). However, it made clear that it “does not adopt every statement made in each of the five [IPCC] Assessment Reports published to date” and underscored that IPCC’s climate models “are better suited to model the potential influence of increased [GHG] concentrations on global mean temperature than to identify *local impacts*—including glacier melt, sea level rise, and coastal flooding—associated with a warming climate system.” *Id.* at 2 (emphasis added).

The other three defendants made similar statements. *See, e.g., ConocoPhillips Co.’s Response to Court’s Notice to Defendants re Mar. 21, 2018 Tutorial at 1, California v. BP p.l.c.*, No. 3:17-cv-6011-WHA (N.D. Cal. Apr. 4, 2018), ECF No. 201 (stating that the company “does not conduct research on global warming and climate change science but defers to the scientific community’s consensus views on the science as reflected in, inter alia, the [IPCC] science assessments,” that it “understands that Chevron Corporation based its March 21 global warming and climate change science tutorial presentation on the IPCC science assessments, and in particular the 2013 Fifth Assessment Report (AR5),” and that it “does not disagree with the points made in the Chevron Corporation tutorial presentation”); Responsive Statement of Defendant Royal Dutch Shell p.l.c. to Court’s Mar. 21, 2018 Order at 2, *California v. BP p.l.c.*, No. 17-06011 WHA (N.D. Cal. Apr. 4, 2018), ECF No. 203 (stating that “[a]lthough RDS does not necessarily adopt each statement contained in the various IPCC reports, RDS agrees that those reports are an appropriate source of information for the Court to consider to further its understanding of the timeline and science surrounding climate change, and RDS does not disagree with Chevron’s presentation of that material.”); *BP p.l.c.’s Response to the Court’s Mar. 21, 2018 Notice*

(ii) Amicus Briefs

A number of amicus curiae briefs were also filed in the proceedings. The amicus submissions generally reflected the parties' submissions, focusing on jurisdictional issues rather than climate science. For example, 15 U.S. states that filed an amicus brief in the district court in support of the defendants' motion to dismiss emphasized, *inter alia*, that “the questions of global climate change and its effects—and the proper balance of regulatory and commercial activity—are political questions not suited for resolution by any court.”¹²⁵ They also noted the tension between environmental policy and energy production, but did not attempt to refute climate science.¹²⁶

Two amicus briefs did question climate science.¹²⁷ Before admitting the briefs, Judge Alsup sought further information on the authors, including “whether (and the extent to which) amici have received funding from individuals or entities on either side of the climate change debate (e.g., from any environmental or industry group)” and whether they were “in any way affiliated (directly or indirectly) with any party” in the actions.¹²⁸ He accepted both briefs.¹²⁹ However, given the agreement

to Defendants Re Tutorial at 1, *California v. BP p.l.c.*, No. 3:17-cv-6011-WHA (N.D. Cal. Apr. 4, 2018), ECF No. 205 (stating that “BP does not disagree with the tutorial presentation made by Chevron on March 21, 2018, and believes that it fairly responded to the Court’s tutorial request and questions,” and reserving “the right to advance on motions and at trial such positions as are supported by fact and scientific/expert evidence in support of its defense.”).

¹²⁵ See Brief for Indiana and Fourteen Other States as Amicus Curiae in Support of Dismissal at 7, *California v. BP p.l.c.*, No. C 17-06011 WHA (N.D. Cal. Apr. 19, 2018).

¹²⁶ See *id.* However, the brief also noted that, “[t]o determine liability, the court would need to determine that plaintiffs have a ‘right’ to the climate—in all of its infinite variations—as it stood at some unspecified time in the past, then find not only that this idealized climate has changed, but that Defendants caused that change through ‘unreasonable’ action that deprived Plaintiffs of their right to the idealized climate.” *Id.* at 10. The states echoed these arguments in the Ninth Circuit. See Brief of Indiana and 17 Other States as Amici Curiae in Support of Defendants-Appellees, *City of Oakland v. BP p.l.c.*, No. 18-16663 (9th Cir. May 17, 2019). There, they also noted that “[a]djudication of claims to abate harms allegedly produced by global climate change would disrupt carefully calibrated state-federal regulatory schemes devised by politically accountable officials.” *Id.* at 1.

¹²⁷ This included briefs by Christopher Monckton of Brenchley et al. (ECF No. 153) and Profs. William Happer, Steven E. Koonin, and Richard S. Lindzen (ECF No. 157). The former submission, for instance, proposed to “demonstrate that there is no ‘consensus’ among scientists that recent global warming was chiefly anthropogenic, still less that unmitigated anthropogenic warming has been or will be dangerous or catastrophic.” See Brief for Viscount Monckton et al. as Amici Curiae at 7, *California v. BP p.l.c.*, No. C 17-06011 WHA (N.D. Cal. Mar. 16, 2018). Plaintiffs did not oppose either motion, but advised the court that publicly available information indicated that “the principal amici and one of their attorneys are affiliated with the Heartland Institute, an organization with ties to the fossil fuel industry,” that they were funded by defendants, and are not climate scientists. See Plaintiff’s Response to Motions to File Amicus Curiae Brief and Tutorial Presentation and Statement of Non-Opposition at 2, *California v. BP p.l.c.*, No. 3:17-cv-06011-WHA (N.D. Cal. Mar. 20, 2018).

¹²⁸ See *California v. BP p.l.c.*, No. 3:17-cv-06011-WHA, at 1 (N.D. Cal. Mar. 19, 2018) (order requesting information re amicus curiae materials).

¹²⁹ See *California v. BP p.l.c.*, No. 3:17-cv-06011-WHA (N.D. Cal. Mar. 23, 2018), ECF No. 184 (order granting leave to file brief of amici curiae); *California v. BP p.l.c.*, No. 3:17-cv-06011-WHA (N.D. Cal. Mar. 23, 2018), ECF No. 185 (order granting administrative motion of William Happer et al. for leave to submit presentation in response to the Court’s tutorial questions).

on basic climate science by the named parties in the case, the court did not discuss these briefs in its opinion. Judge Alsup’s factual statements would thus appear to be a repudiation of the views questioning climate science.¹³⁰

The United States filed an amicus brief in the district court and appeared for oral argument to underscore the lawsuit’s “potential to shape and influence broader policy questions concerning domestic and international energy production and use.”¹³¹ The federal government, speaking for the Trump Administration, did not, however, challenge basic climate science. Rather, it emphasized that “the United States has strong economic and national security interests in promoting the development of fossil fuels”—conduct that it said plaintiffs were seeking to brand as a public nuisance.¹³²

(iii) Findings of Fact on Climate Science

Judge Alsup ultimately granted the defendants’ motion to dismiss in June 2018, finding that issues of global magnitude like climate change are best decided by the political branches, not the courts. In his ruling, however, Judge Alsup also accepted the “vast scientific consensus” on the causes and consequences of climate change. As he wrote,

*The issue is not over science. All parties agree that fossil fuels have led to global warming and ocean rise and will continue to do so, and that eventually the navigable waters of the United States will intrude upon Oakland and San Francisco. The issue is a legal one—whether these producers of fossil fuels should pay for anticipated harm that will eventually flow from a rise in sea level.*¹³³

Judge Alsup made a number of factual statements about climate science. For example, he noted that:

The IPCC completed its first assessment report in 1990. The report made a persuasive case for anthropogenic interference with the climate system, and each subsequent report (about five to six years apart) incorporated advancements in measurements, observations, and modeling—and each presented a more precise picture of how our climate has changed, and what has changed it. The fifth assessment report, released in 2013, was abundantly clear: “Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades and millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of [GHGs] have increased.”

The report was also clear as to the cause, stating that it was “extremely likely” that “human influence has been the dominant cause of the observed warming since the mid-20th century” (ibid.).

The science acknowledges that causes beyond the burning of fossil fuels are also at work. Deforestation has been and remains a significant contributor to the rise in [CO₂]. Others include volcanoes and

¹³⁰ See *infra* § III.A.1.a(iii).

¹³¹ See Brief for the United States as Amicus Curiae in Support of Dismissal at 1, *City of Oakland v. BP p.l.c.*, No. 3:17-cv-06011-WHA (N.D. Cal. May 10, 2018). See also *id.* at 2 (noting that these cases have “the potential to . . . disrupt and interfere with the proper roles, responsibilities, and ongoing work of the Executive Branch and Congress in this area.”). The United States also filed a brief before the Ninth Circuit.

¹³² *Id.* at 1. See also *id.* at 11 (noting that the problems of applying state law to out-of-state sources “are magnified . . . where the sources of emissions alleged to have contributed to climate change span the globe.”).

¹³³ *City of Oakland v. BP p.l.c.*, 325 F. Supp. 3d 1017, 1022 (N.D. Cal. 2018) (emphasis added).

wildfires in greater numbers. Nevertheless, even acknowledging these other contributions, climate scientists are in vast consensus that the combustion of fossil fuels has, in and of itself, materially increased [CO₂] levels, which in turn has materially increased the median temperature of the planet, which in turn has accelerated ice melt and raised (and continues to raise) the sea level.

In sum, in the last 120 years, the amount of [CO₂] (and methane) in the air has increased, with most of the increase having come in recent decades. During that time, the median temperature of Earth has increased 1.8 degrees Fahrenheit. Glaciers around the world have been shrinking. Ice sheets over Greenland and Antarctica have been melting. The sea level has risen by about seven centimeters since 1993 (about seven to eight inches since 1900). As our globe warms and the seas rise, coastal lands in Oakland and San Francisco will, without erection of seawalls and other infrastructure, eventually become submerged by the navigable waters of the United States.¹³⁴

After reviewing the proffers made by the parties, Judge Alsup noted that:

*This order fully accepts the vast scientific consensus that the combustion of fossil fuels has materially increased atmospheric [CO₂] levels, which in turn has increased the median temperature of the planet and accelerated sea level rise. But questions of how to appropriately balance these worldwide negatives against the worldwide positives of the energy itself, and of how to allocate the pluses and minuses among the nations of the world, demand the expertise of our environmental agencies, our diplomats, our Executive, and at least the Senate. Nuisance suits in various United States judicial districts regarding conduct worldwide are far less likely to solve the problem and, indeed, could interfere with reaching a worldwide consensus.*¹³⁵

As Judge Alsup concluded:

*In sum, this order accepts the science behind global warming. So do both sides. The dangers raised in the complaints are very real. But those dangers are worldwide. Their causes are worldwide. The benefits of fossil fuels are worldwide. The problem deserves a solution on amore vast scale than can be supplied by a district judge or jury in a public nuisance case. While it remains true that our federal courts have authority to fashion common law remedies for claims based on global warming, courts must also respect and defer to the other co-equal branches of government when the problem at hand clearly deserves a solution best addressed by those branches. The Court will stay its hand in favor of solutions by the legislative and executive branches.*¹³⁶

Plaintiffs have appealed. The case is currently pending before the Ninth Circuit, to be decided jointly with *San Mateo County*—another case filed by local governments in California against private companies.¹³⁷ Numerous other lawsuits are still pending across the U.S., some of which are discussed here below.

¹³⁴ *Id.* at 1020–21 (internal citations omitted).

¹³⁵ *Id.* at 1026 (emphasis added).

¹³⁶ *Id.* at 1029 (emphasis added).

¹³⁷ San Mateo and Marin Counties and the City of Imperial Beach sued 37 companies for their role in sea-level rise, on the theories of both public nuisance and negligence. Unlike Judge Alsup, Judge Chhabria found that removal was inappropriate and ruled that the cases should be decided by California state courts. *See* Cnty. of San Mateo v. Chevron Corp., 294 F. Supp. 3d 934 (N.D. Cal. Mar. 16, 2018), *appeal docketed*, No. 18-15499 (9th Cir. May 27, 2018) (order granting motions to remand). Also in California, the City and County of Santa Cruz and the City of Richmond filed separate claims against large emitters in state court. Judge Chhabria remanded the case to state court; however, remand is stayed until the Ninth Circuit has resolved the appeal in the San Mateo, Marin and Imperial Beach cases.

b. Baltimore

In July 2018, the City of Baltimore sued twenty-six energy companies in the Circuit Court for Baltimore City, pleading eight causes of actions based on Maryland law (including product liability claims, public nuisance, and violations of the state’s consumer protection statute). In the complaint, Baltimore alleged that the companies’ “production, promotion and marketing of fossil fuel products, simultaneous concealment of the known hazards of those products, and their championing of anti-science campaigns” had harmed the city, which “is particularly vulnerable to sea level rise and flooding.”¹³⁸

As in the other nuisance cases, defendants removed the case to federal court, but the court granted Baltimore’s motion to remand back to state court. In so doing, the court noted that “[c]limate change is certainly a matter of serious national and international concern.”¹³⁹ The Fourth Circuit affirmed the remand order.¹⁴⁰

Here too, defendants focused on jurisdictional issues¹⁴¹ rather than climate science in their pleadings.¹⁴² While they questioned the connection between their own conduct and the harms allegedly suffered by plaintiffs, they did not directly challenge basic climate science in their pleadings.¹⁴³

¹³⁸ See Plaintiff’s Complaint, *Mayor & City Council of Baltimore v. BP p.l.c.*, No. 24-C-18-004219 (Md. Cir. Ct. July 20, 2018).

¹³⁹ *Mayor & City Council of Baltimore v. BP p.l.c.*, 388 F. Supp. 3d 538, 559 (D. Md. 2019) (noting that plaintiff’s action also falls squarely within the local police or regulatory power). See *id.* at 571 (“The City asserts claims against defendants for injuries stemming from climate change. It brings this action on behalf of the public to remedy and prevent environmental damage, punish wrongdoers, and deter illegal activity. As other courts have recognized, such an action falls squarely within the police or regulatory exception to §1452. See *County of San Mateo*, 294 F. Supp. 3d at 939 (holding that suits against oil companies for injuries stemming from climate change were exempt from bankruptcy removal statute because they were “aimed at protecting the public safety and welfare and brought on behalf of the public”).”).

¹⁴⁰ See *Mayor & City Council of Baltimore v. BP p.l.c.*, No. 19-1644 (4th Cir. Mar. 6, 2020). Defendants’ motion to stay the proceedings pending resolution by the U.S. Court of Appeals for the Fourth Circuit of their appeal of the remand order was previously denied. See *Mayor & City Council of Baltimore v. BP p.l.c.*, No. 24-C-18-004219 (D. Md. July 31, 2019) (order denying motion to stay); *BP p.l.c. v. Mayor & City Council of Balt.*, 140 S. Ct. 449 (2019) (mem.) (denying motion to stay).

¹⁴¹ For example, the complaint alleged that the companies’ extraction and production of fossil fuels contributed to the City’s climate-based injuries. The companies responded, in part, that at least some of them “extracted, produced, and sold fossil fuels” at the direction of federal officers. See Application to Stay Remand Order of the United States District Court for the District of Maryland Pending Appeal and Request for Immediate Administrative Stay at 19, *Mayor & City Council of Baltimore v. BP p.l.c.* (U.S. Oct. 1, 2019) (No. 19A368) [hereinafter Defendants’ Stay Application].

¹⁴² See Appellants’ Opening Brief, *Mayor & City Council of Baltimore v. BP p.l.c.*, No. 19-1644 (4th Cir. July 29, 2019). See also *Juliana v. United States*, 339 F. Supp. 3d 1062, 1072–73 (D. Or. 2018) (noting that “plaintiffs and federal defendants agree that federal defendants’ policies regarding fossil fuels and [GHG] emissions play a role in global climate change, though federal defendants dispute that their actions can fairly be deemed to have caused plaintiffs’ alleged injuries”).

¹⁴³ See, e.g., *id.* at 20 (emphasis added) (“Global warming claims involve interstate pollution because they are premised on harms allegedly caused by worldwide [GHG] emissions.”); *id.* at 22 (emphasis added) (“... Plaintiff’s alleged injuries stem

Most of the amici took a similar approach. In its submission to the Fourth Circuit, for example, the U.S. Chamber of Commerce stated:

The Chamber believes that the global climate is changing, and that human activities contribute to those changes. The Chamber also believes that global climate change poses a serious long-term challenge that deserves serious solutions. And it believes that businesses—through technology, innovation, and ingenuity—will offer the best options for reducing greenhouse gas emissions and mitigating the impacts of climate change. An effective climate policy should, therefore, leverage the power of business, maintain U.S. leadership in climate science, embrace technology and innovation, aggressively pursue greater energy efficiency, promote climate resilient infrastructure, support trade in U.S. technologies and products, and encourage international cooperation. . . .

Governmental policies aimed at achieving these goals should come from the federal government, and in particular Congress and the Executive Branch, not through the courts, much less a patchwork of actions under state common law.¹⁴⁴

The defendants have filed a certiorari petition in the U.S. Supreme Court, seeking review of the remand order.¹⁴⁵ The case is pending.

c. New York

Similarly, New York City sued several large energy companies for climate-related harms. Defendants did not contest climate science. In their motion to dismiss, for example, defendants noted that “[t]his case is about global production and global emissions, not a local nuisance,”¹⁴⁶ and further observed that “[g]lobal warming is an important international issue that concerns every nation on Earth.”¹⁴⁷ Defendants further argued that climate change is a global problem requiring global

from global [GHG] emissions—almost all of which occurred outside of Maryland—from the use of fossil-fuel products extracted, produced, and promoted by Defendants and their subsidiaries.”). *See also* Defendants Stay Application at 23–24 (citing *AEP*, 564 U.S. at 421–22) (“Global warming claims plainly involve interstate pollution because they are premised on harms allegedly caused by worldwide [GHG] emissions. This Court has recognized that state law cannot apply to such claims.”); *id.* at 26 (emphasis added) (“Any judgment as to whether the *alleged harm* caused by Applicants’ contribution to worldwide emissions ‘out-weighs any offsetting benefit,’ . . . implicates the federal government’s unique interests in setting national and international policy on matters involving energy, the environment, the economy, and national security” (citing *AEP*, 564 U.S. at 427)). *See also supra* note 124.

¹⁴⁴ Brief for the U.S. Chamber of Commerce as Amicus Curiae in Support of Appellants and Reversal at 1–2, *Mayor & City Council of Baltimore v. BP p.l.c.*, No. 19-1644 (4th Cir. Aug. 2, 2019) (emphasis added). *See also id.* at 5 (“Climate change is a pressing public policy issue with global implications. This appeal, however, turns on more ordinary questions: Did the district court have removal jurisdiction over tort claims related to the effects of climate change, and does this Court have appellate jurisdiction to decide that issue?”); *id.* at 11 (“[T]hese problems are compounded because climate change is caused in part by emissions dating back decades or centuries.”).

¹⁴⁵ *BP p.l.c. v. Mayor & City of Baltimore*, No. 19-1644 (4th Cir. Mar. 6, 2020), *petition for cert. filed* (U.S. Mar. 31, 2020) (No. 19-1189).

¹⁴⁶ *See* Memorandum of Law of Chevron Corporation, ConocoPhillips, and Exxon Mobil Corporation Addressing Common Grounds in Support of Their Motions to Dismiss at 2, *City of New York v. BP p.l.c.*, No. 1:18-cv-00182-JFK (S.D.N.Y. Feb. 23, 2018).

¹⁴⁷ *Id.* at 3.

cooperation, as set out in the United Nations Framework Convention on Climate Change (UNFCCC).¹⁴⁸ Accordingly, “[p]laintiff’s proposed solution to the important issue of global warming—an avalanche of litigation based on overlapping application of every State’s common law—presents a significant obstacle to the federal regulation of air pollution.”¹⁴⁹

The United States filed an amicus brief in the U.S. Court of Appeals for the Second Circuit, noting the importance of the UNFCCC process¹⁵⁰ and of allowing the federal government to coordinate action on climate change.¹⁵¹ The federal government did not dispute climate science, though it did note the “complex scientific issues of causation” given countless sources of emissions globally.¹⁵² Fifteen state attorneys general filed a brief in support of defendants’ motion to dismiss (nearly identical to the brief discussed above in the San Francisco and Oakland litigation).¹⁵³

District Judge Keenan dismissed the lawsuit with prejudice, having determined that “the City’s claims are ultimately based on the ‘transboundary’ emission of [GHGs]” and therefore “arise under federal common law and require a uniform standard of decision.”¹⁵⁴ New York City’s claim thus fell

¹⁴⁸ *Id.* at 3 (citing UNFCCC for the proposition that global warming is “a common concern of humankind,” and that UNFCCC “[a]cknowledg[ed] that the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response.”). See United Nations Framework Convention on Climate Change (UNFCCC), S. Treaty Doc. No. 102-38, 1771 U.N.T.S. 107 (entered into force Mar. 21, 1994).

¹⁴⁹ *Id.* at 24.

¹⁵⁰ See Brief of the United States as Amicus Curiae in Support of Appellees at 15–16, *City of New York v. BP p.l.c.*, No. 18-2188 (2d Cir. Mar. 7, 2019) (noting that “international negotiations related to climate change regularly consider whether and how to pay for the costs to adapt to climate change and whether and how to share costs among different countries and international stakeholders,” and stating that “[a]pplication of *state* nuisance law . . . would substantially interfere with the ongoing foreign policy of the United States.”). See also *id.* at 24 (“The United States has engaged in international efforts to address global climate change for decades. The United States is a party to the [UNFCCC], which establishes a cooperative multilateral framework for addressing climate change.”).

¹⁵¹ *Id.* at 15–16 (noting that “[e]fforts to address climate change, including in a variety of multilateral fora, have for decades been an important element of U.S. foreign policy and diplomacy,” including the issue of “whether and how to pay for the costs to adapt to climate change and whether and how to share costs among different countries and international stakeholders—the very issues raised by the City’s suit. . . . Most importantly, the United States is a Party to the UNFCCC, which aims to stabilize [GHG] concentrations while also enabling sustainable economic development. . . . If countries were to seek transnational compensation or funding for adaptation to climate change, such claims would need to be addressed by the federal government, not one or more States.”).

¹⁵² *Id.* at 23 (internal citations omitted) (noting that “[t]he worldwide scope of this case raises complex scientific issues of causation that implicate the global atmosphere and climate system well beyond the more localized harms at issue in *Milwaukee I* . . .” as the case “concerns the production and sale of fossil fuels in numerous states and foreign countries” while “[t]he City’s claim for damages depends on the combustion of those products and the subsequent emissions of [GHGs] by countless sources worldwide.”).

¹⁵³ See Brief of Indiana and Fourteen Other States as Amicus Curiae in Support of Dismissal, *City of New York v. BP p.l.c.*, No. 18-cv-182-JFK (S.D.N.Y. May 30, 2018).

¹⁵⁴ *City of New York v. BP p.l.c.*, 325 F. Supp. 3d 466, 472 (S.D.N.Y. 2018) (citing *BP*, 2018 WL 1064293, at *3). See also *id.* (“agree[ing] that the City’s claims are governed by federal common law.”).

within the precedents set by the first-generation nuisance actions and could not proceed further in federal court.¹⁵⁵

Judge Keenan, however, also made a number of factual statements with respect to climate change. He observed, for example, that

Climate change is a fact of life, as is not contested by Defendants. But the serious problems caused thereby are not for the judiciary to ameliorate. Global warming and solutions thereto must be addressed by the two other branches of government.¹⁵⁶

The court further noted the likely harmful impacts of climate change:

The Court recognizes that the City, and many other governmental entities around the United States and in other nations, *will be forced to grapple with the harmful impacts of climate change in the coming decades.* However, *the immense and complicated problem of global warming* requires a comprehensive solution that weighs the global benefits of fossil fuel use with the gravity of the impending harms. To litigate such an action for injuries from foreign [GHG] emissions in federal court would severely infringe upon the foreign-policy decisions that are squarely within the purview of the political branches of the U.S. Government. Accordingly, the Court will exercise appropriate caution and decline to recognize such a cause of action.¹⁵⁷

New York City appealed, and the case is currently pending before the Second Circuit.

d. Rhode Island

In July 2018, Rhode Island became the first U.S. state to file a climate lawsuit when it sued 21 large emitters in state court. Rhode Island alleged various state-law tort claims, including public nuisance, arising from the harm allegedly inflicted in the state as a result of climate change. After removal, the federal district court for the District of Rhode Island remanded the case to state court.¹⁵⁸

After the U.S. Court of Appeals for the First Circuit denied their motion for stay pending appeal in the First Circuit,¹⁵⁹ defendants petitioned the Supreme Court for a stay of the proceedings. In their application, they noted that “[f]ew issues touch upon as many uniquely federal interests as global climate change and energy production” and that the Supreme Court “has repeatedly granted

¹⁵⁵ See *id.* (noting that “under *AEP* and *Kivalina*, the Clean Air Act displaces the City’s claims seeking damages for past and future domestic [GHG] emissions brought under federal common law.”). See also *supra* note 105 and accompanying text.

¹⁵⁶ *Id.* at 474–75 (emphasis added).

¹⁵⁷ *Id.* at 475–76 (emphasis added).

¹⁵⁸ See *Rhode Island v. Chevron Corp.*, 393 F. Supp. 3d 142, 149 (D.R.I. 2019) (finding that “environmental federal common law does not—absent congressional say-so—completely preempt the State’s public-nuisance claim, and therefore provides no basis for removal.”).

¹⁵⁹ See *Rhode Island v. Chevron Corp.*, No. 19-1818 (1st Cir. Oct. 7, 2019) (denying motion for a stay pending appeal).

review to address issues related to climate change because of their national and global importance.”¹⁶⁰ Defendants’ application was denied in October 2019.¹⁶¹

The matter is currently on appeal before the First Circuit, where defendants appear to have conceded basic climate science. Defendants’ opening brief, for example, states that “[g]lobal warming is a worldwide phenomenon, generations in the making, resulting from the conduct of billions of actors worldwide. This includes non-defendants that produce the majority of the world’s fossil fuels (many of which are foreign sovereigns) and the countless individuals, companies, and governments—including [Rhode Island]—that have combusted fuels and otherwise generated [GHGs].”¹⁶²

2. Defamation

Climate science has also been at issue in other types of civil claims, including a defamation suit filed by a climate scientist against a conservative magazine and a libertarian think-tank. The background for the case is as follows. Penn State University meteorology scientist, Michael Mann, who is best known for his 1998 article tying the rapid increase in the earth’s temperatures since 1900 to rising GHG emissions (the so-called “hockey stick” graph), found himself at the center of a controversy over leaked emails, which raised concerns that climate scientists were falsifying or manipulating their data.¹⁶³ Mann’s conduct was investigated by several institutions, who ultimately cleared him of misconduct. As the D.C. Court of Appeals would later observe, “[t]he inquiries that considered the science largely validated the methodology underlying the hockey stick graph. None of the investigations found any evidence of fraud, falsification, manipulation, or misconduct on the part of Dr. Mann.”¹⁶⁴

Writers at the *National Review* and the Competitive Enterprise Institute, however, had criticized Mann’s conclusions about global warming and accused him of perpetrating scientific fraud, calling him, inter alia, “the Jerry Sandusky of climate science,” a reference to a notorious convicted

¹⁶⁰ See Application to Stay Remand Order of the U.S. District Court for the District of Rhode Island Pending Appeal and Request for Immediate Administrative Stay at 3, *Rhode Island v. BP p.l.c.*, No. 19-1818 (U.S. Oct. 7, 2019) (No. 19A391) (citing *AEP*, 564 U.S. 410 (2011)).

¹⁶¹ See Supreme Court docket at No. 19A391 for denial of the application by Breyer J., at <https://www.supremecourt.gov/search.aspx?filename=/docket/docketfiles/html/public/19a391.html>.

¹⁶² Brief for Appellants at 1, *Rhode Island v. Chevron Corp.*, No. 19-1818 (1st Cir. Oct. 7, 2019).

¹⁶³ See *Competitive Enter. Inst. v. Mann*, 150 A.3d 1213, 1223 (D.C. 2016) (stating that “[i]n November 2009, thousands of emails from the Climate Research Unit (CRU) of the University of East Anglia in the United Kingdom—some between Dr. Mann and CRU climate scientists—were somehow obtained and anonymously published on the Internet, shortly before the U.N. Global Climate Change Conference was to begin in Copenhagen in December 2009. In a controversy dubbed ‘Climategate,’ some of these emails were cited as proof that climate scientists, including Dr. Mann, falsified or manipulated their data, in collusion with government officials, to produce the hockey stick result. The emails led to public questioning of the validity of the research leading to the hockey stick graph and to calls for evaluation of the soundness of its statistical analysis and the conduct of the scientists involved in the research, including, specifically, Dr. Mann.”).

¹⁶⁴ *Id.* at 1223.

child sexual abuser and former assistant football coach at Penn State. Mann sued in D.C. Superior Court in 2012, claiming that the articles contained false statements that injured his reputation. In their motions to dismiss, defendants argued that the First Amendment protects debate on issues of public concern, which includes scientific matters, and that plaintiff would be unable to prove “actual malice” (as required where the plaintiff is a public figure) by clear and convincing evidence because the statements at issue were not assertions of fact,¹⁶⁵ but rather “opinions on issues of intense public debate.”¹⁶⁶

The D.C. Superior Court denied the motions,¹⁶⁷ and the D.C. Court of Appeals affirmed.¹⁶⁸ The Court of Appeals did not decide the merits of the case but reviewed the legal sufficiency of plaintiff’s evidence to support findings by the fact-finder that statements in the articles were defamatory. Defendants again contended that “all the statements on which Dr. Mann bases his defamation claims are protected under the First Amendment because they expressed . . . opinions about climate change, a matter of widespread public concern that ‘must be resolved through the process of free and open debate, not through costly litigation.’”¹⁶⁹ The court acknowledged the parties’ disagreement about climate science,¹⁷⁰ as well as the fact that “[p]ublic discussion about whether there is a warming climate and, if so, its cause, involves scientific questions and policy prescriptions of general public interest.”¹⁷¹ The court observed that

The First Amendment protects those engaged in a debate of such public concern in the expression of their ideas on the subject, even with pointed language, free of the chilling effect of potential civil liability. As a matter of constitutional principle, when the issue is whether liability may be imposed for speech

¹⁶⁵ *Id.* at 1236.

¹⁶⁶ *See* Competitive Enter. Inst v. Mann, No. 2012 CA 008263 B, at 12 (D.C. Super. Ct. July 19, 2013) (order denying motions to dismiss). *See also id.* at 13 (noting defendants’ argument “the debate over global warming . . . is contentious and acrimonious (giving rise to commonplace highly opinionated language),” that “their statements are not exceptional, but just common statements made within the global warming arena,” and that they “are not actionable because they raise questions rather than make factual assertions that are capable of ‘being proved true or false.’”).

¹⁶⁷ *See id.* (concluding that plaintiff’s claims were “likely to succeed on the merits”—the burden-shifting standard established in the District of Columbia’s Anti-Strategic Lawsuits Against Public Participation (Anti-SLAPP) Act to defeat a motion to dismiss).

¹⁶⁸ *See* Competitive Enter. Inst, 150 A.3d at 1240–41, 1247, 1249 (concluding that plaintiff “hurdled the Anti-SLAPP statute’s threshold showing of likelihood of success on the merits because the evidence he has presented is legally sufficient to support findings by the fact-finder that [the relevant] statements . . . were defamatory, were published by appellants to a third party without privilege, and were made with actual malice,” but also dismissing several of plaintiff’s claims). The court amended its decision in December 2018 in non-material ways.

¹⁶⁹ *See id.* at 1242.

¹⁷⁰ *See id.* (noting that the statements “were made in the context of a broad disagreement between the parties about the existence and cause of global warming, a disagreement that reached a high level of intensity and rhetoric”).

¹⁷¹ *See id.*

expressing scientific or policy views, the question is not who is right; the First Amendment protects the expression of all ideas, good and bad.¹⁷²

However, the court also noted that

[N]ot all the statements cited in the complaint are necessarily cloaked by the First Amendment simply because the articles in which they appeared related to a matter of public concern. . . . [T]he law distinguishes between statements expressing ideas and false statements of fact. . . . Tarnishing the personal integrity and reputation of a scientist important to one side may be a tactic to gain advantage in a no-holds-barred debate over global warming. That the challenged statements were made as part of such debate provides important context and requires careful parsing in light of constitutional standards. But if the statements assert or imply false facts that defame the individual, they do not find shelter under the First Amendment simply because they are embedded in a larger policy debate.¹⁷³

The court proceeded to review the articles in which the statements appeared and concluded—*without* commenting on the underlying climate science¹⁷⁴—that a jury could find the articles to convey a defamatory meaning.¹⁷⁵ The court further determined that a jury could find, by clear and convincing evidence, that defendants has acted with actual malice (i.e., they published their articles either knowing that their accusations were false or had reckless disregard for their truth) given that four separate investigations had exonerated Dr. Mann.¹⁷⁶

The U.S. Supreme Court declined to hear the case in November 2019. Justice Alito would have granted review given its importance for the freedom of speech and freedom of the press and “the protection afforded to journalists and others who use harsh language in criticizing opposing advocacy on one of the most important public issues of the day.”¹⁷⁷ Justice Alito further emphasized the importance of closely scrutinizing any restrictions on the statements that can be made on important public policy issues, lest they be “used to silence the expression of unpopular views.”¹⁷⁸ At issue here is the line between “a pungently phrased expression of opinion regarding one of the most hotly debated issues of the day” (which are protected by the First Amendment) and “a statement that is worded as an expression of opinion but actually asserts a fact that can be proven in court to be false” (which is

¹⁷² *Id.*

¹⁷³ *Id.* at 1242–43.

¹⁷⁴ *Id.* at 1248 (noting that the articles were “not about the merits of the science of global warming, but about Dr. Mann’s ‘deceptions’ and ‘wrongdoing.’”).

¹⁷⁵ *See id.* at 1245 (noting that defendants’ assertion that the leaked “emails showed or revealed that Dr. Mann engaged in deception and academic and scientific misconduct is not simply a matter of opinion: not only is it capable of being proved true or false, but the evidence of record is that it actually has been proved to be false by four separate investigations.”).

¹⁷⁶ *See id.* at 1252–59 (“consider[ing] (as would a jury) the source of the reports, the thoroughness of the investigations, and the conclusions reached.”).

¹⁷⁷ *See* Competitive Enter. Inst. v. Mann, 589 U.S. ___, at *1 (2019) (Alito, J., dissenting from denial of certiorari). *See also id.* at *4 (stating that the question of whether the trier-of-fact should decide whether an allegedly defamatory statement can be shown to be untrue has serious implications for the right to freedom of expression).

¹⁷⁸ *Id.* at *5.

not protected).¹⁷⁹ Justice Alito emphasized that the Court has traditionally protected free speech, especially on important political or social issues, adding:

This is just such a case. Climate change has staked a place at the very center of this Nation’s public discourse. Politicians, journalists, academics, and ordinary Americans discuss and debate various aspects of climate change daily—its causes, extent, urgency, consequences, and the appropriate policies for addressing it. The core purpose of the constitutional protection of freedom of expression is to ensure that all opinions on such issues have a chance to be heard and considered.¹⁸⁰

Justice Alito did not express an opinion on whether the speech at issue in this case was entitled to First Amendment protection.¹⁸¹ A similar defamation proceeding filed by another climate scientist is underway in Canada.¹⁸²

B. Federal and State Statutory Law

Numerous climate-related suits have been filed in the United States under a wide range of federal statutes and regulations, including the APA and NEPA, the Clean Air Act, the Endangered Species Act, securities and financial regulations, freedom of information, as well as under state statutes. Some of the leading cases that offer insight into the courts’ and the parties’ treatment of climate science are discussed in Sections B.1–B.5 below.

1. APA and NEPA

A significant number of recent climate-related cases have involved judicial review of decisions made by federal agencies under the Administrative Procedure Act (APA)¹⁸³ and the National Environmental Policy Act (NEPA).¹⁸⁴ Federal public lands account for a sizeable share of hydrocarbon development in the United States.¹⁸⁵ The U.S. Bureau of Land Management (BLM), for example, is responsible for conservation and development on 245 million acres or 10% of U.S. land base, as well as 700 million acres in subsurface mineral estate.

As detailed below, federal agencies have not questioned climate science in recent judicial proceedings: they had relevant climate data in their possession and relied, or declined to rely, on it in

¹⁷⁹ *Id.*

¹⁸⁰ *Id.* at *7.

¹⁸¹ *See id.*

¹⁸² *See* Emma McIntosh, *Michael E. Mann Took Climate Change Deniers to Court. They Apologized.*, NAT’L OBSERVER (June 13, 2019).

¹⁸³ 5 U.S.C. §§551 et seq.

¹⁸⁴ 42 U.S.C. §§4321 et seq.

¹⁸⁵ *See* Juliana v. United States, No. 18-36082, slip op. at 19 (9th Cir. Jan. 7, 2019) (noting that “about 25% of fossil fuels extracted in the United States come from federal waters and lands, an activity that requires authorization from the federal government.”).

making their determinations. The issue has been whether, in so doing, they had acted reasonably under the APA or other statutory standards. In the course of judicial review, courts have made a number of findings regarding climate science. For example, they have repeatedly recognized the link between the extraction of fossil fuels, the emissions resulting from the burning of those fuels, and the emissions' contribution to climate change. They have also recognized the deleterious impacts of climate change on a local, national, or global scale. The courts' rulings based on these findings have in some cases prompted substantial changes in agency decision-making processes or methodologies. This section reviews some of the major cases in those categories.

a. Accounting for Emissions

Given the role that U.S. federal agencies play in hydrocarbon development on federal public lands, a key question before the courts has been one of accounting for emissions from coal, oil, and gas leases. The parties have generally been in agreement on the existence of a causal chain between hydrocarbon development, emissions from extraction, transportation, and combustion, and climate change, but have often disagreed on the applicable tools or methods for measuring those emissions or their environmental impacts. It is now well established in U.S. jurisprudence that federal agencies are required to consider and quantify direct and indirect emissions resulting from hydrocarbon development in the Environmental Impact Statement (EIS) for a given project, including the project's downstream and cumulative emissions, if such emissions are reasonably foreseeable.¹⁸⁶ In reaching

¹⁸⁶ See, e.g., *Citizens for a Healthy Cmty. v. U.S. Bureau of Land Mgmt.*, 377 F. Supp. 3d 1223, 1236–37 (D. Colo. 2019) (holding that the agencies had “acted in an arbitrary and capricious manner and violated NEPA by not taking a hard look at the foreseeable indirect effects resulting from the combustion of oil and gas,” as it is well-established “that combustion emissions are an indirect effect of an agency’s decision to extract those natural resources”); *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 71 (D.D.C. 2019) (“BLM failed to take a hard look at the environmental impacts of leasing because it failed to quantify and forecast aggregate GHG emissions from oil and gas development.”); *Wilderness Workshop v. U.S. Bureau of Land Mgmt.*, 342 F. Supp. 3d 1145, 1156 (D. Colo. 2018) (holding that “BLM acted in an arbitrary and capricious manner and violated NEPA by not taking a hard look at the indirect effects resulting from the combustion of oil and gas in the planning area under the RMP [Resource Management Plan]” in the Colorado River Valley); *San Juan Citizens All. v. U.S. Bureau of Land Mgmt.*, 326 F. Supp. 3d 1227, 1242–43 (D.N.M. 2018) (collecting authorities in support of the proposition that BLM’s reasoning for omitting analysis of indirect GHG emissions when it approved oil and gas leases in the Santa Fe National Forest was “contrary to the reasoning in several persuasive cases that have determined that combustion emissions are an indirect effect of an agency’s decision to extract those natural resources”); *W. Org. of Res. Councils v. U.S. Bureau of Land Mgmt.*, No. CV 16-21-GF-BMM, 2018 WL 1475470, at *13 (D. Mont. Mar. 26, 2018) (“In light of the degree of foreseeability and specificity of information available to the agency while completing the EIS, NEPA requires BLM to consider in the EIS the environmental consequences of the downstream combustion of the coal, oil and gas resources potentially open to development under these RMPs.”); *Sierra Club v. Fed. Energy Regulatory Comm’n*, 867 F.3d 1357, 1374 (D.C. Cir. 2017) (explaining that GHG emissions from gas combustion “are an indirect effect of authorizing this [pipeline] project, which [the agency] could reasonably foresee” and “conclud[ing] that the EIS for the . . . Pipelines Project should have either given a quantitative estimate of the downstream [GHG] emissions that will result from burning the natural gas that the pipelines will transport or explained more specifically why it could not have done so”); *Montana Env’tl. Info. Ctr. v. U.S. Office of Surface Mining*, 274 F. Supp. 3d 1074, 1098-99 (D. Mont. 2017) (holding that the agency failed to take a hard look at the indirect and cumulative effects of coal transportation and coal combustion and at foreseeable GHG emissions, and finding that indirect effects from coal trains includes “the effects of the estimated 23.16 million metric tons of [GHG] emissions the Mining Plan EA concluded would result from combustion

these conclusions, courts have squarely engaged with climate science. At the same time, courts have been deferential to agency expertise on matters of methodology¹⁸⁷ or scientific uncertainty,¹⁸⁸ while also directing agencies to base their decisions on the best available scientific evidence.¹⁸⁹

For example, in *WildEarth Guardians v. U.S. Bureau of Land Mgmt.*, U.S. Forest Service (USFS) and BLM approved coal leases in Wyoming’s Powder River Basin, which were near, and partially within, a national forest.¹⁹⁰ Environmental groups sued, arguing that BLM had failed to

of the coal that would be extracted from the Mine”). *See also* High Country Conserv. Advocates v. U.S. Forest Serv., 52 F. Supp. 3d 1174, 1198 (D. Colo. 2014) (“[R]easonably foreseeable effect [of downstream combustion] must be analyzed, even if the precise extent of the effect is less certain.”).

See also CEQ Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews, 81 Fed. Reg. 51,866 (Aug. 5, 2016) at 14 & 16 n.42 (stating that “NEPA reviews for proposed resource extraction and development projects typically include the reasonably foreseeable effects of various phases in the process, such as clearing land for the project, building access roads, extraction, transport, refining, processing, using the resource, disassembly, disposal, and reclamation” and noting that, “where the proposed action involves fossil fuel extraction . . . [t]he indirect effects of such an action that are reasonably foreseeable at the time would vary with the circumstances of the proposed action. For actions such as a Federal lease sale of coal for energy production, the impacts associated with the end-use of the fossil fuel being extracted would be the reasonably foreseeable combustion of that coal”), *withdrawn* 82 Fed. Reg. 16,576 (Apr. 5, 2017).

¹⁸⁷ *See, e.g., W. Org. of Res. Councils*, 2018 WL 1475470, at *13–14.

¹⁸⁸ *See, e.g., Citizens for a Healthy Cmty. v. U.S. Bureau of Land Mgmt.*, 377 F. Supp. 3d 1223, 1239 (D. Colo. 2019) (emphasis added) (accepting BLM’s argument that “the assessment of GHG emissions and climate change is extremely complex because of the inherent interrelationships among its sources, causation, mechanisms of action, and impacts” and as such, *it was impossible to attribute a particular climate impact in any given region to GHG emissions from a particular source*. In the EIS and EA, Defendants explain that tools did not exist that would allow them to predict how a project’s emissions would impact global, regional, or local climate because, *at the time*, government agencies did not have standardized protocols or specific levels of significance by which they could quantify climate impacts.”).

¹⁸⁹ *See, e.g., San Juan Citizens All.*, 326 F. Supp. 3d at 1249 (stating that, on remand, “BLM must not rely on outdated scientific tools and analyses” and noting that “the IPCC has updated its reports on climate change, and further, new reports have been issued by the [U.S.] Global Change Research Program (a cooperative effort of 13 agencies) as well” such that “since the date of the ARTR (2013), substantial progress may have been made in assessing the potential global and regional effects of climate change.”). *See also id.* at 1249 n.8, 1250. *See also W. Org. of Res. Councils*, 2018 WL 1475470, at *16 (holding that BLM’s failure to acknowledge changing science in the FEIS constituted an additional arbitrary decision that undermined the accuracy and integrity of its GWP analysis).

However, courts cannot ask agencies to supplement their analysis unless the new information would result in “significantly different environmental effects” than those already considered. 43 C.F.R. §46.120(c). *See, e.g., WildEarth Guardians v. Bernhardt*, No. 19-cv-001920-RBJ, slip. op. at 23–24 (D. Colo. Nov. 8, 2019) (upholding agency decision not to supplement the cumulative climate impacts analysis made at the leasing stage, noting that, “[t]hrough the new information, like the old information, is troubling, conservation groups seem to be stuck with it.”). *See also W. Org. of Res. Councils v. Zinke*, 892 F.3d 1234, 1243 (D.C. Cir. 2018) (holding that the agency’s NEPA obligation for the Federal Coal Management Program terminated with its adoption in 1979 even though plaintiffs had identified “significant scientific studies that have identified the causes and consequences of continued atmospheric warming and showed that coal combustion is the single greatest contributor to the growing concentration of [GHGs] in the atmosphere,” which were not available in the 1970s and 80s and which the agency does not contest).

¹⁹⁰ *See WildEarth Guardians v. U.S. Bureau of Land Mgmt.*, 870 F.3d 1222 (10th Cir. 2017).

comply with NEPA when it concluded, inter alia, that the new leases would not increase total U.S. CO₂ emissions relative to the no-action alternative. BLM reasoned that, even if it had not approved the leases, the same amount of coal would be sourced from elsewhere, such that there was no difference between the proposed action and the no-action alternative.¹⁹¹

The district court upheld the leases. The U.S. Court of Appeals for the Tenth Circuit reversed, holding that BLM's assumption that there was no difference between issuing and declining to issue the leases because third party sources of coal would perfectly substitute for any volume lost on the open market was arbitrary and capricious.¹⁹² As the court wrote, BLM's conclusion represented a "long logical leap," which "presume[d] that either the reduced [coal] supply will have no impact on price, or that any increase in price will not make other forms of energy more attractive and decrease coal's share of the energy mix, even slightly."¹⁹³

In its analysis, the Tenth Circuit also observed that none of the parties contested "some basic presumptions" in the agency's Final Environmental Impact Statement (FEIS), including that:

the quantity of coal proposed in these leases would result in approximately 382 million tons of annual [CO₂] emissions from electricity generation, which is the equivalent of roughly 6% of the United States's total emissions in 2008, anthropogenic [CO₂] emissions contribute to climate change, climate change presents a litany of environmental harms disbursed throughout the globe, and if the nation's energy mix shifts towards non-coal energy sources, less [CO₂] would be emitted.¹⁹⁴

The court found that the BLM's emissions analysis "underestimate[d] the effect on climate change," because the "RODs assume[d] that coal will continue to be a much used source of fuel for electricity and that coal use will increase with population size."¹⁹⁵ As the court observed,

The BLM acknowledged that climate change is a scientifically verified reality. Climate science may be better in 2017 than in 2010 when the FEIS became available, but it is not a scientific frontier as defined by the Supreme Court in *Baltimore Gas*, i.e., as barely emergent knowledge and technology. *Balt. Gas*, 462 U.S. at 92, 103 S. Ct. 2246. Moreover, the climate modeling technology exists: the NEMS [National Energy Modeling System] program is available for the BLM to use.¹⁹⁶

¹⁹¹ See *id.* at 1227–29 (noting BLM's assessment that "[i]t is not likely that selection of the No Action alternative [] would result in a decrease of U.S. CO₂ emissions attributable to coal mining and coal-burning power plants in the longer term, because there are multiple other sources of coal that, while not having the cost, environmental, or safety advantages, could supply the demand for coal beyond the time that the . . . mines complete recovery of the coal in their existing leases.").

¹⁹² The Tenth Circuit remanded with instructions to BLM to revise its Environmental Impact Statements (EISs) and Records of Decision (RODs), but it did not vacate the leases. *Id.* at 1226.

¹⁹³ *Id.* at 1226. See also *id.* at 1237–38 (holding that "it was an abuse of discretion to rely on an economic assumption, which contradicted basic economic principles, as the basis for distinguishing between the no action alternative and the preferred alternative.").

¹⁹⁴ See *id.* at 1228 (internal citations to FEIS omitted).

¹⁹⁵ *Id.* at 1236.

¹⁹⁶ *Id.* at 1236–37.

Therefore, BLM was not owed “any greater deference on the question at issue here because it does not involve ‘the frontiers of science.’”¹⁹⁷

In his concurrence, Circuit Judge Bobby Ray Baldock stated that the court erred by commenting on matters of climate science where the appeal could have been disposed of by resolving an economic question.¹⁹⁸ He noted that “[t]he [court’s] assertion that climate science is settled science is, in my view, both unnecessary to this appeal and questionable as a factual matter.”¹⁹⁹ In particular, Judge Baldock noted that the court did not address specific statements in the FEIS that were indicative of an ongoing debate within the scientific community, nor did it “cite[] any authority seconding its assertion that climate science is settled science.”²⁰⁰

In *Western Organization of Resource Councils v. U.S. Bureau of Land Management*, plaintiffs challenged BLM’s approval of new coal leases in the Powder River Basin, alleging that the agency had failed to consider alternatives and had not taken a “hard look” at the environmental consequences of its action.²⁰¹

The court found that the agency record “contained enough specifics to permit a productive analysis of the downstream burning of the coal, oil and gas open to potential development under the RMPs [Resource Management Plans]”²⁰² and directed BLM to conduct the requisite analysis.²⁰³ As the court noted, the RMPs projected the quantity of recoverable fossil fuels to be extracted during a 20-year period; they acknowledged that the coal would be burned to generate electricity; and that “[t]he impact on the climate borne by the burning of [GHGs] proved ‘readily apparent’” when BLM scoped

¹⁹⁷ *Id.* at 1236. In *Baltimore Gas*, the Supreme Court stated in its multi-factor analysis that courts are most deferential to agency decisions based not just on “simple findings of fact,” but in the agency’s “special expertise, at the frontiers of science.” See *Baltimore Gas & Electric Co. v. NRDC*, 462 U.S. 87, 102–04 (1983) (upholding the Nuclear Regulatory Commission’s conclusion that permanent storage of nuclear waste would not result in significant environmental harm in part because the Commission’s assumption that the waste repositories would perform perfectly dealt with an “area of special expertise, at the frontiers of science” and thus merited judicial deference).

¹⁹⁸ See *WildEarth Guardians*, 870 F3d. at 1241–42 (Baldock, J., concurring) (concurring “with the Court’s analysis of the BLM’s economic assumption and disposition of this appeal on that basis, without joining its conclusion about climate science.”).

¹⁹⁹ *Id.* See also *id.* at 1241 n.1 (noting that “[e]ven if a question of climate science was before us . . . matters of climate science and its attendant policy implications are precisely the type of questions we should defer to agencies on under the present state of the law” (quoting *AEP*, 564 U.S. at 428)).

²⁰⁰ *Id.* at 1241. See also *id.* (“Contrary to this Court’s assertion, the Supreme Court has recognized that opposing views exist on climate science. See *Am. Elec. Power Co. v. Connecticut*, 564 U.S. 410, 417 n.2 (2011).”). In the referenced footnote in *AEP*, the Supreme Court wrote: “For views opposing EPA’s, see, e.g., Dawidoff, *The Civil Heretic*, N.Y. TIMES MAGAZINE 32 (March 29, 2009). The Court, we caution, endorses no particular view of the complicated issues related to carbon-dioxide emissions and climate change.” See generally *supra* notes 82-86 and accompanying text.

²⁰¹ *W. Org. of Res. Councils v. U.S. Bureau of Land Mgmt.*, No. CV 16-21-GF-BMM, 2018 WL 1475470, at *18 (D. Mont. Mar. 26, 2018), *appeal dismissed*, No. 18-35836, 2019 WL 141346 (9th Cir. Jan. 2, 2019).

²⁰² *Id.* at *13 (internal citations omitted).

²⁰³ *Id.* at *13 (holding that NEPA requires BLM to “consider the environmental consequences of the downstream combustion of the coal, oil and gas resources potentially open to development” in the EIS).

and completed the EISs (which acknowledged climate concerns).²⁰⁴ The court also ruled that the agency had to analyze the cumulative impacts of climate change, but it held that NEPA did not prescribe a particular method to quantify these impacts²⁰⁵ and that the agency’s scientific judgment as to which method to apply was entitled to deference.²⁰⁶

Plaintiffs also argued that BLM had violated NEPA by failing to properly quantify the global warming potential (GWP) of methane emissions by using outdated science.²⁰⁷ BLM’s record evidenced alternate GWP figures and the agency’s awareness of “the evolving nature of the science regarding carbon emissions.”²⁰⁸ The court held that BLM’s failure to acknowledge this changing science in the FEIS constituted an additional arbitrary decision that undermined the accuracy and integrity of its GWP analysis.²⁰⁹

In another recent NEPA proceeding, *WildEarth Guardians v. Bernhardt*, two non-profit organizations challenged the federal government’s authorizations of oil and gas leasing on 460,000 acres of federal land across three states—Wyoming, Utah, and Colorado.²¹⁰ Plaintiffs claimed that BLM had insufficiently accounted for GHG emissions that would be generated by oil and gas development on the leased parcels. States of Wyoming, Utah, and Colorado and two oil industry organizations intervened as defendants. The court found that BLM had “failed to take a ‘hard look’” at both downstream and cumulative emissions from Wyoming lease sales and thus failed to comply with NEPA in authorizing the leases.²¹¹ The ruling has led BLM to revise its climate analysis for other oil and gas leases as well.²¹²

The court observed that “[c]limate change, and humanity’s ability to combat it, are increasingly prominent topics of public discourse.”²¹³ More specifically, it noted that while “BLM summarized the potential on-the-ground impacts of climate change in the state, the region, and across

²⁰⁴ *Id.*

²⁰⁵ *Id.* at *13–14 (noting that “[p]laintiffs identify no case, and the Court has discovered none, that supports the assertion that NEPA requires the agency to use a global carbon budget analysis.”). NEPA merely requires disclosure of “ecological[,] . . . economic, [and] social” impacts of proposed agency action. *See* 40 CFR. §1508.8(b).

²⁰⁶ *See id.* at *14 (stating that “[t]he Court’s review of NEPA compliance through the APA does not allow the Court to ‘substitute its judgment for that of the agency’”) (internal citations omitted).

²⁰⁷ *Id.* at *14–15.

²⁰⁸ *Id.* at *16.

²⁰⁹ *Id.*

²¹⁰ *See WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41 (D.D.C. 2019). Pursuant to Fed. R. Civ. Proc. 25(d), Secretary of the U.S. Department of the Interior David Bernhardt was automatically substituted for former Secretary Ryan Zinke in July 2019.

²¹¹ The court withheld judgment on whether BLM’s leasing decisions were correct. *Id.*

²¹² *See* Niina H. Farah, *BLM Tells Court It’s Done Enough to Tackle Climate Impacts*, E&E NEWS (Mar. 11, 2020), <https://www.eenews.net/energywire/2020/03/11/stories/1062571561>.

²¹³ *WildEarth Guardians*, 368 F. Supp. 3d at 51.

the country,” it failed to “adequately quantify the climate change impacts of oil and gas leasing.”²¹⁴ The administrative record contained a number of climate facts, which the court discussed at some length:

The [Environmental Assessments (EAs)] discuss climate change on a conceptual level. They summarize Wyoming’s current climate, explain the mechanics of climate change, acknowledge that oil and gas drilling contributes to climate change, and predict the impact of climate change on the state’s climate. . . . Certain EAs also reference various climate change reports. For instance, several EAs incorporate reports issued by the . . . IPCC[] discussing the impact of GHG emissions on climate change. . . .

The EAs also include more specific GHG emissions assessments, which are slightly different across the challenged EAs but are similarly detailed. The EAs acknowledge that oil and gas drilling on leased parcels will emit GHGs, and they describe the sources of those emissions, but they do not attempt to quantify and project the GHG emissions likely to result from a given lease sale. For instance, certain EAs acknowledge that each potential oil or gas well on the leased parcels could emit approximately 0.00059 metric tons of [CO₂], but they state that ‘[t]he [total] amount of increased emissions cannot be quantified at this time since it is unknown how many wells might be drilled, the types of equipment needed if a well were to be completed successfully . . . or what technologies may be employed by a given company for drilling any new wells.’ . . .

Although the EAs acknowledge that GHG emissions may contribute to climate change, they conclude that ‘[t]he inconsistency in results of scientific models used to predict climate change at the global scale coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level.’ . . . Ultimately, the EAs conclude that ‘[w]hen compared to total national or global emissions, the amount [of GHG emissions] released as a result of potential production from the proposed lease tracts would not have a measurable effect,’ . . . or would represent only an ‘incremental contribution to the total regional and global GHG emission levels.’²¹⁵

In view of this record, the court found that defendants’ assertion “that quantifying GHG emissions at the leasing stage would be overly speculative . . . is belied by an administrative record replete with information on oil and gas development and GHG emissions.”²¹⁶ The court thus ruled that the agency had failed to take a “hard look” at the climate impacts of oil and gas drilling due to multiple deficiencies in emissions accounting in the EAs.²¹⁷ With respect to downstream emissions from fossil fuel use, the

²¹⁴ *Id.*

²¹⁵ *Id.* at 56 (internal references omitted).

²¹⁶ *Id.* at 68 (pointing to “raw data that would allow BLM to project the pace and scope of oil and gas development on the leased parcels” and thus “project GHG emissions resulting from that development” and noting that “EAs also incorporate studies quantifying and categorizing GHG emissions more generally”); *id.* (noting “thousands of pages of quantitative . . . analyses, including additional analys[es] of GHG emission and climate change impacts”).

²¹⁷ *See id.* at 83 (internal citations omitted), finding that

the EAs (1) failed to quantify and forecast drilling-related GHG emissions; (2) failed to adequately consider GHG emissions from the downstream use of oil and gas produced on the leased parcels; and (3) failed to compare those GHG emissions to state, regional, and national GHG emissions forecasts, and other foreseeable regional and national BLM projects. By asserting that these crucial environmental analyses are overly speculative at the leasing stage and more appropriate for later, site-specific assessments, BLM risks relegating the analyses to the “tyranny of small decisions.” Given the national,

court reaffirmed the commonly-accepted proposition that such emissions “are an indirect effect of BLM’s oil and gas leasing program.”²¹⁸

The court also discussed climate science in the context of the plaintiffs’ argument that an EIS was statutorily required because the effects of the lease sales were “highly uncertain or involve[d] unique or unknown risks.”²¹⁹ The court observed that this factor is implicated when an action involves new science, or when an action’s impact on a species is unknown.²²⁰ Those circumstances were not present here, where the parties agreed on key facts:

Defendants correctly note that ‘oil and gas leasing is commonplace in the mountain west,’ and that the ‘uncertainties Plaintiffs point to concerning *quantity* of GHG emissions . . . do not establish uncertainty as to the *effect* of GHG emissions.’ BLM Mem. at 32. The parties agree that oil and gas development on the Wyoming Leases will produce GHG emissions. They agree that GHG emissions contribute to climate change. Thus, while the parties debate the usefulness and accuracy of tools by which GHG emissions and their precise environmental impacts may be measured, the risks of GHG emissions are not ‘unique or unknown,’ and the EAs adequately summarized those risks.²²¹

The court remanded the Wyoming leases to BLM for supplementary analysis and enjoined further activity.²²² After BLM finalized the Supplemental EA and issued its ROD reaffirming the Wyoming leases, plaintiffs alleged that the Supplemental EA had failed to give “serious consideration

cumulative nature of climate change, considering each individual drilling project in a vacuum deprives the agency and the public of the context necessary to evaluate oil and gas drilling on federal land before irretrievably committing to that drilling.

See also id.:

Simply put, NEPA required more robust analyses of GHG emissions from oil and gas drilling and downstream use. Accordingly, BLM’s EAs and FONSI for the Wyoming Lease Sales are inadequate. That said, the challenged EAs were not—at least at the time they were issued—required to apply the social cost of carbon or global carbon budget protocols to quantify the climate change impact of GHG emissions.

²¹⁸ *Id.* at 73. The court did not require that BLM quantify downstream emissions. *Id.* (internal citations omitted) (holding that quantification of GHG emissions is not “required every time those emissions are an indirect effect of an agency action, so long as the agency provides a satisfactory explanation for why quantification is not useful.”). *See also supra* note 186.

²¹⁹ 40 C.F.R. §1508.27(b)(5).

²²⁰ 368 F. Supp. 3d at 82.

²²¹ *Id.* at 83.

²²² The Colorado and Utah leases were to be addressed in subsequent stages. The court granted the federal defendants’ motion for a voluntary remand of the Utah and Colorado decisions to conduct “further environmental analysis.” The court declined to enjoin new leasing activity there, but it underscored that BLM must take its obligation to supplement seriously for all the land parcels challenged in the suit and encouraged it to refrain authorizing drilling “until it is far more certain that they are supported by adequate NEPA review.” *See WildEarth Guardians v. Bernhardt*, No. 1:16-cv-01724, at 8–9 (D.D.C. July 19, 2019) (order denying plaintiffs’ motions to amend judgment and to enforce remand order).

to the Court’s concerns” because it had, inter alia, failed to conduct cumulative impacts assessment ordered by the court.²²³ BLM argues that its analysis is sound.²²⁴ The case is pending.

Similarly, in *Indigenous Environmental Network v. U.S. Department of State*, a Montana District Court vacated the U.S. State Department’s determination in 2017 that construction of the Keystone XL pipeline—a 1,200-mile-long project that would carry Canadian bitumen oil from Alberta into the United States—was in the national interest.²²⁵ In its initial Record of Decision (ROD) in 2015, the State Department had reached the opposite conclusion.²²⁶ There, it had also “acknowledged science supporting a need to keep global temperature below two degrees Celsius above pre-industrial levels,” “recognized the scientific evidence that human activity represents a dominant cause of climate change,” and “accepted the [U.S.] impact as the world’s largest economy and second-largest [GHG] emitter.”²²⁷ In 2017, the new Administration issued a new ROD approving the project.²²⁸ Plaintiffs challenged the 2017 ROD on numerous grounds, citing deficiencies under the APA, NEPA, and the Endangered Species Act (ESA).

The court enjoined further construction and vacated the State Department’s 2017 determination.²²⁹ As relevant here, the court determined that the Department had failed to comply with NEPA and the APA when it disregarded prior factual findings related to climate change and reversed course.²³⁰ While administrative agencies are entitled to change their mind, and the law allows subsequent administrations to promulgate new policies,²³¹ they must do so on the basis of a “reasoned

²²³ Motion for Summary Judgment after Remand at 2, 17, *WildEarth Guardians v. Bernhardt*, No. 1:16-cv-01724 (D.D.C. Jan. 6, 2020).

²²⁴ See Federal Defendants’ Memorandum in Support of Their Cross-Motion for Summary Judgment, *WildEarth Guardians v. Bernhardt*, No. 1:16-cv-01724 (D.D.C. Mar. 9, 2020).

²²⁵ See *Indigenous Envtl. Network v. U.S. Dep’t of State*, 347 F. Supp. 3d 561 (D. Mont. 2018), *rev’d as moot*, No. 18-36068 (9th Cir. June 6, 2019). The State Department is responsible for the decision due to its authority to issue “presidential permits” for cross-border infrastructure projects.

²²⁶ See DEP’T OF STATE, RECORD OF DECISION AND NATIONAL INTEREST DETERMINATION 32 (2015), <https://keystonepipeline-xl.state.gov/documents/organization/249450.pdf> (determining that approval of Keystone was not in the national interest).

²²⁷ See *Indigenous Envtl. Network*, 347 F. Supp. 3d at 584–85.

²²⁸ See DEP’T OF STATE, RECORD OF DECISION AND NATIONAL INTEREST DETERMINATION 31 (2017), <https://keystonepipeline-xl.state.gov/documents/organization/269323.pdf>.

²²⁹ See *Indigenous Envtl. Network*, 347 F. Supp. 3d at 571 et seq.

²³⁰ See *id.* at 591.

²³¹ The Supreme Court has explained that it is not arbitrary and capricious for an agency to change its policies. See *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 514 (2009) (holding that courts should not engage in “more searching review” under the arbitrary-and-capricious standard simply because an agency alters its prior policy). However, the agency must acknowledge such change. *Id.* at 514–15. This is especially so when an agency’s “new policy rests upon factual findings that contradict those which underlay its prior policy; or when its prior policy has engendered serious reliance interests that must be taken into account.” *Id.* at 515. This requirement derives from the need for a “reasoned explanation

explanation.”²³² Here, the court observed that the Department had “simply discarded prior factual findings related to climate change to support its course reversal.”²³³

The court also ruled that the Department’s analysis of the cumulative effects of GHG emissions fell short of a “hard look” under NEPA, as it failed to analyze impacts along with another pending pipeline expansion.²³⁴ There was no dispute among the parties about the fact that the projects would generate emissions, or their magnitude.²³⁵

b. Modelling Climate Impacts

If the courts in the above set of NEPA cases have focused on the first part of the causal chain—the link between agency authorization of hydrocarbon development on federal public lands and the resulting emissions—courts in other cases have examined the second part of that chain—the link between climate change and adverse environmental impacts on lands under federal management, on human health, or on water supplies.

For example, in *AquAlliance v. U.S. Bureau of Reclamation*, plaintiffs argued that the U.S. Bureau of Reclamation had failed to consider specific climate impacts on California’s water supply in its 10–year water transfer program for the Central Valley Project.²³⁶ The court concluded that the agency “record supports a finding that climate change will have an impact on the water supply, which will in turn put pressure on California’s water resources ‘which are already fully utilized by the demands of a growing economy and population.’”²³⁷ The parties agreed that NEPA required an evaluation of climate impacts on a project.²³⁸ Under NEPA, “[w]hen assessing the effects of climate change on a proposed action, an agency typically starts with an identification of the reasonably

. . . for disregarding facts and circumstances that underlay or were engendered by the prior policy.” *Id.* at 516. Otherwise, an agency has discretion to pursue a range of policy outcomes within its statutory authorization.

²³² See *Indigenous Envtl. Network*, 347 F. Supp. 3d at 583.

²³³ *Id.* at 584 (noting that the 2017 ROD “initially tracked the 2015 ROD nearly word-for-word,” but then, “without explanation or acknowledgment, . . . omitted entirely a parallel section discussing ‘Climate Change-Related Foreign Policy Considerations’” and ignored “the 2015 ROD’s conclusion that 2015 represented a critical time for action on climate change.”). See also *id.* at 583 (noting that “[t]he Department possesses the authority to give more weight to energy security in 2017 than it had in 2015,” but, as the Supreme Court has held in *Fox*, “[a]n agency cannot simply disregard contrary or inconvenient factual determinations that it made in the past, any more than it can ignore inconvenient facts when it writes on a blank slate.”).

²³⁴ See *id.* at 578, 590.

²³⁵ The Keystone SEIS indicated that GHG emissions associated with the pipeline would range annually from 1.3 to 27.4 million metric tons of CO₂ equivalent (MMtCO₂e), while the EIS for the other pipeline determined that combined emissions would range annually from 2.1 to 49.9 MMtCO₂e. *Id.* at 579.

²³⁶ *AquAlliance v. U.S. Bureau of Reclamation*, 287 F. Supp. 3d 969, 1023 (E.D. Cal. 2018).

²³⁷ *Id.* at 1027 (emphasis added).

²³⁸ See *id.* at 1028.

foreseeable future condition of the affected environment for the ‘no action’ alternative based on available climate change measurements, statistics, observations, and other evidence.”²³⁹

In reviewing the record, the court made several findings relating to climate science. Inter alia, the court noted that “[a]t least one climate modeling scenario included in the [Administrative Record (AR)] predicts that, statewide, snow water equivalent will decrease by 16 percent by 2035”²⁴⁰ and that “[o]ther evidence in the record corroborates the assertion that snowpack in California has and likely will continue to decrease as a result of climate change.”²⁴¹ The agency, however, had evaluated the project’s impact on water supply using a model that is based on “historical hydrology from 1922 through 2003.”²⁴² Plaintiffs argued it was unreasonable to rely on historical data when the record reflects that “[t]he past century is no longer a reasonable guide to the future for water management.”²⁴³ The court ruled that the agency’s focus on annual patterns ignored a critical aspect of climate impacts.²⁴⁴

The agency also argued that evidence of California’s *decreasing* GHG emissions suggested that climate impacts on the proposed action would be less than significant.²⁴⁵ The court described this argument as “simply illogical,” noting that “it is undisputed (and indisputable) that [GHG] emissions from California cannot and will not control the trajectory of climate change overall.”²⁴⁶ The record “explain[ed] that snowpack and streamflow is predicted to decline,” yet “the FEIS/R fails to address or otherwise explain how this information about the potential impacts of climate change can be reconciled with the ultimate conclusion that climate change impacts to the Project will be less than significant.”²⁴⁷ The court held that the analysis of climate change in the FEIS/R violated NEPA and granted the plaintiffs’ motion for summary judgment.²⁴⁸

2. Clean Air Act

A significant number of climate cases has arisen under the Clean Air Act (CAA),²⁴⁹ including some of the seminal cases cited above such as *Massachusetts* and *UARG*.²⁵⁰ A recent CAA proceeding

²³⁹ *Id.*

²⁴⁰ *Id.*

²⁴¹ *Id.* at 1028 n.32.

²⁴² *Id.* at 1028.

²⁴³ *Id.* (citing Second National Climate Assessment, cited in the FEIS/R and included in the AR).

²⁴⁴ *Id.* at 1029.

²⁴⁵ *Id.* at 1030.

²⁴⁶ *Id.*

²⁴⁷ *Id.* at 1032.

²⁴⁸ *See id.*

²⁴⁹ 42 U.S.C. §§7401 et seq.

²⁵⁰ *See, e.g., supra* § II.

involves EPA’s announcement in 2017 that the EPA would reconsider the appropriateness of vehicle emissions standards adopted by the previous Administration in 2012 for model year 2022–2025 motor vehicles, which it said might be “too stringent.”²⁵¹ A coalition of more than a dozen U.S. states, environmental groups, and electric industry representatives sued, alleging that the action was arbitrary under the APA. The D.C. Circuit dismissed for lack of jurisdiction, holding that EPA had not engaged in “final action” under the CAA.²⁵²

The case is interesting in that it underscores acceptance of basic climate science by the litigants. The administrative record, for example, contained a significant number of climate facts, which EPA did not challenge before the court. The key decision was the agency’s aforementioned 2009 Endangerment Finding, in which EPA had “determined . . . that elevated atmospheric concentrations of six well-mixed [GHGs] may reasonably be anticipated to endanger public health and welfare, and that emissions from new motor vehicles contribute to such air pollution.”²⁵³ Based on the Endangerment Finding, EPA had promulgated rules establishing GHG emission standards for different categories of motor vehicles. Relatedly, in 2009, EPA and the National Highway Traffic Safety Administration (NHTSA) had acknowledged that “[t]he close relationship between emissions of CO₂—the most prevalent [GHG] emitted by motor vehicles—and fuel consumption, [which] means that the technologies to control CO₂ emissions and to improve fuel economy overlap to a great degree.”²⁵⁴ The two agencies published a joint final rule establishing “strong and coordinated” GHG emission and Corporate Average Fuel Economy (CAFE) standards, increasing in stringency annually from model year 2012 to 2016.²⁵⁵ In 2012, EPA and NHTSA published new standards, estimating that the latest phase of the program would save 4 billion barrels of oil and reduce GHG emissions by 2 billion metric tons.²⁵⁶

After presidential transition, EPA concluded that the original standards were “not appropriate” and were based on assumptions that “were optimistic or have significantly changed.”²⁵⁷ However, the agency’s new administrative record did not challenge the previously-established link between motor vehicles, GHG emissions, and climate change.²⁵⁸ Neither did the car manufacturers who intervened

²⁵¹ See *California v. Env’tl. Prot. Agency*, 940 F.3d 1342, 1345 (D.C. Cir. 2019) (noting that EPA changed lanes following the change in presidential administrations).

²⁵² *Id.*

²⁵³ See EPA’s Endangerment Finding, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act (“Endangerment Finding”), 74 Fed. Reg. 66496, 66499 (Dec. 15, 2009).

²⁵⁴ See *California*, 940 F.3d at 1345 (citing Notice of Upcoming Joint Rulemaking to Establish Vehicle GHG Emissions and CAFE Standards, 74 Fed. Reg. 24007, 24008, 24009 n.7 (May 22, 2009)).

²⁵⁵ *Id.* (citing Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, 75 Fed. Reg. 25324, 25326, 25330 (May 7, 2010)).

²⁵⁶ *Id.*

²⁵⁷ *Id.* at 1348 (citing Mid-Term Evaluation of Greenhouse Gas Emissions Standards for Model Year 2022-2025 Light-Duty Vehicles, 83 Fed. Reg. 16077, 16077 (Apr. 13, 2018) (Revised Determination)).

²⁵⁸ EPA’s critique focused on factors that had nothing to do with climate science—such as uncertainty about the availability of technological advances to meet the standards, “flagging” consumer demand for electric vehicles, and potential effect on

on EPA’s side, noting that “[t]he principal GHG emission from vehicles powered with carbon-based fuels like gasoline is [CO₂]. The only effective way to reduce those [CO₂] emissions is to increase a vehicle’s fuel economy.”²⁵⁹ Rather, car manufacturers questioned EPA’s assumptions about compliance costs.²⁶⁰

In dismissing the petitions, the D.C. Circuit noted that “[t]he Original Determination has been withdrawn, but the evidence supporting it stands.”²⁶¹ Accordingly, if EPA’s new rulemaking were to result in changes to the existing standards, the agency “will be required to provide a reasoned explanation and cannot ignore prior factual findings and the supporting record evidence contradicting the new policy.”²⁶²

3. Endangered Species Act

Courts have also made a number of climate findings in cases involving the federal government’s administration of the Endangered Species Act (ESA)—a 1973 statute whose purpose is to protect and recover imperiled species and the ecosystems on which they depend. The ESA is administered by two agencies, the U.S. Fish and Wildlife Service (FWS) for terrestrial and freshwater organisms, and the Commerce Department’s National Marine Fisheries Service (NMFS) for mainly marine wildlife and some fish species. The ESA notably enshrines the “best available science” standard, which courts have interpreted in several climate-related cases. As with some of the NEPA proceedings above,²⁶³ climate-related claims under the ESA have generally focused on whether federal agencies had sufficiently considered the impacts of climate change in their analysis of a species’ vulnerability.²⁶⁴ Basic climate science, often discussed extensively in the agencies’ records, has not been in dispute.

low-income consumers. *See id.* at 1349. *See also* Initial Brief for Respondents at 9, *California v. Env’tl. Prot. Agency*, No. 18-1114 (D.C. Cir. Apr. 4, 2019) (noting “the inherently close relationship between vehicle [GHG] emissions and fuel economy”). *See also id.* at 52–54; Respondents’ Motion to Dismiss Petitions for Lack of Jurisdiction at 3–4, *California v. Env’tl. Prot. Agency*, No. 18-1114 (D.C. Cir. July 10, 2019) (listing relevant considerations).

²⁵⁹ *See* Movant-Intervenors’ Motion to Dismiss for Lack of Jurisdiction at 3, *California v. Env’tl. Prot. Agency*, No. 18-1114 (D.C. Cir. July 10, 2018).

²⁶⁰ *See, e.g.*, Brief for Intervenors at 12, *California v. Env’tl. Prot. Agency*, No. 18-1114 (D.C. Cir. Apr. 15, 2019) (stating that “. . . EPA’s up-to-date information demonstrated that the agency had been downright mistaken—or at least, could no longer claim a sound empirical basis—with respect to critically important variables like gas prices, consumer acceptance of low-emission vehicles, the pace and feasibility of improvements in emission-reduction technology, the cost of new technology, the economic impact of the existing standards, and other relevant factors.”).

²⁶¹ *California*, 940 F.3d at 1353.

²⁶² *Id.*

²⁶³ *See supra* § III.B.1.b.

²⁶⁴ *See, e.g.*, *Alaska Oil & Gas Ass’n v. Jewell*, 815 F.3d 544, 550 (9th Cir. 2016) (rejecting challenge by oil and gas trade associations, several Alaska Native corporations and villages, and the state of Alaska against federal designation of critical habitat for polar bears and recognizing the future impact of climate change as relevant in the designation); *Nat’l Wildlife Fed’n v. Nat’l Marine Fisheries Serv.*, 184 F. Supp. 3d 861, 874 (D. Or. 2016) (finding that NMFS had failed to analyze

For example, in *Wild Fish Conservancy v. Irving*, NMFS analyzed whether the operation of a fish hatchery would threaten the existence of endangered fish spawning in the same watershed.²⁶⁵ The agency's record included a detailed discussion of projected climate impacts on salmon recovery, including that models predict a "significant reduction in total snowpack and low-elevation snowpack, affecting streamflow and water temperatures."²⁶⁶ Despite this evidence, NMFS relied on historical stream and water temperature data.²⁶⁷

The court acknowledged its duty to give deference to an expert agency on highly scientific or technical questions. However, it also noted that

The problem with NMFS's analysis is not that it used recent historical streamflow data to model the effects of hatchery operations and water use at different flow levels. *The problem here is that NMFS included no discussion whatsoever of the potential effects of climate change in the BiOp's [Biological Opinion's] analysis of the Hatchery's future operations and water use.* NMFS discusses the effects of climate change generally and then proceeds with analysis on the apparent assumption that there will be no change to the hydrology of Icicle Creek. NMFS does not necessarily need to conduct a study or build a model addressing the impacts of climate change on the Icicle Creek watershed. But its analysis must consider that the best available science, which it discusses elsewhere in the BiOp, suggests that baseline historical flow averages may not be effective predictors of future flows.²⁶⁸

The court held that the agency's analysis was arbitrary and capricious.²⁶⁹

In *Turtle Island Restoration Network v. U.S. Department of Commerce*, the Ninth Circuit grappled with the impact of climate change on sea turtles. In 2012, the NMFS had issued a Biological Opinion (BiOp) concluding that its proposed action (removing the annual limit on fishery lines) would not jeopardize the existence of loggerhead and leatherback sea turtles for the next 25 years.²⁷⁰ The NMFS also determined that climate change may be starting to affect both turtle species, but

properly how climate change "increases the chances of an event that would be catastrophic for the survival" of listed salmon and steelhead species in the Federal Columbia River Power

System); *cf.* *Defenders of Wildlife v. Jewell*, 176 F. Supp. 3d 975, 1011 (D. Mont. 2016) (holding that the agency's decision against listing the wolverine as threatened was arbitrary and capricious, in part because "[n]o greater level of certainty is needed to see the writing on the wall for this snow-dependent species standing squarely in the path of global climate change.").

²⁶⁵ *Wild Fish Conservancy v. Irving*, 221 F. Supp. 3d 1224, 1227–28 (E.D. Wash. 2016).

²⁶⁶ *Id.* at 1233.

²⁶⁷ *Id.* The agency argued that its analysis reflected the best available science on region-wide climate change and used historical data to analyze only the specific stream where the hatchery was located (because finer-scale climate analysis of that stream was not available). *Id.*

²⁶⁸ *Id.* at 1233–34 (emphasis added).

²⁶⁹ *Id.* at 1234.

²⁷⁰ *Turtle Island Restoration Network v. U.S. Dep't of Commerce*, 878 F.3d 725, 736 (9th Cir. 2017).

lacked sufficient data to quantify the threat.²⁷¹ Plaintiffs argued that the 2012 BiOp’s conclusion was unsupported by the agency’s own scientific methods.²⁷²

With respect to the loggerhead turtles, the court held that the NMFS had “violated the APA’s requirement that the agency articulate a rational connection between the population viability model upon which the NMFS relied and its no jeopardy conclusion.”²⁷³ Here, the agency acknowledged that its climate-based model predicted “a heightened risk of extinction,” but still upheld a no-jeopardy.²⁷⁴ Rejecting this logic,²⁷⁵ the court explained that the relevant inquiry is whether the “action effects, when added to the underlying baseline conditions,” are such that they would cause jeopardy.²⁷⁶ As the court stated,

Even though the NMFS was unable to quantify the risks of climate change and its associated impacts, the agency recognized that they would be detrimental to the loggerheads.

The climate-based model predicted that the proposed action would exacerbate the loggerheads’ decline, and the BiOp is structurally flawed to the extent the NMFS failed to incorporate those findings into its jeopardy analysis. Because the NMFS has not articulated a rational connection between the best available science and its conclusion that the loggerhead sea turtles would not be affected by the increased fishing efforts, the agency’s determination that the loggerhead ‘population will remain large enough to retain the potential for recovery’ is arbitrary and capricious.²⁷⁷

Plaintiffs also argued that the agency had acted arbitrarily by dismissing the effects of global warming on sea turtles as uncertain without further study.²⁷⁸ Here, the court upheld the agency analysis, noting that the NMFS had “considered a variety of ways in which climate change may affect the sea turtles, but simply concluded that the data available was too indeterminate for the agency to evaluate the potential sea-turtle impacts with any certainty.”²⁷⁹ Plaintiffs had the burden of sufficiently refuting “the NMFS’s stated inability to offer more specific predictions on the effects of climate change, and they ha[d] not alleged that less speculative scientific information is available that the

²⁷¹ *See id.*

²⁷² *See id.* at 736–37 (noting that 99.5% of the tests showed the loggerhead falling below the quasi-extinction threshold within 25 years and that “[v]irtually all the loggerhead climate model runs . . . indicat[ed] high extinction risk with high model confidence.”).

²⁷³ *Id.* at 737.

²⁷⁴ *See id.*

²⁷⁵ *Id.*

²⁷⁶ *See id.* at 737–38. *Accord Nat’l Wildlife Fed’n*, 524 F.3d at 930 (holding that “where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm”); *id.* (noting that listed species’ “slow slide into oblivion is one of the very ills the ESA seeks to prevent”).

²⁷⁷ *Id.* at 739 (internal citations omitted).

²⁷⁸ *Id.* at 740.

²⁷⁹ *Id.* (emphasis added) (noting that the NMFS explained that the effects from climate change include rising sand temperatures and sea levels, beach erosion, increased storm activity, and changes in ocean temperature and chemistry and summarized studies anticipating that climate change will impact, inter alia, turtle gender ratios, nesting habitat, and reproductive capacity).

agency overlooked.”²⁸⁰ Therefore, the NMFS’s consideration of climate change was not arbitrary or capricious, nor was it contrary to the agency’s obligation to base its jeopardy decision on the best scientific data it could obtain.

In *Center for Biological Diversity v. Zinke*, the Ninth Circuit considered climate threats to the Arctic grayling, a cold-water fish that today exists only in the Upper Missouri River Basin in Montana and which the Fish and Wildlife Service had decided not to list as endangered or threatened under the ESA.²⁸¹ An environmental group challenged that determination on several grounds, including that the agency’s 2014 assessment of the cumulative impacts of climate change arbitrarily relied on uncertainty to avoid making determinations about climate threats. The trial court ruled in favor of FWS, and the Ninth Circuit reversed.

The Ninth Circuit held that FWS’s refusal to make “any projection as to the synergistic effects of climate change, simply because of the uncertainty”²⁸² was “unacceptable.”²⁸³ In particular, the court observed that the agency had “fail[ed] to explain why the uncertainty of climate change favors not

²⁸⁰ *Id.* (internal citations omitted) (“Where superior information is not readily available, we cannot insist on perfection: The ‘best scientific . . . data available,’ does not mean the best scientific data possible.”). The court also upheld the agencies’ analysis in *WildEarth Guardians*, where the plaintiff argued, inter alia, that USFS and FWS had not properly analyzed the effects of climate change on the Mexican spotted owl in the BiOps. *See WildEarth Guardians v. U.S. Fish & Wildlife Serv.*, No. CV-13-00151-TUC-RCC, 2019 WL 4345333 (D. Ariz. Sept. 12, 2019). Climate science was not in dispute. *See id.* at *14–15 (noting that the agency record contained a number of findings relating to climate change, including that “in the Southwest, climate change will manifest in increased temperatures and aridity, intensified flooding, and delayed monsoons” and “may result in more wildfires”). The burden was on the plaintiff to identify deficiencies in the agency’s approach to managing a changing climate. *See id.* at *15 (noting that “[p]laintiff would like a different approach to climate change but fails to show that Defendants did not consider the effects on the [Mexican spotted owl]. The BiOps include information that increased fires due to warmer, drier temperatures could ruin habitat and increase disease. FWS recommended utilizing fuels management and forest restoration measures to protect multilayered, dense canopies amenable to the [Mexican spotted owl] population. This Court must be deferential to Defendants’ predictions about the possible effects of climate change.”). *See also* *Ctr. for Biological Diversity v. Bernhardt*, No. 3:18-CV-00064-SLG, 2019 WL 4725124, at *11 (D. Ala. Sept. 26, 2019) (finding that FWS had adequately explained its decision to use the year 2060 as the timeframe for its foreseeable future analysis in its 2017 Listing Decision for the Pacific walrus, where agency had “reviewed model projections for future global warming trends, sea ice seasons, Pacific walrus habitat access, ocean warming, benthic productivity, and ocean acidification” and concluded “that beyond 2060 the conclusions concerning the impacts other effects of climate change on the Pacific walrus population are based on speculation, rather than reliable prediction.”); *Ctr. for Biological Diversity v. Zinke*, 868 F.3d 1054, 1062 (9th Cir. 2017) (finding that FWS appropriately addressed climate change in its 2012 decision not to list the bald eagle under the ESA); *Desert Survivors v. U.S. Dep’t of the Interior*, No. 16-cv-01165-JCS, slip. op. (N.D. Cal. May. 15, 2018) (upholding agency analysis of cumulative impact on sage-grouse habitat, where the agency acknowledged the “synergistic interactions among fire, people and infrastructure, invasive species, and climate change” in the Withdrawal Decision).

²⁸¹ *Ctr. for Biological Diversity v. Zinke*, 900 F.3d 1053 (9th Cir. 2018).

²⁸² *Id.* at 1073 (noting FWS’s statement that “[u]ncertainty about how different temperature and precipitation scenarios could affect water availability make projecting possible synergistic effects of climate change on the Arctic grayling too speculative at this time.”).

²⁸³ *Id.* at 1072–73 (citing *Greater Yellowstone Coal.*, 665 F.3d at 1028) (ruling that FWS had acted in an arbitrary and capricious manner).

listing the arctic grayling when the 2014 Finding acknowledges the warming of water temperatures and decreasing water flow because of global warming.”²⁸⁴

The situation was the reverse in *Colorado v. U.S. Fish and Wildlife Service*, a recent case involving the Gunnison sage-grouse.²⁸⁵ There, FWS had issued Final Rules listing the sage-grouse as a threatened species under the ESA and designated 1.4 million acres in Colorado and Utah as critical habitat for the bird, relying in part on evidence of climate change. The States of Colorado and Utah, local governments, and private associations sued. The court held that the agency’s decision was reasonable and had substantial support, and noted that “the record demonstrate[d] an affirmative association between past drought conditions in Colorado and reductions to all Gunnison sage-grouse populations. . . .”²⁸⁶

The fact of climate change was not in dispute among the parties: at issue was the severity of its impacts and the governments’ ability to manage them. As the court noted,

Plaintiffs do not dispute that temperatures are rising and precipitation, lessening. Plaintiffs also admit to some climate-and drought-related issues, such as a decrease in riparian systems upon which sage-grouse depend for brood-rearing. Plaintiffs nonetheless contend that these changes do not significantly impact the Gunnison Basin population because of its low elevation and resiliency, as well as the protective conservation efforts in place. Again, Plaintiffs’ arguments amount to little more than a disagreement with the science upon which the Service relied to reach a contrary conclusion and the Service’s assessment of local conservation efforts²⁸⁷

Ultimately, the court determined that the agency’s “thorough, lengthy analysis” supported its determination. The agency had laid out evidence of climate change in Colorado, where “warming [was] occurring more rapidly than elsewhere in the country”²⁸⁸ and had cited “numerous accredited sources” in its discussion of consequences of increased temperatures and prolonged drought on the sage-grouse, including fire and insect reduction.²⁸⁹

²⁸⁴ *Id.* See also *id.* (noting that agency’s record clearly indicated that “[i]ncreases in temperature and changes in precipitation are likely to affect the availability of water in the West”); *id.* at 1059 (observing that “[d]espite [the fish’s] adaptation [to warmer temperatures], climate change threatens the arctic grayling. Less water in streams poses a threat to the arctic grayling. Droughts and warmer-than-normal air temperatures can reduce water levels and, consequently, raise water temperatures higher than the range of temperatures that the arctic grayling can tolerate.”).

²⁸⁵ See *Colorado v. U.S. Fish & Wildlife Serv.*, 362 F. Supp. 3d 951 (D. Colo. 2018).

²⁸⁶ *Id.* at 971, 981. See also *id.* (finding that “the Service’s assessment of an increased threat from climate change and drought conditions was not arbitrary and capricious, nor does it support reversal.”).

²⁸⁷ *Id.*

²⁸⁸ *Id.* at 971.

²⁸⁹ *Id.*

4. Securities and Financial Regulation

Several recent cases have brought to the fore questions of climate risk and climate science in the context of federal securities and financial regulation.

For example, in *Fentress v. Exxon Mobil Corp.*, current and former employees of Exxon sued their employer under the 1974 Employee Retirement Income Security Act (ERISA) in the U.S. District Court for Northern Texas, claiming that the company had mismanaged their retirement plan by insufficiently considering climate risks.²⁹⁰ The court dismissed the case, finding that plaintiffs had failed to meet the very high pleading standards established for an ERISA claim.²⁹¹

Climate science was not questioned in the case. The court noted, for example, “there was ample publicly available information about climate change for the market to consider in valuing Exxon’s stock.”²⁹² As the court explained:

The Supreme Court recognized that ‘[t]he harms associated with climate change are serious and well recognized’ and could be attributed, at least in part, to ‘manmade greenhouse gas emissions,’ in 2007, years before the Class Period. *Massachusetts v. EPA*, 549 U.S. 497, 521, 523 (2007). *To pretend that environmental risks about climate change were unknown until Exxon itself shared information about climate change is an affront to scientists, academics, and government bodies, not to mention the people who were already experiencing the effects of climate change by 2015.*²⁹³

In its analysis of what was publicly known about climate change, the court referenced a number of official sources, noting that

National and international scientific organizations and government organizations had researched and published information about climate change before the Class Period. The Intergovernmental Panel on Climate Change published its fifth Assessment Report on the state of knowledge on climate change in November 2014, before the Class Period. See IPCC, Publications and Data, https://www.ipcc.ch/publications_and_data/publications_and_data.shtml. The National Aeronautics and Space Administration, an independent United States federal government agency, has been studying and recognizing climate change since at least 2008 and recognizes that studies publish in peer-reviewed scientific journals overwhelmingly recognize climate change trends and risks associated with the trends. See NASA, Articles: News, <https://climate.nasa.gov/news/> (select “2008” from drop down menu); NASA, Facts: Scientific Consensus: Earth’s climate is warming, <https://climate.nasa.gov/scientific-consensus/> (last visited Feb. 13, 2018). The United States Global Change Research Program had

²⁹⁰ Plaintiffs alleged breach of fiduciary duties in the management of plan arising out of alleged public materially false and misleading statements employer made about health of business, “specifically that employer failed to disclose reports about environmental risks caused by climate change and the effects on employer.” See *Fentress v. Exxon Mobil Corp.*, 304 F. Supp. 3d 569 (S.D. Tex. 2018).

²⁹¹ See *Fentress v. Exxon Mobil Corp.*, No. 4:16-CV-3484, slip. op. (S.D. Tex. Feb. 4, 2019). Plaintiffs’ second amended complaint was also dismissed. See *id.*

²⁹² See *Fentress*, 304 F. Supp. at 576 (noting that during the Class Period, “the insider information could only be that Exxon had studied the risks for decades; information about the risks of climate change was publicly available during 2015 and 2016. Even if Exxon knew more about climate change than the company publicly let on, an efficient market can incorporate other information than what a company discloses. . . . [T]here was ample publicly available information about climate change for the market to consider in valuing Exxon’s stock.”).

²⁹³ *Id.* at 576–77 (emphasis added).

published its third National Climate Assessment about the impacts of climate change in the United States by the time the Class Period began. U.S. National Climate Assessment: Climate Change Impacts in the United States (May 2014), available at <https://www.globalchange.gov/browse/reports>. The report was put together by a ‘team of more than 300 experts guided by a 60-member Federal Advisory Committee,’ and then ‘extensively reviewed by the public and experts, including federal agencies and a panel of the National Academy of Sciences.’ *Id.*²⁹⁴

Due to the nature of the ERISA proceeding, the court was asked to review a number of internal company documents and archival materials on climate science, as well as the company’s public statements.²⁹⁵ The company argued, *inter alia*, that not only did it disclose climate risks before and during the relevant Class Period (November 2015 through October 2016), but that its supposedly “internal documents” were actually publicly available before the Class Period, including its 2015 Corporate Citizenship Report (which acknowledged “risks of climate change”) and its Form 10-K for 2007 and 2015 fiscal years (which mentioned “global climate change”).²⁹⁶ In view of this evidence, the court noted that a number of climate facts was “known by the market and certainly by Defendants,” including that “the oil industry and climate change are inter-related (i.e., the burning of fossil fuels contributes to climate change and so regulatory programs to address climate change could affect the oil industry).”²⁹⁷ Ultimately, the court’s decision was limited to the issues raised by defendants’ motion to dismiss. Not having reached the merits, the court did not decide whether Exxon had actually “contributed to climate change.”²⁹⁸

Similar arguments were raised in *Ramirez v. Exxon Mobil Corp.*, a class action filed under the Private Securities Litigation Reform Act (PSLRA) in the federal district court for the Northern District of Texas. There, a group of shareholders have alleged that Exxon had defrauded investors by intentionally misrepresenting climate risks.²⁹⁹ Climate science, at this stage in the proceedings, has not been in dispute. In its motion to dismiss, for example, the company noted that it had “disclosed to investors the risks of climate change to its business” well before the alleged class period (2014 to 2017).³⁰⁰ Those risks, as the company explained, included the risk that new climate policies—

²⁹⁴ *Id.* at 577 n.2.

²⁹⁵ *See id.* *See also id.* at 576 (“News articles and reports that Defendants filed with their motion to dismiss corroborate this disconnect between what Exxon knew about climate change science internally and what it presented externally.”).

²⁹⁶ *Id.* at 576.

²⁹⁷ *Id.* at 580.

²⁹⁸ *See id.* at 587.

²⁹⁹ *See Ramirez v. Exxon Mobil Corp.*, 334 F. Supp. 3d 832 (N.D. Tex. 2018).

³⁰⁰ *See Defendants’ Motion to Dismiss the Consolidated Complaint and Brief in Support* at 4, *Ramirez v. Exxon Mobil Corp.*, No. 3:16-cv-03111-K (N.D. Tex. Sept. 26, 2017). *See also id.* at 2, 5 (explaining that the company “analyzes the potential impact on its business of climate-change regulation using a proxy cost of carbon, a figure representing the estimated impact of a wide variety of potential climate-related policies on future global demand for energy”; that, “where appropriate, ExxonMobil also uses GHG costs to estimate its own expenses for its emissions of [CO₂] or other [GHGs]”; and, that, “[u]nlike a proxy cost of carbon, which considers the cumulative impact of climate-related policies on demand without regard to who bears the cost, GHG costs reflect costs that climate-related policies might impose directly on ExxonMobil for its own [GHG] emissions in developing or operating particular projects.”).

including caps on emissions in various jurisdictions and the risk of stranded assets—would reduce the value of the company stock.

In 2018, the court allowed the suit to proceed, having found that plaintiffs had sufficiently pleaded the alleged material misstatements and loss causation and met the heightened scienter standard in a securities fraud claim.³⁰¹ The court noted that it was inappropriate to consider expert opinions at the pleading stage; however, it took into account nonconclusory, factual portions of submitted statements.³⁰² The case is pending.

Another suit was filed under New York state law. In *People v. ExxonMobil Corp.*, the Office of the Attorney General of the State of New York (NYAG) alleged that ExxonMobil had made a number of materially false and material disclosures to the public from late 2013 through 2016 in violation of New York state law about how it managed the risks of climate change and of increasing climate-related regulations.³⁰³ NYAG argued that the company had used a lower estimate of the future potential cost of climate change (proxy cost of carbon) internally from the numbers it shared with investors. The trial in New York Supreme Court followed 3.5 years of investigation and pre-trial discovery that required the company to produce millions of pages of documents and dozens of witnesses for interviews and depositions.³⁰⁴ In December 2019, the court found that NYAG had failed to prove by a preponderance of the evidence its allegations.³⁰⁵

The parties did not dispute either the reality of climate change, or the underlying climate science. The parties, and the court, for example, recognized the link between fossil fuel investment and emissions. As the court noted:

It is undisputed that ExxonMobil recognized more than a decade ago that climate policies and regulations could affect its business by reducing the demand for its products and by increasing the costs of bringing those products to market.

At least as early as 2007, separate teams in ExxonMobil's Corporate Strategic Planning group developed planning assumptions for different contexts. The team that worked exclusively on the [*Outlook for Energy*] developed a proxy cost of carbon assumption for use in assessing demand for ExxonMobil products. A separate team, the Corporate Planning Group, developed GHG cost assumptions that could be applied as direct expense items in evaluations of specific investments which, *if funded*, would emit [GHGs].³⁰⁶

³⁰¹ See *Ramirez*, 334 F. Supp. 3d at 859.

³⁰² *Id.*

³⁰³ NYAG withdrew its claims of equitable fraud and common law fraud contained in its original complaint. See *People v. Exxon Mobil Corp.*, No. 452044/2018, 65 Misc. 3d 1233(A), 2019 NY slip op. 51990(U) (Sup. Ct. N.Y. Cnty. Dec. 10, 2019).

³⁰⁴ *Id.* at 1.

³⁰⁵ The court noted that an alleged misstatement is material to a reasonable investor only if it is sufficiently specific to guarantee some concrete fact or outcome. See *id.* at 34 (finding that “investors had no insight into the criteria ExxonMobil used to determine when or whether ExxonMobil would consider it appropriate to apply GHG costs to a specific project.”).

³⁰⁶ *Id.* at 9 (internal citations omitted).

The court explained, however, that it was not making any findings relating to the company's potential contribution to climate change:

Nothing in this opinion is intended to absolve ExxonMobil from responsibility for contributing to climate change through the emission of [GHGs] in the production of its fossil fuel products. ExxonMobil does not dispute either that its operations produce [GHGs] or that [GHGs] contribute to climate change. But ExxonMobil is in the business of producing energy, and this is a securities fraud case, not a climate change case. Applying the applicable legal standards, the Court finds that the [NYAG] failed to prove by a preponderance of the evidence that ExxonMobil made any material misrepresentations that 'would have been viewed by a reasonable investor as having significantly altered the 'total mix' of information made available.'³⁰⁷

The ruling has not been appealed. A similar action filed by Massachusetts is pending.³⁰⁸

5. Freedom of Information

The issue of climate science also arose in several Freedom of Information Act (FOIA) requests filed by environmental groups relating to public statements made by government officials.

In the first such lawsuit, *Public Employees for Environmental Responsibility v. EPA*, a non-profit organization sought information relating to on-air public statements in 2017 by former Administrator of the EPA Scott Pruitt to the effect that "[CO₂] created by human activity is not the primary driver of global climate change."³⁰⁹ Contrary to this statement, the EPA's *Causes of Climate Change* webpage stated that "[CO₂] is the primary greenhouse gas that is contributing to recent climate change" and that "[t]he primary human activity affecting the amount and rate of climate change is [GHG] emissions from the burning of fossil fuels."³¹⁰

Plaintiffs filed a FOIA request to obtain Administrator Pruitt's preparation notes (none of which referenced climate change), as well as any EPA documents that supported his conclusion that human activity is not the largest factor driving global climate change. In its reply, the EPA argued that no response to the FOIA request was required because the request constituted "an impermissible attempt to compel EPA and its Administrator to answer questions and take a position on the climate change debate."³¹¹ The D.C. District Court disagreed, describing the agency's assertion as "troubling."³¹² As the court found, the public statements of an agency head about the causes of climate

³⁰⁷ *Id.* at 3 (internal citations omitted).

³⁰⁸ See *Commonwealth v. Exxon Mobil Corp.*, No. 1:19-cv-12430 (D. Mass. Mar. 18, 2020) (order granting motion to remand to state court).

³⁰⁹ See *Pub. Employees for Envtl. Responsibility v. U.S. Envtl. Prot. Agency*, 314 F. Supp. 3d 68, 72 (D.D.C. 2018).

³¹⁰ *Id.*

³¹¹ *Id.* at 75 (quoting Defendants' Reply).

³¹² *Id.* at 77 (internal citations omitted):

Particularly troubling is the apparent premise of this agency challenge to the FOIA request, namely: that the evidentiary basis for a policy or factual statement by an agency head, including about the scientific factors contributing to climate change, is inherently unknowable. Such a premise runs directly

change, even if they reflect merely personal opinion, may nonetheless guide the agency's regulatory efforts.³¹³ Therefore, "to the extent any agency records provide the basis for such public statements, those agency records are a perfectly proper focus of a FOIA request."³¹⁴

As for the second part of the FOIA request (agency records concluding that human activity is not the largest driver of climate change), EPA argued that this request would require the agency "to take a position and make an affirmative statement as to what this material does or does not demonstrate," and "take a position about what conclusions all of the documents in its possession potentially related to climate change may or may not support."³¹⁵ The court was puzzled by the EPA's opposition to disclosure given the EPA's extensive administrative record on basic climate science, as recognized by ample judicial authority:

. . . EPA's apparent concern about taking a position on climate change is puzzling since EPA has already taken a public position on the causes of climate change. The D.C. Circuit described as "substantial" the "body of scientific evidence marshaled by EPA," which "scientific evidence of record included support for the proposition that greenhouse gases trap heat on earth that would otherwise dissipate into space; that this 'greenhouse effect' warms the climate; that human activity is contributing to increased atmospheric levels of greenhouse gases; and that the climate system is warming." *Coal. for Responsible Regulation, Inc. v. EPA*, 684 F.3d 102, 120 (D.C. Cir. 2012), *aff'd in part, rev'd in part sub nom. Util. Air Regulatory Grp. v. EPA*, ___ U.S. ___, 134 S. Ct. 2427, 189 L.Ed.2d 372 (2014). "Based on this scientific record, EPA made the linchpin finding: in its judgment, the 'root cause' of the recently observed climate change is 'very likely' the observed increase in anthropogenic greenhouse gas emissions." *Id.*; *see also id.* at 121 ("To recap, EPA had before it substantial record evidence that anthropogenic emissions of greenhouse gases 'very likely' caused warming of the climate over the last several decades."); *Util. Air Regulatory Grp.*, 134 S. Ct. at 2436–37 ("In 2009, EPA announced its determination regarding the danger posed by motor-vehicle greenhouse-gas emissions. EPA found that greenhouse-gas emissions from new motor vehicles contribute to elevated atmospheric concentrations of greenhouse gases, which endanger public health and welfare by fostering global 'climate change.'" (citing Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66496, 66523, 66537 (Dec. 15, 2009))). *Given EPA's plain position on climate change presented in litigation before the D.C. Circuit and the Supreme Court*, the FOIA request at issue may be viewed as seeking agency records underpinning a potential change in position signaled by Administrator Pruitt's March 9, 2017, public statements.³¹⁶

counter to "an axiom of administrative law that an agency's explanation of the basis for its decision must include 'a rational connection between the facts found and the choice made,' . . . and the 'responsibility of the agency to explain the rationale and factual basis for its decision.'" . . . EPA's strained attempt to raise an epistemological smokescreen will not work here to evade its obligations under the FOIA.

³¹³ *See id.*

³¹⁴ *Id.*

³¹⁵ *Id.* at 78–79.

³¹⁶ *Id.* at 79 (emphasis added).

In August 2018, the EPA released documents showing that former Administrator Pruitt had not relied on climate science in making his statements.³¹⁷ Dozens of other FOIA claims have been filed since that raise issues of climate science.³¹⁸

6. State Administrative Law

Many U.S. states also provide for judicial review of agency decision-making along the lines similar to the APA, discussed above. Some of those cases have also required state courts to grapple with climate science.³¹⁹

In a recent case, Colorado residents had petitioned the Colorado Oil and Gas Conservation Commission to adopt a rule that, *inter alia*, would have precluded the Commission from issuing permits for the drilling of oil and gas wells “unless the best available science demonstrates, and an independent, third-party organization confirms, that drilling can occur in a manner that does not cumulatively, with other actions, impair Colorado’s atmosphere, water, wildlife, and land resources, does not adversely impact human health, and does not contribute to climate change.”³²⁰ The Commission denied the rulemaking petition, and the residents applied for judicial review.³²¹ The District Court upheld the Commission’s decision. The Court of Appeals reversed and remanded the District Court’s affirmance, and the Commission petitioned for a writ of certiorari.

The Colorado Supreme Court upheld the Commission’s ruling. As in the cases considered above, the linkage between oil and gas development and climate impacts was not in doubt. Rather, the Supreme Court determined that the governing statute did not “allow the Commission to condition one legislative priority (here, oil and gas development) on another (here, the protection of public health

³¹⁷ See Miranda Green, *EPA: Pruitt Didn’t Rely on Science When Making Comment About Climate Change*, THE HILL (Aug. 7, 2018), <https://thehill.com/policy/energy-environment/400707-epa-admits-pruitt-didnt-rely-on-science-when-making-comment-about>.

³¹⁸ See U.S. Litigation Chart, SABIN CTR. FOR CLIMATE CHANGE LAW, <http://climatecasechart.com/category/freedom-of-information-act/> (listing FOIA cases).

³¹⁹ See, e.g., *In re Haw. Elec. Light Co.*, 445 P.3d 673, 696–97 (Haw. 2019) (remanding to agency to “give explicit consideration to the reduction of GHG emissions in determining whether to approve the [project],” consistent with legislative direction); *Cleveland Nat’l Forest Found. v. San Diego Ass’n of Gov’ts*, 3 Cal.5th 497 (Cal. 2017) (holding that the regional transportation planning authority did not abuse its discretion by declining to explicitly engage in an analysis of the consistency of projected 2050 GHG emissions with emissions targets in the Governor’s executive order, but noting that agencies are required to ensure that such analyses “stay in step with evolving scientific knowledge and state regulatory schemes”); *In re Daley Farms of Lewiston LLP*, No. A19-0207, slip. op. at 16–18 (Minn. Ct. App. Oct. 14, 2019) (holding that the agency failed to take a “hard look” at potentially significant environmental effects of dairy-farm operations when it failed to consider emissions of “methane, a [GHG] that contributes to climate change, and that [GHG] emissions could have the potential for significant environmental effects”).

³²⁰ See *Colorado Oil & Gas Conserv. Comm’n v. Martinez*, 2019 CO 3, ¶ 2, 433 P.3d 22, 25.

³²¹ *Id.*

and the environment).”³²² The court emphasized, however, an additional and “equally significant” ground for the Commission’s decision: the Commission was already “working . . . to address many of the concerns implicated by Respondents’ petition and other regulatory priorities took precedence at this time.”³²³

Elsewhere, state climate legislation has been the subject of judicial review. Massachusetts, for example, had promulgated the Global Warming Solutions Act, St. 2008, c. 298, to address what it characterized as grave threats posed by climate change to the Commonwealth’s health, economy, and natural resources.³²⁴ The legislature established significant, legally binding, short- and long-term restrictions on emissions.³²⁵ The act, along with the regulations promulgated thereunder, has faced several challenges.

In *Kain*, youth petitioners argued that the Massachusetts Department of Environmental Protection had failed to mitigate climate change in accordance with the state’s ambitious legislation. In 2016, the Massachusetts Supreme Judicial Court found that the state had failed to comply with its statutory mandate to reduce GHG emissions by at least 80% below 1990 levels by 2050.³²⁶ After scrutinizing the department’s various other initiatives and rejecting them as not being a substitute for climate mitigation, the court concluded that the legislation requires “actual, measurable, and permanent emissions reductions,” with set limits that decline on an annual basis, and ordered the department to promulgate the necessary regulations.³²⁷

In its discussion of legislative history and purposes, the court made a number of statements relating to climate science. For example, it observed that “[t]he act was developed against the backdrop of an *emerging consensus shared by a majority of the scientific community* that climate change is attributable to increased GHG emissions, as well as perceptions in the Commonwealth that national and international efforts to reduce those emissions are inadequate.”³²⁸ It further noted that “[t]he act established a comprehensive framework to address the effects of climate change in the Commonwealth *by reducing emissions to levels that scientific evidence had suggested were needed* to avoid the most damaging impacts of climate change.”³²⁹ Specifically, the court concluded that the department had not

³²² *Id.* at ¶¶ 49–50.

³²³ *Id.* at ¶¶ 50–51. The court noted that “the Commission’s finding that the issues implicated by Respondents’ petition are being addressed elsewhere is . . . precisely the kind of agency action to which courts owe deference.” *Id.* at ¶ 52 (citing *Massachusetts*, 549 U.S. at 527 (noting that “an agency has broad discretion to choose how best to marshal its limited resources and personnel to carry out its delegated responsibilities”).

³²⁴ See *New England Power Generators Ass’n, Inc. v. Dep’t of Env’tl. Prot.*, 480 Mass. 398, 399 (2018) (discussing legislative history).

³²⁵ See *id.*

³²⁶ See *Kain v. Dep’t of Env’tl. Prot.*, 474 Mass. 278 (Mass. 2016).

³²⁷ See *id.* at 300.

³²⁸ *Id.* at 281 (emphasis added).

³²⁹ *Id.* at 281–82 (emphasis added).

fulfilled its statutory mandate and ordered it to promulgate regulations to establish limits on multiple GHG emissions sources, which “must decline on an annual basis.”³³⁰

To comply with the court’s order, the Commonwealth promulgated new regulations under the Global Warming Solutions Act.³³¹ Two power companies sued, asserting that the Massachusetts Department of Environmental Protection and Executive Office of Energy and Environmental Affairs had exceeded their authority in imposing declining GHG emissions limits on the in-State electric sector through 2050. Plaintiffs did not question the scientific basis for the caps, but put forward other arguments, including that the regulation would actually increase emissions.³³²

The court upheld the regulation.³³³ In construing the statute, the court made a number of observations relating to the link between electricity generation, emissions, and climate change. For example, the court pointed to the electric sector’s sizeable contribution to the Commonwealth’s emissions (around 20%) and noted that “[t]he electric sector’s transition away from fossil fuels is critical to reaching the sustainable future that the act envisions.”³³⁴ The court also considered the Commonwealth’s emissions trading scheme in the context of “the act’s fundamental purpose to ‘attain actual, measurable, and permanent emissions reductions’”³³⁵ The court noted that since the cap-and-trade system set up under the Regional Greenhouse Gas Initiative (RGGI)³³⁶ allowed in-State power plants to purchase CO₂ allowances from RGGI-participating states, there was no way to ensure in-State reductions in CO₂ emissions. It therefore determined that the RGGI regulatory regime alone was not sufficient to satisfy the legislative purposes regarding the electric sector: “The act is designed to go well beyond business as usual in terms of reducing emissions: to upend, rather than to uphold, the status quo. The electric sector is no exception.”³³⁷

In Washington, the Department of Ecology promulgated a Clean Air Rule in 2016 under the Washington Clean Air Act, purporting to establish and enforce GHG emission standards not only for businesses and utilities that directly emit GHGs, but also for those entities whose products ultimately release emissions even if they themselves do not. A coalition of businesses and industry trade

³³⁰ See *id.* at 280.

³³¹ See *New England Power Generators*, 480 Mass. at 402 (explaining that Executive Order No. 569, Establishing an Integrated Climate Change Strategy for the Commonwealth, inter alia, directed the department to promulgate final regulations to ensure that the Commonwealth meets the 2020 Statewide emissions limit mandated by the act).

³³² See *id.* at 399–400.

³³³ See *id.* at 405.

³³⁴ *Id.* See also *id.* at 405–06 (finding that “cutting emissions from the electric sector is a crucial initial step to achieving long-term progress in combatting climate change” and citing agency record noting that “the Commonwealth must achieve a significant reduction in GHG emissions from transportation, the heating of buildings, and the electric sector” and that “a significant percentage of vehicles and building systems must be electrified as a way to reduce GHG emissions”).

³³⁵ *Id.*

³³⁶ RGGI is a cooperative effort among ten states including Massachusetts to reduce emissions. See *Elements of RGGI*, REG. GREENHOUSE GAS INITIATIVE, <https://www.rggi.org/program-overview-and-design/elements>.

³³⁷ *New England Power Generators*, 480 Mass. at 405–06.

organizations challenged the Rule under the Washington Administrative Procedure Act. The trial court agreed that Ecology lacked statutory authority to promulgate the Rule³³⁸ and invalidated the entire Rule as promulgated. The Washington Supreme Court upheld the lower court’s determination with respect to indirect emitters, while severing the Rule’s application with respect to direct emitters. As the court made clear at the outset, however, climate science was not in doubt:

This case concerns a novel rule promulgated by the Department of Ecology to address the undeniable crisis of climate change. The issue is not whether man-made climate change is real—it is. *See generally* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, GLOBAL WARMING OF 1.5° C (2019) [<https://perma.cc/W2LS-DJQL>]. Nor is the issue whether dramatic steps are needed to curb the worst effects of climate change—they are. *Id.*³³⁹

Rather, at issue was statutory interpretation.³⁴⁰ In upholding the Rule’s application to the state’s largest stationary sources of GHG emissions, the court observed that “regulation of these sources alone marks significant progress in Washington’s efforts to curb [GHG] emissions and combat climate change.”³⁴¹

C. Constitutional Law Cases

The vast majority of U.S. climate-related litigation has involved federal administrative law. However, several cases engaging with climate science have also alleged violations of the U.S. Constitution, with plaintiffs asserting violations of Due Process and Equal Protection rights, as well as bringing claims under the Treaty Clause, the Compact Clause, and the Commerce Clause, as discussed below.³⁴²

1. Substantive Rights

The U.S. Constitution does not expressly protect the environment, and U.S. courts have yet to infer an implicit right to a clean environment from the Constitution.³⁴³ Accordingly, in climate

³³⁸ *See* Ass’n of Wash. Bus. v. Wash. State Dep’t of Ecology, No. 95885-8, slip. op. (Wash. Jan. 16, 2020) (en banc).

³³⁹ *Id.* at 2.

³⁴⁰ *See id.*

³⁴¹ *Id.* at 24. *See also id.* at 18 (observing that “[f]orcing businesses to internalize the environmental costs of their customers’ actions may indirectly help limit the aggregate concentrations of [GHGs] in the atmosphere, but it does not actually regulate the release of those contaminants.”).

³⁴² Constitutional petitions have also been filed under state constitutions in the U.S. *See* Banda & Fulton at 10126.

³⁴³ *See, e.g.*, Environmental Def. Fund, Inc. v. Corps of Eng’rs of U.S. Army, 325 F. Supp. 728, 739 (E.D. Ark. 1971) (holding no such right protected under the Fifth, Ninth, and Fourteenth Amendments, but noting that such “claims, even under our present Constitution, are not fanciful and may, indeed, some day, in one way or another, obtain judicial recognition”). *See also* Ely v. Velde, 451 F.2d 1130, 1139 (4th Cir. 1971) (“[G]enerally it has been held that there is no constitutional right to [environmental] protection.”); Tanner v. Armco Steel, 340 F. Supp. 532, 537 (S.D. Tex. 1972) (“[N]o legally enforceable right to a healthful environment . . . is guaranteed by the Fourteenth Amendment or any other provision of the Federal Constitution.”); *In re Agent Orange Prod. Liab. Litig.*, 475 F. Supp. 928 (D.C.N.Y. 1979).

cases, U.S. petitioners have not claimed a violation of their right to a clean environment, but have instead alleged that the federal government’s actions have violated a range of other constitutionally-protected rights.³⁴⁴ Particularly instructive from the perspective of the courts’ consideration of climate science is the proceeding in *Juliana*, given the extensive briefing in the case.

a. Juliana et al. v. United States

In a constitutional petition filed in 2015, a group of 21 youth petitioners alleged that the federal government’s actions relating to climate change, such as its continued approval, promotion, extraction, and use of fossil fuels, violated their constitutionally protected rights, including the fundamental rights to life, liberty, and property, equal protection, and the implicit right to a stable climate, as well as the public trust doctrine.³⁴⁵ This section provides a brief overview of procedural history in *Juliana* before turning to the litigants’ and the courts’ consideration of climate science.

(i) Proceedings in *Juliana*

The proceedings unfolded in several phases, culminating in a decision by the Ninth Circuit in 2020. In April 2016, U.S. Magistrate Judge Thomas Coffin issued his Findings and Recommendation (F&R), recommending that the trial court deny the defendants’ motions to dismiss.³⁴⁶ In November 2016, the District Court issued an opinion and order adopting Magistrate Judge Coffin’s F&R and denying the motions to dismiss.³⁴⁷

In the course of the proceedings, the federal government unsuccessfully sought a writ of mandamus from the Ninth Circuit,³⁴⁸ and the U.S. Supreme Court denied the government’s motion for a stay of proceedings.³⁴⁹ The Supreme Court, however, cautioned that the “breadth of respondents’

Some U.S. state constitutions do establish a right to a clean environment. *See, e.g.*, *In re Maui Elec. Co., Ltd.* 408 P.3d 1, 17, 21 (Haw. 2017) (holding that the “right to a clean and healthful environment [under the state constitution] includes the right that explicit consideration be given to reduction of [GHG] emissions . . . as provided for [by statute]” such that a due process hearing was required to consider the impacts of project approval on the protected rights, “including the release of harmful [GHGs]”). However, this is not necessarily enough to compel the state government to regulate GHG emissions. *See, e.g.*, *Funk v. Wolf*, 144 A.3d 228, 233 (Pa. Commw. Ct. 2016) (holding that the Environmental Rights Amendment to Pennsylvania’s Constitution does not provide petitioners with a clear right to the performance of the specific acts—here, regulation of emissions).

³⁴⁴ *See* *Banda & Fulton* at 10124.

³⁴⁵ *See id.* at 10124 et seq.

³⁴⁶ *See* *Juliana v. United States*, No. 6:15-CV-1517-TC, 2016 WL 1442435 (D. Or. Apr. 8, 2016) (order and F&R).

³⁴⁷ *See* *Juliana v. United States*, 217 F. Supp. 3d 1224, 1276 (D. Or. 2016).

³⁴⁸ *See* *In re United States*, 884 F.3d 830, 837–38 (9th Cir. 2018).

³⁴⁹ *See* *United States v. U.S. Dist. Court for Dist. of Or.*, 139 S. Ct. 1 (2018).

claims is striking . . . and the justiciability of those claims presents substantial grounds for difference of opinion.”³⁵⁰

Following the ruling, the federal government moved for summary judgment and judgment on the pleadings, which the district court granted in part.³⁵¹ However, the court also reaffirmed that the plaintiffs had standing and concluded that they had presented sufficient evidence to survive summary judgment on several claims.³⁵²

The district court initially declined the government’s request to certify those orders for interlocutory appeal. The Ninth Circuit, while considering a second mandamus petition from the government, invited the district court to revisit certification, noting the Supreme Court’s justiciability concerns.³⁵³ The district court then certified the orders denying the motions for interlocutory appeal under 28 U.S.C. §1292(b) and stayed the proceedings, while “stand[ing] by its prior rulings . . . as well as its belief that this case would be better served by further factual development at trial.”³⁵⁴ The Ninth Circuit granted the government’s petition for permission to appeal.

In January 2020, the Ninth Circuit dismissed the case, finding that the plaintiffs had no standing under Article III of the U.S. Constitution to pursue their constitutional claims.³⁵⁵ To have Article III standing, a plaintiff must have (1) a concrete and particularized injury that (2) is caused by the challenged conduct and (3) is likely redressable by a favorable judicial decision.³⁵⁶ The Ninth Circuit panel agreed with the district court that the plaintiffs had met the injury and the causation requirements.³⁵⁷ However, even assuming that the plaintiffs had a constitutional right to a “climate system capable of sustaining human life,” two of the three judges “reluctantly” concluded that plaintiffs had failed to meet the redressability requirement.³⁵⁸ As the panel explained, federal courts cannot provide the requested redress—an order requiring the government to develop a plan to “phase out

³⁵⁰ *Id.*

³⁵¹ The district court granted summary judgment on the Ninth Amendment claim, dismissed the president as a defendant, and dismissed the equal protection claim in part. *See Juliana v. United States*, 339 F. Supp. 3d 1062 (D. Or. Oct. 15, 2018).

³⁵² *See id.* at 1096.

³⁵³ *See Juliana v. United States*, No. 18-36082, slip op. at 13–14 (9th Cir. Jan. 7, 2019) (reviewing procedural history).

³⁵⁴ *See Juliana v. United States*, No. 6:15-cv-01517-AA, 2018 WL 6303774, at *3 (D. Or. Nov. 21, 2018) (order certifying the case for interlocutory appeal and staying the case pending a decision by the Ninth Circuit).

³⁵⁵ *See Juliana v. United States*, No. 18-36082, slip. op. (9th Cir. Jan. 7, 2019).

³⁵⁶ *See generally* *Friends of the Earth, Inc. v. Laidlaw Envtl. Servs. (TOC), Inc.*, 528 U.S. 167, 180–81 (2000).

³⁵⁷ *See Juliana v. United States*, No. 18-36082, slip op. at 18–21 (9th Cir. Jan. 7, 2019). However, the court also noted that if the broad constitutional rights described by the dissent existed, plaintiffs would likely not meet the injury requirement for Article III standing. *See id.* at 29.

³⁵⁸ *See id.* at 11. To establish Article III redressability, the plaintiffs must show that the relief they seek is *both* (1) substantially likely to redress their injuries; and (2) within the district court’s power to award. *Id.* at 21. The court was “skeptical” that the first redressability prong was satisfied, but, even assuming that it was, it found that the plaintiffs could not satisfy the second prong. *See id.* at 25.

fossil fuel emissions and draw down excess atmospheric CO₂.³⁵⁹ Accordingly, the panel majority held that the plaintiffs’ case for redress rests with the political branches.³⁶⁰ District Judge Josephine Laura Staton, serving as part of the Ninth Circuit panel, dissented, concluding that the claims were not beyond the ability of federal courts to redress.³⁶¹ Plaintiffs have petitioned for en banc rehearing.³⁶²

(ii) Climate Science in *Juliana*

Climate science—including basic facts about the causes of climate change and its effects—was at the core of the plaintiffs’ argument. This section discusses first, the district court’s consideration of climate science, including how the federal defendants and the intervenor-defendants responded to the plaintiffs’ scientific and factual allegations and how the district court evaluated the sufficiency of the evidence presented for purposes of the motion to dismiss (in part (A)); second, it reviews the Ninth Circuit’s pronouncements on climate science (in part (B)).

(A) *Proceedings in the District Court*

Much of the plaintiffs’ evidence came from the federal government itself, such as NASA’s and NOAA’s extensive research into climate impacts and the inter-agency *Fourth National Climate Assessment*. Unsurprisingly, the basics of climate science were not seriously contested in the course of the litigation. In January 2017, for example, federal defendants agreed in their Answer with some of the central scientific and factual allegations in the plaintiffs’ First Amended Complaint.³⁶³ As U.S. District Judge Ann Aiken noted,

Those admissions and federal defendants’ other filings make clear that plaintiffs and federal defendants agree on the following contentions: climate change is happening, is caused in significant part by humans, specifically human induced fossil fuel combustion, and poses a ‘monumental’ danger to Americans’ health and welfare. . . . The pleadings also make clear that plaintiffs and federal defendants agree that federal defendants’ policies regarding fossil fuels and [GHG] emissions play a role in global climate change, though federal defendants dispute that their actions can fairly be deemed to have caused plaintiffs’ alleged injuries.³⁶⁴

³⁵⁹ See *id.* The challenge, as the plaintiffs’ experts had also made plain, is “that reducing the global consequences of climate change demands much more than cessation of the government’s promotion of fossil fuels. . . . [S]uch a result calls for no less than a fundamental transformation of this country’s energy system, if not that of the industrialized world.” *Id.* at 23.

³⁶⁰ See *id.* See also *id.* at 16 (noting that, because plaintiffs contend that the *totality* of various government actions contributes to the deprivation of constitutionally protected rights, they “cannot effectively pursue their constitutional claims—whatever their merits—under [the APA].”).

³⁶¹ See *id.* at 32 et seq. (Staton, J., dissenting).

³⁶² See Petition for Rehearing En Banc of Plaintiffs-Appellees, *Juliana v. United States*, No. 18-36082 (9th Cir. Mar. 2, 2019).

³⁶³ See *Juliana v. United States*, 339 F. Supp. 3d 1062, 1072–73 (D. Or. 2018) (citing defendants’ answer).

³⁶⁴ *Id.* (internal citations omitted).

To narrow the number of evidentiary issues at trial, plaintiffs had filed a motion seeking the court to take judicial notice of 386 purported federal government documents³⁶⁵ and other documents.³⁶⁶ Judge Aiken ruled that the court would take judicial notice of documents provided they met the standards set by the Federal Rules of Evidence.³⁶⁷

In its 2017 motion for summary judgment, the Trump Administration raised a number of arguments that had been previously raised by the Obama Administration and considered by the district court in its November 2016 Order.³⁶⁸ While conceding basic climate science, the federal government, among other things, reiterated its contention that plaintiffs lacked Article III standing because their injuries were not concrete and particularized; the harms alleged were not fairly traceably to federal defendants; and plaintiffs' claims were not redressable by courts. In response, plaintiffs proffered declarations of the named plaintiffs, as well as declarations from eighteen expert witnesses on the catastrophic harms of climate change.³⁶⁹ They also submitted evidence, in the form of expert declarations and government documents, in support of their argument that the federal defendants' actions had led to climatic changes and the alleged harms.³⁷⁰

The district court denied the government's motion to dismiss, concluding that the plaintiffs had standing to sue, raised justiciable questions, and stated a claim for infringement of a Fifth Amendment due process right to a "climate system capable of sustaining human life."³⁷¹ The court found, *inter alia*, that "plaintiffs have introduced sufficient evidence and experts' opinions to demonstrate a question of material fact as to federal defendants' knowledge, actions, and alleged

³⁶⁵ See Motion in Limine Seeking Judicial Notice of Federal Government Documents, *Juliana v. United States*, No. 6:15-cv-01517-TC (D. Or. June 28, 2018), ECF No. 254 (asking the court to take judicial notice of 386 documents purportedly produced by the federal government).

³⁶⁶ Plaintiffs also filed two other motions in limine seeking judicial notice of various documents. The federal government argued that the court should take judicial notice only of the 286 documents to which the government did not specifically object (it filed specific objections to 42 documents and took no position on 58 documents). See *Juliana v. United States*, No. 6:15-cv-01517-AA, slip op. at 5 (D. Or. Oct. 15, 2018) (order granting in part and denying in part plaintiffs' motion in limine).

³⁶⁷ *Id.* at 6 (declining to take judicial notice of documents for which "Plaintiffs have either not yet provided an adequate foundation as to the authenticity," or which "are not available on the internet at a reliable source"). See also *id.* (internal citations omitted) (explaining that courts can take judicial notice of "[p]ublic records and government documents available from reliable sources on the Internet, such as websites run by governmental agencies" and further noting that "[w]hen the court takes notice of a public record, including websites, it does so 'not for the truth of the facts recited therein, but for the existence of the [record] which is not subject to reasonable dispute over its authenticity.'"). See also *supra* § I.A.4.

³⁶⁸ See *Juliana v. United States*, 217 F. Supp. 3d 1224 (D. Or. 2016).

³⁶⁹ See *Juliana v. United States*, 339 F. Supp. 3d 1062, 1086 (D. Or. 2018).

³⁷⁰ See *id.*

³⁷¹ The court had defined that right as one to be free from catastrophic climate change that "will cause human deaths, shorten human lifespans, result in widespread damage to property, threaten human food sources, and dramatically alter the planet's ecosystem." *Juliana*, 217 F. Supp. 3d at 1250.

deliberate indifference. Once this claim is reviewed with a full factual record, plaintiffs must still clear a very high bar to ultimately succeed.³⁷² As the court noted, plaintiffs offered

sworn affidavits attesting to their specific injuries, as well as a swath of extensive expert declarations showing those injuries are linked to fossil fuel-induced climate change and if current conditions remain unchanged, these injuries are likely to continue or worsen. *Federal defendants offer nothing to contradict these submissions*, and merely recycle arguments from their previous motion. Thus, for the purposes of this case, the declarations submitted by plaintiffs and their experts have provided ‘specific facts,’ of immediate and concrete injuries.³⁷³

The court also found the plaintiffs’ evidence showing causation to be sufficient to survive the motion for summary judgment, while noting that a final ruling on this issue would “benefit from a fully developed factual record where the Court can consider and weigh evidence from both parties.”³⁷⁴ As Judge Aiken noted, “climate science and our ability to understand the effects of climate change are constantly evolving.”³⁷⁵

The question of climate science also featured centrally in the participation of industry interveners in the proceeding. In 2015, the National Association of Manufacturers (NAM), the American Fuel & Petrochemical Manufacturers (AFPM), and the American Petroleum Institute (API) moved to intervene on behalf of the federal government and to dismiss the complaint. The industry associations argued that the relief plaintiffs seek, if granted, would harm their economic interests in the production, refining, and use of fossil fuels. Magistrate Judge Coffin granted their motions to intervene as of right in 2016.³⁷⁶

³⁷² *Juliana*, 339 F. Supp.3d at 1101.

³⁷³ *Id.* at 1090 (emphasis added). *See also id.* at 1093 (noting that expert declarations show that federal defendants’ actions have led to plaintiffs’ injuries and that plaintiffs’ experts “tether[ed] plaintiffs’ specific injuries to climate change and climate change related weather events”).

³⁷⁴ As the court noted, “plaintiffs’ ‘need not connect each molecule’ of domestically emitted carbon to their specific injuries to meet the causation standard. *Bellon*, 732 F.3d 1142–43. The ultimate issue of causation will require perhaps the most extensive evidence to determine at trial, but at this stage of the proceedings, plaintiffs have proffered sufficient evidence to show that genuine issues of material fact remain on this issue. A final ruling on this issue will benefit from a fully developed factual record where the Court can consider and weigh evidence from both parties.” *Id.* at 1093. *See also id.* at 1095 (finding, based on “the summary judgment record regarding traceability and plaintiffs’ experts’ opinions that reducing domestic emissions, which plaintiffs contend are controlled by federal defendants’ actions, could slow or reduce the harm plaintiffs are suffering,” “that plaintiffs have shown an issue of material fact that must be considered at trial on full factual record.”).

³⁷⁵ *Juliana*, 339 F. Supp. 3d at 1091. *Cf. Juliana*, 217 F. Supp. 3d at 1245 (quoting Kirsten Engel & Jonathan Overpeck, *Adaptation and the Courtroom: Judging Climate Science*, 3 MICH. J. ENV’T & ADMIN. L. 1, 25 (2013) (although “climate impacts at the regional and local levels are subject, among other things, to the uncertainties of downscaling techniques [...] . . . our knowledge of the climate is developing at a breakneck pace.”)). *See also id.* (finding that prior precedents do not foreclose standing in a given suit simply because it is based on actions causing dangerous levels of emissions).

³⁷⁶ *See Juliana v. United States*, No. 6:15-cv-01517-TC, 2016 WL 138903, at *5 (D. Or. Jan. 14, 2016) (order granting motion to intervene) (noting that “[e]quity demands that members of the proposed intervenors whose property interests are alleged to be in direct conflict to plaintiffs’ life, liberty, and property interests have a say in this litigation. At a minimum, such intervention will simplify future litigation as defendants endeavor to resolve this complex confluence of economic

Unlike the federal government, the intervenor-defendants’ answer “contained no admissions with respect to plaintiffs’ factual and scientific assertions about climate change.”³⁷⁷ At a series of status conferences in 2017, Judge Coffin “pressed intervenor-defendants to clarify their position regarding whether the issues to be litigated at trial would include whether climate change is happening or whether humans play a role in causing climate change.”³⁷⁸ In the end, “[i]ntervenor-defendants withdrew from the lawsuit before taking a position on those questions.”³⁷⁹

For example, at a status conference in February 2017, Judge Coffin noted that the discrepancy in the admissions made by the federal government and the intervenor-defendants made it more difficult to determine the scope of issues for discovery and trial. As Judge Coffin observed:

To summarize, the government has admitted that, yes, climate change is a reality and that, yes, it’s induced by human activity, and they admit that CO₂ right now is at a level of 400 parts per million, which exceeds the level—is the highest level in millions of years. So a number of the allegations made by the plaintiffs in their complaint are admitted by the government.

The intervenors’ answer, on the other hand—basically the mantra of the intervenors’ answer is we don’t know, and on that basis we deny. We don’t know what’s going on. We don’t know if it’s climate change or not. We don’t know if it’s human induced or not.

So to what extent does the government’s admissions control where we go in this case? The intervenors in your proposed schedule indicate that they don’t intend to do any fact discovery.

Does that mean, then, that the intervenors essentially are not going to contest the government’s admissions?

So are you going to ride the government’s coattails, so to speak, in this litigation?

Are you going to set out and attempt to controvert some of the government’s admissions?

So that’s going to be a big help in terms of how we manage this discovery to find out what the intervenors intend to do.³⁸⁰

Two months later, Judge Coffin again noted the difficulties facing the court where the federal defendant and intervenor-defendants were not aligned on the basic facts of climate science:

[I]f I were trying this case as the trial judge, I would be wondering, you know, what is your position about human-induced climate change. Is it consistent with the government? Is it contradictory to the government’s position? Do you intend—you indicate in the status report that you view the role of the

and property interests of the populace on the one hand and the health interests of current and future generations on the other.”).

³⁷⁷ See *Juliana*, 339 F. Supp. 3d at 1073 n.3. Intervenor-defendants “asserted that they lacked sufficient information to admit or deny those allegations.” *Id.*

³⁷⁸ *Id.* (reviewing procedural history).

³⁷⁹ *Id.*

³⁸⁰ Transcript of Status Conference (Feb. 7, 2017) at 14–15, *Juliana v. United States*, No. 6:15-cv-01517-TC (D. Or. 2017), ECF No. 115.

intervenor to be that of offering expert testimony in the case. Expert testimony on what subject? What position are your experts going to take that's relevant to this case?³⁸¹

Eventually, all three intervenor-defendants separately moved to withdraw.³⁸² Plaintiffs did not oppose the withdrawal, though they sought to attach conditions such as attorneys' fees. Intervenor-defendants, which represent 15,000+ members, responded that

There are no claims asserted against intervenor-defendants, and as plaintiffs have propounded expansive and largely irrelevant discovery demands against intervenor-defendants, it has become increasingly clear that, *unlike the unified and substantial legal challenges to plaintiffs' theories, the factual and scientific challenges to plaintiffs' case would require intervenor-defendants to address many issues on which they had never taken a position.* After careful consideration, the intervenor-defendants are convinced that the case would be more streamlined and efficient, and impose fewer burdens on all involved—the Court and the parties—if intervenor-defendants simply withdraw.³⁸³

Judge Coffin granted the intervenors' request. In the order, he also noted the centrality of climate science to these proceedings:

The granting of intervenors' motion to participate as Defendant parties in this case was based upon their showing that their members had important economic and other interests at stake that merited them to fully participate in addressing not only the legal issues presented in this lawsuit, but *also the factual issues and science which lies at the heart of Plaintiffs' claims—including:* is human-induced climate change occurring, if so, is it occurring at the rate alleged by Plaintiffs, will it have the deleterious impact on habitability and cause the harm alleged, are the actions and policies of Defendant United States promoting, encouraging, and facilitating [GHG] emissions and thus a material cause of the degree and pace of climate change, are the actions and policies being taken with knowledge of or deliberate indifference to the harms caused Plaintiffs and all those similarly situated, and do such actions/policies violate the Constitution and the public trust obligations of the government?³⁸⁴

He further noted:

If the science on which Plaintiffs rely in support of their claims regarding climate change, its causes, and its effects is disputed by Intervenor, a trial is the most reliable forum to put the Plaintiffs to their proof, contest their evidence, and submit any reliable and admissible scientific evidence to the contrary. A trial is conducted in a public forum, evidence must be presented under oath, and it is subject to cross-examination. Given that Intervenor are comprised of more than 15,000 members who are leaders of the coal, oil, and natural gas industries, as well as petroleum refiners and petrochemical manufacturers, and that their economic interests are impacted by this litigation, *the court has no doubt that they have thoroughly studied the issue at the core of this case and are in a position to tender their own scientific evidence regarding climate change*

³⁸¹ Transcript of Status Conference (Apr. 7, 2017) at 17–18, *Juliana v. United States*, No. 6:15-cv-01517-TC (D. Or. 2017), ECF No. 143.

³⁸² See Intervenor-Defendant the National Association of Manufacturers' Motion to Withdraw, *Juliana v. United States*, No. 6:15-cv-01517-TC (D. Or. May 22, 2017), ECF No. 163; Intervenor-Defendant American Petroleum Institute's Motion to Withdraw, *Juliana v. United States*, No. 6:15-cv-01517-TC (D. Or. May 25, 2017), ECF No. 166; Intervenor-Defendant American Fuel & Petrochemical Manufacturers' Motion to Withdraw, *Juliana v. United States*, No. 6:15-cv-01517-TC (D. Or. May 25, 2017), ECF No. 167.

³⁸³ Reply in Support of Intervenor-Defendants' Separate Motions to Withdraw at 4, *Juliana v. United States*, No. 6:15-cv-01517-TC (D. Or. June 22, 2017), ECF No. 180 (emphasis added).

³⁸⁴ *Juliana v. United States*, No. 6:15-cv-01517-TC, at 3 (D. Or. June 28, 2017) (order granting motions to withdraw).

if they desire to challenge Plaintiffs' evidence or the admissions of the United States. At any rate, Intervenor have been given that opportunity, they choose to withdraw rather than engage in further discovery and trial, and the court grants their motion.³⁸⁵

(B) Proceedings Before the Ninth Circuit

The Ninth Circuit, in dismissing the case, also reviewed the evidence of climate change presented below, which the federal government did not contest.³⁸⁶ As Circuit Judge Andrew D. Hurwitz wrote for the majority, the panel disagreed not about the “gravity of the plaintiffs’ evidence,” but rather about the question of redressability.³⁸⁷ The majority noted, for example, that:

In the mid-1960s, a popular song warned that we were “on the eve of destruction.” The plaintiffs in this case have presented *compelling evidence* that climate change has brought that eve nearer. A *substantial evidentiary record* documents that the federal government has long promoted fossil fuel use despite knowing that it can cause catastrophic climate change, and that failure to change existing policy may hasten an environmental apocalypse.³⁸⁸

The majority further discussed the evidence presented in the following terms:

The plaintiffs have compiled an *extensive record*, which at this stage in the litigation we take in the light most favorable to their claims. *The record leaves little basis for denying that climate change is occurring at*

³⁸⁵ *Id.* at 4 (emphasis added). See also Transcript of Oral Argument on Motion to Intervene at 9:18–23, *Juliana v. United States*, No. 6:15-cv-01517-TC (D. Or. 2017), ECF No. 53 (stating that “there would be three intervenors, but they would be speaking with one voice[,] . . . submitting joint submissions in all circumstances in this case operating essentially as one intervenor.”).

³⁸⁶ See *Juliana v. United States*, No. 18-36082, slip op. at 15 (9th Cir. Jan. 17, 2020) (“The government by and large has not disputed the factual premises of the plaintiffs’ claims.”).

³⁸⁷ See *id.* (“Our dissenting colleague quite correctly notes the gravity of the plaintiffs’ evidence; we differ only as to whether an Article III court can provide their requested redress.”). Judge Staton’s dissent emphasized the urgency of climate change, as evidenced in the government’s own reports. See, e.g., *id.* at 31–32 (Staton, J., dissenting) (“[T]he government accepts as fact that the United States has reached a tipping point crying out for a concerted response—yet presses ahead toward calamity. It is as if an asteroid were barreling toward Earth and the government decided to shut down our only defenses. Seeking to quash this suit, the government bluntly insists that it has the absolute and unreviewable power to destroy the Nation.”); *id.* at 32 (“No case can singlehandedly prevent the catastrophic effects of climate change predicted by the government and scientists.”); *id.* at 33 (“As the majority recognizes, and the government does not contest, [CO₂] and other [GHG] emissions created by burning fossil fuels are devastating the planet. . . . [A]s described by plaintiffs’ experts, the injuries experienced by plaintiffs are the first small wave in an oncoming tsunami—now visible on the horizon of the not-so-distant future—that will destroy the United States as we currently know it.”); *id.* at 34 (“Despite countless studies over the last half century warning of the catastrophic consequences of anthropogenic [GHG] emissions, many of which the government conducted, the government not only failed to act but also ‘affirmatively promote[d] fossil fuel use in a host of ways.’”); *id.* at 60 (“In sum, resolution of this action requires answers only to scientific questions, not political ones. And plaintiffs have put forth sufficient evidence demonstrating their entitlement to have those questions addressed at trial in a court of law.”); *id.* at 63 (“Where is the hope in today’s decision? Plaintiffs’ claims are based on science, specifically, an impending point of no return. If plaintiffs’ fears, backed by the government’s *own studies*, prove true, history will not judge us kindly. When the seas envelop our coastal cities, fires and droughts haunt our interiors, and storms ravage everything between, those remaining will ask: Why did so many do so little?”).

³⁸⁸ *Id.* at 14 (emphasis added) (internal citations omitted).

an increasingly rapid pace. It documents that since the dawn of the Industrial Age, atmospheric [CO₂] has skyrocketed to levels not seen for almost three million years. For hundreds of thousands of years, average carbon concentration fluctuated between 180 and 280 parts per million. Today, it is over 410 parts per million and climbing. Although carbon levels rose gradually after the last Ice Age, the most recent surge has occurred more than 100 times faster; half of that increase has come in the last forty years.

Copious expert evidence establishes that this unprecedented rise stems from fossil fuel combustion and will wreak havoc on the Earth's climate if unchecked. Temperatures have already risen 0.9 degrees Celsius above pre-industrial levels and may rise more than 6 degrees Celsius by the end of the century. The hottest years on record all fall within this decade, and each year since 1997 has been hotter than the previous average. This extreme heat is melting polar ice caps and may cause sea levels to rise 15 to 30 feet by 2100. The problem is approaching “the point of no return.” Absent some action, the destabilizing climate will bury cities, spawn life-threatening natural disasters, and jeopardize critical food and water supplies.

The record also conclusively establishes that the federal government has long understood the risks of fossil fuel use and increasing [CO₂] emissions. As early as 1965, the Johnson Administration cautioned that fossil fuel emissions threatened significant changes to climate, global temperatures, sea levels, and other stratospheric properties. In 1983, an Environmental Protection Agency (“EPA”) report projected an increase of 2 degrees Celsius by 2040, warning that a “wait and see” carbon emissions policy was extremely risky. And, in the 1990s, the EPA implored the government to act before it was too late. Nonetheless, by 2014, U.S. fossil fuel emissions had climbed to 5.4 billion metric tons, up substantially from 1965. This growth shows no signs of abating. From 2008 to 2017, domestic petroleum and natural gas production increased by nearly 60%, and the country is now expanding oil and gas extraction four times faster than any other nation.

The record also establishes that the government's contribution to climate change is not simply a result of inaction. The government affirmatively promotes fossil fuel use in a host of ways, including beneficial tax provisions, permits for imports and exports, subsidies for domestic and overseas projects, and leases for fuel extraction on federal land.³⁸⁹

Further, when discussing the causation requirement of Article III standing, the Ninth Circuit noted:

The causal chain here is sufficiently established. The plaintiffs' alleged injuries are caused by carbon emissions from fossil fuel production, extraction, and transportation. A significant portion of those emissions occur in this country; the United States accounted for over 25% of worldwide emissions from 1850 to 2012, and currently accounts for about 15%. *See Massachusetts*, 549 U.S. at 524–25 (finding that emissions amounting to about 6% of the worldwide total showed cause of alleged injury “by any standard”). And, the plaintiffs' evidence shows that federal subsidies and leases have increased those emissions. About 25% of fossil fuels extracted in the United States come from federal waters and lands, an activity that requires authorization from the federal government.³⁹⁰

In this regard, without questioning climate science, the majority emphasized its institutional limitations:

There is much to recommend the adoption of a comprehensive scheme to decrease fossil fuel emissions and combat climate change, both as a policy matter in general and a matter of national survival in particular.

³⁸⁹ *Id.* (emphasis added) (internal citations omitted).

³⁹⁰ *Id.* at 19 (emphasis added) (internal citations omitted).

But it is beyond the power of an Article III court to order, design, supervise, or implement the plaintiffs' requested remedial plan.

. . . [T]he plaintiffs' request for a remedial plan would subsequently require the judiciary to pass judgment on the sufficiency of the government's response to the order, which necessarily would entail a broad range of policymaking. . . . And, given the complexity and long-lasting nature of global climate change, the court would be required to supervise the government's compliance with any suggested plan for many decades.

. . . Although the plaintiffs' invitation to get the ball rolling by simply ordering the promulgation of a plan is beguiling, it ignores that an Article III court will thereafter be required to determine whether the plan is sufficient to remediate the claimed constitutional violation of the plaintiffs' right to a "climate system capable of sustaining human life." We doubt that any such plan can be supervised or enforced by an Article III court. And, in the end, any plan is only as good as the court's power to enforce it.³⁹¹

Ultimately, the majority concluded that "[not] every problem posing a threat—even a clear and present danger—to the American Experiment can be solved by federal judges."³⁹² As for the political branches, the majority opined that the "compelling" evidence that plaintiffs had marshalled would might make political action more likely:

*The plaintiffs have made a compelling case that action is needed; it will be increasingly difficult in light of that record for the political branches to deny that climate change is occurring, that the government has had a role in causing it, and that our elected officials have a moral responsibility to seek solutions. We do not dispute that the broad judicial relief the plaintiffs seek could well goad the political branches into action. Diss. at 45–46, 49–50, 57–61. We reluctantly conclude, however, that the plaintiffs' case must be made to the political branches or to the electorate at large, the latter of which can change the composition of the political branches through the ballot box. That the other branches may have abdicated their responsibility to remediate the problem does not confer on Article III courts, no matter how well-intentioned, the ability to step into their shoes.*³⁹³

As the *Juliana* litigation demonstrates, climate science had matured significantly over the past decade when questions of injury and causation seemed far more uncertain. As Judge Staton writing in dissent noted, "[w]hen *Massachusetts v. EPA* was decided, more than a decade ago, there was uncertainty and skepticism as to whether an individual could state a sufficiently definite climate change-induced harm based on gradually warming air temperatures and rising seas."³⁹⁴ In *Massachusetts*, the Supreme Court had effectively navigated around such questions by focusing on the Commonwealth's stake in the issue as a sovereign state. By 2020, the dissent noted, "the plaintiffs submit undisputed scientific evidence that their distinct and discrete injuries are caused by climate

³⁹¹ *Id.* at 28 (emphasis added).

³⁹² *Id.* at 29.

³⁹³ *Id.* at 30–31 (emphasis added).

³⁹⁴ *Id.* at 48 n.9 (Staton, J., dissenting).

change brought about by emissions from fossil-fuel combustion. They need not rely on the ‘special solicitude’ of a state to be heard.”³⁹⁵

b. Clean Air Council v. United States

Several other claims alleging violations of fundamental rights under the federal Constitution have been filed in U.S. courts. For example, in *Clean Air Council*, environmental non-profit groups and minors sued the federal government, alleging that its dismantling of environmental regulations had violated the Fifth and Ninth Amendments and the government’s duty as sovereign trustee to hold the nation’s resources in public trust.³⁹⁶ Plaintiffs further alleged that any scholarship suggesting that climate change has not occurred is “junk science.”³⁹⁷ Some of the plaintiffs were minor children who alleged that their severe seasonal allergies were aggravated by climate change or that they suffered from anxiety about climate change.³⁹⁸

The federal government moved to dismiss the claim for lack of subject-matter jurisdiction and failure to state a claim. However, it did not challenge basic climate science,³⁹⁹ and neither did the court.⁴⁰⁰ At that stage of the proceedings, the court accepted the allegations as true,⁴⁰¹ but determined that plaintiffs lacked Article III standing. For example, the court found that one plaintiff’s anxiety over climate change is not a particularized injury: “[I]t is the ‘kind of generalized grievance[] brought by concerned citizens that we have consistently held are not cognizable in the federal courts.’”⁴⁰² The court

³⁹⁵ *Id.* (internal citations omitted).

³⁹⁶ *See Clean Air Council v. United States*, 362 F. Supp. 3d 237 (E.D. Pa. 2019). *See id.* at 242–43 (asking the court to “[d]eclare that Defendants cannot effectuate or promulgate any rollbacks that increase the frequency and/or intensity of the life-threatening effects of climate change based on junk science in violation of Plaintiffs’ . . . rights” under the due process clause and the public trust doctrine).

³⁹⁷ *Id.*

³⁹⁸ *Id.* at 243.

³⁹⁹ *See, e.g.*, Memorandum of Law in Support of Defendants’ Motion to Dismiss at 10, *Clean Air Council v. United States*, No. 2:17-cv-04977-PD (E.D. Pa. Mar. 29, 2018), ECF No. 18 (noting that plaintiffs “fail to tie their alleged injuries to Defendants’ actions Fundamentally, the United States is by no means the only—or even the predominant—source of global gas emissions. Rather, [GHGs] from global sources ‘quickly mix and disperse in the global atmosphere and have a long atmospheric lifetime,’ meaning that ‘there are numerous independent sources of GHG emissions, both within and outside the United States, which together contribute to the greenhouse effect.’”) (citing *Wash. Env’tl. Council v. Bellon*, 732 F.3d 1131, 1143 (9th Cir. 2013)).

⁴⁰⁰ *See, e.g., Clean Air Council*, 362 F. Supp. 3d at 252 (“Finally, it is worth noting (again) that climate change is the creation of those that pollute the air, not the Government, which seeks to regulate that pollution (evidently, to Plaintiffs’ dissatisfaction).”).

⁴⁰¹ *See id.* at 247 (“At this early stage, I must credit those allegations.”).

⁴⁰² *Id.*

also found that “[p]laintiffs’ anticipated injuries are not imminent or certain since the attenuated, contingent chain of events does not make out ‘certainly impending’ injury.”⁴⁰³

c. Animal Legal Def. Fund v. United States

In another recent filing, a group of non-profit organizations whose members comprise scientists, wildlife advocates, and outdoor enthusiasts sued the federal government in the Oregon District Court to “protect [their] constitutional right to wilderness” from climate-related harms to federally-owned and managed public lands.⁴⁰⁴ Plaintiffs alleged that the federal government’s “promotion, development, and subsidization of fossil fuel extraction, animal agriculture, and large-scale commercial logging, its contribution to and facilitation of overpopulation and overcrowding of wilderness, as well as its failure to act to reduce or eliminate the disastrous impacts of excess [GHGs] in the atmosphere” violated their constitutional rights,⁴⁰⁵ including their Fifth Amendment substantive due process “right to wilderness,” their Ninth Amendment right to self-determination, and their First Amendment right to freedom of association.⁴⁰⁶ They asked the court, *inter alia*, to order the government “to prepare and implement an enforceable national remedial plan to mitigate” climate impacts.⁴⁰⁷

In its motion to dismiss, the federal government did not contest basic climate science.⁴⁰⁸ Indeed, it referred to climate change as “the paradigmatic example of a generalized grievance shared by all humans, not just in this country but on the planet” and “a complicated global phenomenon that cannot be solved by a single country.”⁴⁰⁹ However, citing Chief Justice Roberts’ dissent in *Massachusetts*, the government argued that plaintiffs cannot meet the particularization requirement of Article III standing.⁴¹⁰

⁴⁰³ The court accepted, at this early stage, plaintiffs’ theory that: “(1) Defendants are attempting to rescind regulations and statutes intended to limit levels of [GHG] emissions; (2) if their attempt is successful, this, in turn, will cause unnamed third parties to increase their pollution of the air; (3) this, in turn, will necessarily include increase [GHG] emissions; (4) this, in turn, will cause further climate change; and (5) this, in turn, will aggravate [plaintiffs’] allergy and asthma symptoms.” *Id.*

⁴⁰⁴ See First Amended Complaint for Declaratory and Injunctive Relief at 6, *Animal Legal Def. Fund v. United States*, No. 18-cv-1860 (D. Or. Feb. 14, 2019).

⁴⁰⁵ *Id.* at 6.

⁴⁰⁶ *Id.* at ¶¶ 265–67, 275–79, 287.

⁴⁰⁷ *Id.* at 6.

⁴⁰⁸ See Defendants’ Motion to Dismiss Plaintiffs’ First Amended Complaint for Declaratory and Injunctive Relief or, in the Alternative, for a Stay Pending the Ninth Circuit’s Decision in *Juliana v. United States* at 1–2, *Animal Legal Def. Fund v. United States*, No. 18-cv-1860 (D. Or. May 16, 2019) (arguing that, *inter alia*, plaintiffs lacked standing and failed to comply with APA’s requirements and state a cause of action).

⁴⁰⁹ *Id.*

⁴¹⁰ *Id.* at 11 (citing *Massachusetts*, 549 U.S. at 541 (Roberts, C.J., dissenting)) (noting that the “very concept of global warming seems inconsistent with” Article III standing’s “particularization requirement,” because “[g]lobal warming is a

The district court dismissed the claims in July 2019, declining to engage in “revolutionary” thinking and create new fundamental rights that are not enumerated in the Constitution or found in Supreme Court precedent.⁴¹¹ It distinguished the ruling in *Juliana* by noting that the right to a “stable climate system” alleged in *Juliana* is narrower than the “right to wilderness” advocated in this case.⁴¹² The court additionally held that plaintiffs lacked standing because “the harm [they] seek to redress is a diffuse, global phenomenon that affects every citizen of the world” and “is not individualized.”⁴¹³ In dismissing the case, the court specifically “acknowledge[d] the ‘serious’ and ‘well recognized’ harms associated with climate change,” as recognized by the Supreme Court in *Massachusetts*.⁴¹⁴ Plaintiffs have appealed.

2. Treaty Clause and Compact Clause

In October 2019, the U.S. Department of Justice (DOJ) filed a civil complaint in the Eastern District of California against the State of California and related state entities for forging a cap-and-trade agreement with the Canadian Province of Quebec without congressional approval. The program, in place since 2013, seeks to improve California’s air quality and allows companies to trade credits in Quebec. The federal government argued that the program violated the U.S. Constitution by “intrud[ing] into the federal sphere” and “enhancing the political power of that state vis-à-vis the United States.”⁴¹⁵

The complaint did not question climate science. It recited U.S. international climate policy since the 1990s,⁴¹⁶ noting that “[t]he United States has demonstrated an active and continuous interest in reconciling protection of the environment, promotion of economic growth, and maintenance of national security.”⁴¹⁷ The complaint also alleged that California’s actions had undermined the federal

phenomenon ‘harmful to humanity at large.’”). *See also id.* (citing *Ctr. for Biological Diversity v. U.S. Dep’t of the Interior*, 563 F.3d 466, 478 (D.C. Cir. 2009)) (noting that “climate change is a harm that is shared by humanity at large, and the redress that Petitioners seek—to prevent an increase in global temperature—is not focused any more on these petitioners than it is on the remainder of the world’s population. Therefore Petitioners’ alleged injury is too generalized to establish standing.”).

⁴¹¹ *See Animal Legal Def. Fund v. United States*, 404 F. Supp. 3d 1294, 1298 (D. Or. 2019).

⁴¹² *Id.* at 1302.

⁴¹³ *Id.* at 1299–1300 (holding that plaintiffs failed to allege a particularized injury and declining to reach defendants’ traceability, redressability, or associational standing arguments).

⁴¹⁴ *Id.* at 1300 (citing *Massachusetts*, 549 U.S. at 521).

⁴¹⁵ *See Complaint for Declaratory and Injunctive Relief at ¶ 3, United States v. California*, No. 2:19-at-01013 (E.D. Cal. Oct. 23, 2019) (seeking declaratory and injunctive relief under the Treaty Clause, the Compact Clause, and Foreign Commerce Clause of the U.S. Constitution and the Foreign Affairs Doctrine).

⁴¹⁶ *Id.* at ¶¶ 33–42.

⁴¹⁷ *Id.* at ¶ 32.

government’s ability to reconcile these interests and “the President’s ability to negotiate competitive agreements with other nations, as the President sees fit.”⁴¹⁸

In March 2020, the District Court ruled that the California-Quebec agreement is neither a “treaty” nor a “compact” within the meaning of the Constitution and granted defendants’ motions for summary judgment on those claims.⁴¹⁹ Given agreement among the litigants on the issue, the court took the legislative purposes behind the regulatory regime (climate mitigation) as a given and did not question climate science. The case is pending.⁴²⁰

3. Commerce Clause

The Ninth Circuit also considered whether California’s and Oregon’s regulatory scheme to reduce in-state GHG emissions was constitutional under the U.S. Constitution’s Commerce Clause. The Commerce Clause grants Congress the power “[t]o regulate Commerce with foreign Nations, and among the several States, and with the Indian tribes.”⁴²¹ The Clause also “has long been understood to have a ‘negative’ aspect that denies the States the power unjustifiably to discriminate against or burden the interstate flow of articles of commerce.”⁴²² This so-called “dormant” Commerce Clause is “driven by concern about ‘economic protectionism—that is, regulatory measures designed to benefit in-state economic interests by burdening out-of-state competitors.’”⁴²³

Since 2006, California Air Resource Board (CARB) has promulgated a number of regulations to implement provisions of California’s Global Warming Solutions Act, including a low-carbon fuel standard (LCFS). Industry associations representing ethanol and oil companies challenged the LCFS on the grounds that it was pre-empted by federal renewable fuel standard (RFS) and violated the dormant Commerce Clause.

In its 2013 opinion in *Rocky Mountain Farmers Union v. Corey (Rocky Mountain I)*, the Ninth Circuit specifically stated that it was not being asked to rule on the science of climate change:

⁴¹⁸ Press Release, U.S. Dep’t. of Justice, United States Files Lawsuit Against State of California for Unlawful Cap and Trade Agreement with the Canadian Province of Quebec (Oct. 23, 2019), <https://www.justice.gov/opa/pr/united-states-files-lawsuit-against-state-california-unlawful-cap-and-trade-agreement>.

⁴¹⁹ See *United States v. California*, No. 2:19-at-01013, slip op. (E.D. Cal. Mar. 12, 2020).

⁴²⁰ The court expressed no view on plaintiff’s other theories, including the Foreign Affairs Doctrine and the Foreign Commerce Clause. See *id.* at 33.

⁴²¹ U.S. Const. art. I, §8, cl. 3.

⁴²² *Or. Waste Sys., Inc. v. Dep’t. of Envtl. Quality of State of Or.*, 511 U.S. 93, 98 (1994).

⁴²³ See *Dep’t. of Revenue of Ky. v. Davis*, 553 U.S. 328, 337–38 (2008) (internal citations omitted). Courts must uphold a non-discriminatory law against a dormant Commerce Clause challenge “unless the burden imposed on [interstate] commerce is clearly excessive in relation to the putative local benefits.” *Am. Fuel & Petrochemical Manufacturers v. O’Keeffe*, 903 F.3d 903, 910 (9th Cir. 2018), *cert. denied sub nom. Am. Fuel & Petrochemical Mfrs. v. O’Keeffe*, 139 S. Ct. 2043 (2019) (internal citations omitted).

*Whether global warming is caused by carbon emissions from our industrialized societies is a question for scientists to ponder. Whether, if such a causal relationship exists, the world can fight or retard global warming by implementing taxes or regulations that deter carbon emissions is a question for economists and politicians to decide. Whether one such regulatory scheme, implemented by the State of California, is constitutional under the United States Constitution’s Commerce Clause is the question that we consider in this opinion.*⁴²⁴

Despite this, the court observed in passing that “[t]here is growing scientific and public consensus that the climate is warming and that this warming is to some degree caused by anthropogenic GHG emissions.”⁴²⁵ Ultimately, it held that the state legislature’s determination that California faces tremendous risks from climate change⁴²⁶—and its decision to mandate CARB to reduce California’s rate of emissions—was owed judicial deference.⁴²⁷

Six years later, in *Rocky Mountain II*, the Ninth Circuit expressly accepted a number of climate facts. In its 2019 ruling, for instance, the court observed that

The California legislature is rightly concerned with the health and welfare of humans living in the State of California. These persons may be subjected, for example, to crumbling or swamped coastlines, rising water, or more intense forest fires caused by higher temperatures and related droughts, *all of which many in the scientific communities believe are caused or intensified by the volume of [GHG] emissions.*⁴²⁸

⁴²⁴ *Rocky Mountain Farmers Union v. Corey (Rocky Mountain I)*, 730 F.3d 1070, 1077 (9th Cir. 2013), *reh’g en banc denied*, 740 F.3d 507 (9th Cir. 2014), *and cert. denied*, ___ U.S. ___, 134 S. Ct. 2875 (2014) (emphasis added). As the *Rocky Mountain I* court further noted:

“With its long coastlines vulnerable to rising waters, large population that needs food and water, sizable deserts that can expand with sustained increased heat, and vast forests that may become tinderboxes with too little rain, California is uniquely vulnerable to the perils of global warming. The California legislature determined that GHG emissions from the production and distribution of transportation fuels contribute to this risk, and that those emissions are caused by the in-state consumption of fuels. *Whether or not one agrees with the science underlying those views, those determinations are permissible ones for the legislature to make*, and the Supreme Court has recognized that these risks constitute local threats. *See Massachusetts*, 549 U.S. at 522, 127 S. Ct. 1438.” *Id.* at 1106 (emphasis added).

⁴²⁵ *Id.* at 1090 n.8 (citing EPA’s Endangerment Finding (finding that “emissions of well-mixed [GHGs] . . . contribute to the total [GHG] air pollution, and thus to the climate change problem, which is reasonably anticipated to endanger public health and welfare”), IPCC’s 2007 report (explaining that “[w]arming of the climate system is unequivocal” and “very likely due to the observed increase in anthropogenic GHG concentrations”), and *Coal. for Responsible Regulation*, 684 F.3d at 114 (upholding the Endangerment Finding)).

⁴²⁶ *See id.* at 1079 (citing state legislation which provides that “[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California.”).

⁴²⁷ *See Rocky Mountain I* at 1089–90 (stating that “[u]nless and until either the [U.S.] Supreme Court or the Congress forbids it, California is entitled to proceed on the understanding that global warming is being induced by rising carbon emissions and attempt to change that trend. California, if it is to have any chance to curtail GHG emissions, must be able to consider all factors that cause those emissions when it assesses alternative fuels.”).

⁴²⁸ *Rocky Mountain Farmers Union v. Corey (Rocky Mountain II)*, 913 F.3d 940, 946 (9th Cir. 2019).

The court relied in part on IPCC reports.⁴²⁹ In particular, the court stated that potential climate “risks to the people living in California have only intensified in the past several years” since the decision in *Rocky Mountain I*, as reflected in increased threat from forest fires, caused in part by the extensive droughts throughout the state, and more powerful storms hitting California’s coastlines.⁴³⁰ Based on the evidence before it, the court concluded that “California has attempted to address a vitally important environmental issue with vast potential consequences. . . . It seems clear beyond dispute that potential climate change poses one of the most difficult challenges facing all civilizations worldwide for the twenty-first century.”⁴³¹

A similar challenge was filed against Oregon, which had modelled its legislation on California’s in 2007.⁴³² In *O’Keeffe*, national trade associations challenged an Oregon program regulating production and sale of transportation fuels based on GHG emissions on the grounds that it violated the Commerce Clause and was preempted by the Clean Air Act.⁴³³ As the Ninth Circuit ruled, “[i]t is well settled that the states have a legitimate interest in combating the adverse effects of climate change on their residents.”⁴³⁴ The court held that the Oregon program did not a discriminatory effect on out-of-state industry. The legitimacy of Oregon’s efforts to combat climate change, or the scientific basis for the state’s actions, was not questioned.⁴³⁵

D. Public Trust Doctrine

A number of climate suits, including *Juliana*, have been filed across the U.S. on the basis of the public trust doctrine—a principle grounded in federal or state common law that the government must preserve certain natural resources for public use, including protecting the atmosphere by regulating GHG emissions.⁴³⁶

⁴²⁹ *Id.* at 946 n.1 (citing, inter alia, IPCC’s Special Report (2018)).

⁴³⁰ *Id.* at 957.

⁴³¹ *Id.* at 955 (citing *O’Keeffe*, 903 F.3d at 913).

⁴³² In 2007, the Oregon legislature found that “[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources and environment of Oregon,” and identified “a need to . . . take necessary action to begin reducing [GHG] emissions.” See *O’Keeffe*, 903 F.3d at 907–08 (internal citations omitted). The legislature accordingly created the Oregon Clean Fuels Program and instructed the Oregon Environmental Quality Commission (OEQC) to adopt rules to decrease GHG emissions from transportation fuels produced in or imported into Oregon. Between 2010 and 2015, the OEQC promulgated rules that aimed to reduce such emissions by at least 10% lower than 2010 levels by 2025. *Id.* The Oregon program was modeled on the California LCFS. *Id.* at 911.

⁴³³ See *id.*

⁴³⁴ *Id.* at 911 (citing *Massachusetts*, 549 U.S. at 522–23).

⁴³⁵ See also *id.* at 919 (Smith C.J., dissenting) (“It is also plausible that there are nondiscriminatory means of advancing Oregon’s legitimate interest in combating global warming.”).

⁴³⁶ See *Banda & Fulton* at 10122 n.3 (reviewing cases). See also *Preston*, *supra* note 15, at 136.

In one such case, *Chernaik*, minor children sued the State of Oregon and Oregon’s Governor in 2011, seeking declaratory and injunctive relief for Oregon’s alleged failure to take sufficient steps to protect the state’s public-trust resources from the effects of climate change.⁴³⁷ Relying on Oregon state common law, plaintiffs asserted that the state holds “vital natural resources” in trust for the benefit of its citizens, including the waters of the state, coastal areas, wildlife, fish, and the atmosphere, and that it has a fiduciary obligation to protect and conserve those resources. Plaintiffs also made a number of allegations relating to climate change, including that “Oregon has the ability to curtail [GHG] emissions, increase carbon sequestration, and take the steps necessary to protect the public trust assets of the State from the adverse [effects] of climate change.”⁴³⁸

In 2014, the Oregon Court of Appeals reversed the trial court’s dismissal of the case on justiciability grounds and directed the trial court to determine whether plaintiffs were entitled to declarations that natural resources are trust resources that the state has a fiduciary obligation to protect.⁴³⁹ On remand, the trial court dismissed the plaintiffs’ case, holding that (a) only state submerged and submersible lands are resources encompassed by the common-law public-trust doctrine and that (b) the State does not have a fiduciary obligation to protect submerged and submersible lands from the effects of climate change.⁴⁴⁰

The Court of Appeals affirmed in 2019 that the public-trust doctrine under state common law does not impose a fiduciary obligation on the state to take affirmative action to protect public-trust resources from climate impacts.⁴⁴¹ Neither the court nor the litigants appeared to question the reality of climate impacts or the connection between emissions reductions and climate mitigation—at issue was the scope of the common law doctrine.⁴⁴²

E. Criminal Law

Less commonly, courts have also made findings of climate facts in the criminal law context. There are currently around twenty cases in the United States in which juries will hear the necessity defense in a criminal trial against climate activists.⁴⁴³ Generally, the necessity defense (also known as

⁴³⁷ See *Chernaik v. Brown (Chernaik II)*, 295 Or. App. 584, 436 P.3d 26 (2019).

⁴³⁸ *Id.* at 587.

⁴³⁹ See *Chernaik v. Kitzhaber (Chernaik I)*, 263 Or. App. 463, 481, 328 P.3d 799 (2014).

⁴⁴⁰ See *Chernaik v. Brown (Chernaik II)*, 436 P.3d 26, 30–31 (Or. Ct. App. 2019).

⁴⁴¹ *Id.* at 27–28.

⁴⁴² See, e.g., *id.* at 35 (“We can find no source under the Oregon conception of the public-trust doctrine for imposing fiduciary duties on the state to affirmatively act to protect public-trust resources from the effects of climate change.”).

⁴⁴³ See, e.g., *State v. Ward*, 438 P.3d 588, 592 (Wash. Ct. App.), *rev. denied*, 193 Wash. 2d 1031, 447 P.3d 161 (2019); *State v. Klapstein*, A17-1649 (Minn. Ct. App. Apr. 23, 2018) (dismissing appeal of lower court’s ruling permitting defendants to present evidence at trial on the defense of necessity); *People v. Cromwell*, No. 15120561, slip. op. (Town of Wawayanda Just. Ct., N.Y., May 20, 2017) (finding that, although climate change is a threat to the environment and is “a more serious harm than a relatively brief disruption of traffic at the entrance of a construction site,” defendant was

the choice of evils defense) excuses the commission of a crime in specific circumstances if the defendant can demonstrate that the crime was necessary to avoid an imminent (and often greater) harm to public or private interests. In these cases, defendants have argued that their otherwise illegal actions were compelled by the “climate emergency.” This has had the effect of putting climate science squarely before the trier of fact.

For example, in *State v. Ward*, Kenneth Ward broke into a Kinder Morgan pipeline facility in Washington state and turned off a valve to stop the flow of Canadian tar sands oil to local refineries, which he contended contributes to climate change.⁴⁴⁴ He was charged with burglary. Ward sought to introduce expert and scientific evidence to document climate impacts and to show that climate change is primarily caused by GHG emissions resulting from human activity, including burning tar sands oil.⁴⁴⁵ The state trial court excluded all testimony and evidence in support of Ward’s necessity defense, and Ward was found guilty of burglary. Ward argued that, as a result, he was deprived of his Sixth Amendment right to present his only defense—necessity—to the jury.

On appeal, Ward argued that the reasonableness of his belief that his actions were “reasonably calculated to be effective in averting the imminent harm of climate change” was a question for the jury, not the trial court, to decide (and thus required expert evidence).⁴⁴⁶ The state did not attempt to deny the connection between the pipeline project and climate change. Rather, it argued that Ward merely “temporarily inconvenience[d] Kinder Morgan’s employees so it was unreasonable to think that his actions would actually avoid or minimize the broader harms associated with climate change,” and that, in any event, he had recourse to other, legal alternatives.⁴⁴⁷

The Washington Court of Appeal made a number of statements relating to climate science in its analysis. For example, it considered climate science in examining whether Ward had met his initial burden of showing that he would likely be able to submit a sufficient quantum of evidence on each element of the necessity defense to make it a jury question whether he established that element beyond a reasonable doubt. The court opined that Ward

offered sufficient evidence to show that the harms of global climate change were greater than the harm of breaking into Kinder Morgan’s property. Ward asserted that the extent of the harm resulting from his actions were the loss of a few locks and the temporary inconvenience to Kinder Morgan’s employees. Compared to this, Ward introduced ‘voluminous scientific evidence of the harms of climate change.’ This evidence included information establishing climate change is real and detrimentally effecting Washington, and that tar sands oil poses a specifically acute threat to our environment. Further, Ward offered to present testimony from climate scientists . . . supporting his defense.⁴⁴⁸

not entitled to the defense of justification by necessity). *See also* U.S. Litigation Chart, SABIN CTR. FOR CLIMATE CHANGE LAW, <http://climatecasechart.com/case-category/protesters/> (listing cases).

⁴⁴⁴ *See State v. Ward*, 438 P.3d 588, 592 (Wash. Ct. App.), *rev. denied*, 193 Wash. 2d 1031, 447 P.3d 161 (2019).

⁴⁴⁵ *Id.*

⁴⁴⁶ *Id.* at 594.

⁴⁴⁷ *Id.*

⁴⁴⁸ *Id.* at 594.

Similarly, the court discussed climate science in concluding that Ward had offered sufficient evidence to create a question of fact on whether there were reasonable legal alternatives (and holding that the trial court had violated Ward’s constitutional rights).⁴⁴⁹ It noted, *inter alia*, Ward’s argument “that the window for action on climate change has narrowed to the point that immediate, emergency action is necessary.”⁴⁵⁰ The court, however, did not decide that the proffered “evidence was sufficient to establish that [Ward’s] history of failed attempts to address climate change revealed the futility of supposed reasonable alternatives”—this was a question for the jury.⁴⁵¹

Finally, the court referenced climate science in its analysis of the intent behind Ward’s actions (and what specific harm Ward’s protest was intended to avoid).⁴⁵² The court distinguished between protest of the global phenomenon of climate change and its local manifestation, finding that the latter might support Ward’s defense.⁴⁵³ Ward’s argument fell within the second category.⁴⁵⁴ Since protesters sought to physically stop the flow of Canadian tar sands oil into the U.S.—a substance they saw as a particularly potent contributor to climate change—the court determined that the protest “was a direct way of preventing a uniquely potent contributor to climate change from entering the United States.”⁴⁵⁵

IV. CLIMATE SCIENCE IN FOREIGN COURTS

Numerous climate lawsuits have also been filed outside the United States in recent years. This section reviews how foreign courts have engaged with climate science. The analysis is necessarily not exhaustive but aims to provide an account of some of the most prominent recent cases from a dozen different civil and common law jurisdictions that have engaged with climate science. In particular, it reviews suits based on (a) duty of care theories, (b) constitutional claims, and (c) statutory claims.

⁴⁴⁹ *Id.* at 595.

⁴⁵⁰ *See id.* (citing Ward’s numerous attempts to address climate change over a 40-year period and discussing proposed expert testimony “to the effect that the fossil fuel industry’s influence over political institutions renders traditional legal avenues unreasonable as a means of addressing the climate emergency”).

⁴⁵¹ *Id.*

⁴⁵² *See id.* at 596.

⁴⁵³ *Id.* (noting that “[i]f Ward was protesting global warming as a whole, then the impact of his action would be so infinitesimal that . . . his actions were symbolic in nature. If, however, . . . the harm he was attempting to alleviate was, for example, the danger of Canadian tar sands oil specifically or the danger that global warming poses to Washington—then we could conclude that his actions were actually intended to have an impact on the harm that he sought to avoid.”).

⁴⁵⁴ Below, Ward had asserted that “the harm he was attempting to avoid was threefold: (1) global climate change, generally, has the potential to destroy our way of life, (2) Canadian tar sands oil is a uniquely potent contributor to climate change, and (3) the localized impacts of climate change on Washington has the potential to be debilitating.” *Id.* at 596.

⁴⁵⁵ Accordingly, the court held that the trial court erred in preventing Ward from introducing evidence in support of his necessity defense. *See id.* (noting that “the harms that Ward asserted he was trying to alleviate were more than just climate change, generally, but also included both the specific dangers of Canadian tar sands oil and the impacts of sea level rise on Washington”).

As the analysis shows, the judicial consensus on climate science transcends borders.⁴⁵⁶ Despite considerable differences across various national legal systems, there are a number of similarities in the courts' treatment of climate science in the United States and in non-U.S. jurisdictions. For example, foreign courts and litigants have also overwhelmingly accepted basic climate science, they have relied on much of the same scientific evidence (such as the IPCC's Assessment Reports, as well as U.S. government research), and courts have often made detailed findings of fact on the issue. A number of foreign courts have also gone further than their U.S. counterparts and made findings about what the scientific community considers to be a "safe" level of warming (and, relatedly, what it considers to be a safe level of GHG concentration in the atmosphere).⁴⁵⁷

In some cases, those factual findings have served as a predicate for extensive judicial orders directing the political branches to act on climate change, including orders to reduce nationwide emissions or exposure to the risks of climate change. One key contextual difference is that a number of other States, unlike the United States, have general climate change legislation that specifically instructs the government to implement the Paris Agreement obligations or to reach certain emissions targets.⁴⁵⁸ However, in many cases, as in the United States, the courts' acceptance of climate science as a factual matter did not translate into legal conclusions favorable to the plaintiffs or judicial intervention.

A. Duty of Care

The concept that a State has a "duty of care" towards its citizens and their environment has multiple doctrinal sources. As the discussion of *Urgenda* below shows, courts in some jurisdictions have derived this principle from domestic tort case law on negligent endangerment (or hazardous negligence), as well as constitutional principles and international law.⁴⁵⁹

⁴⁵⁶ See, e.g., *Thompson v The Minister for Climate Change Issues* [2017] NZHC 733 (High Ct. Nov. 2, 2017) (N.Z.) (surveying foreign case law).

⁴⁵⁷ See, e.g., *Urgenda Found. v. The Netherlands*, No. 19/00135, at ¶ 4.3, Sup. Ct. Civ. Div. (Dec. 20, 2019) (Neth.), translated in <https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:HR:2019:2007> (stating that "[c]limate science long ago reached a high degree of consensus that the warming of the earth must be limited to no more than 2°C and that this means that the concentration of [GHGs] in the atmosphere must remain limited to a maximum of 450 ppm. Climate science has since arrived at the insight that a safe warming of the earth must not exceed 1.5°C."). Cf. *Friends of the Irish Env't CLG v. Ireland* [2019] IEHC 747 (Sept. 19, 2019) (H. Ct.) (Ir.). See also *Gloucester Resources Ltd. v. Minister for Planning* [2019] NSWLEC 7 (NSW Land & Env't Ct.) (Austl.) (discussing the concept of a "carbon budget").

⁴⁵⁸ Cf. *Mexichem Fluor, Inc. v. Env'tl. Prot. Agency*, 866 F.3d 451, 460 (D.C. Cir. 2017) (noting that U.S. "Congress's failure to enact general climate change legislation does not authorize EPA to act" and that "congressional inaction does not license an agency to take matters into its own hands, even to solve a pressing policy issue such as climate change.").

⁴⁵⁹ See Jonathan Verschuuren, *The State of the Netherlands v Urgenda Foundation: The Hague Court of Appeal Upholds Judgment Requiring the Netherlands to Further Reduce its Greenhouse Gas Emissions*, 28 RECIEL 94 (2019) (describing doctrinal shift in the course of the proceedings).

1. The Netherlands

Urgenda v. The Netherlands may be the most well-known climate case decided by a non-U.S. court. There, The Hague District Court ruled that the Netherlands had breached its duty of care to the plaintiffs by taking insufficient measures to prevent climate change, and ordered the government to implement specific emissions reductions.⁴⁶⁰ As in most U.S. cases reviewed in Section III above, both sides agreed on the need for climate mitigation, and the government was already taking a broad range of measures to reduce emissions. At issue was “the pace, or the level, at which the State needs to start reducing [GHG] emissions.”⁴⁶¹ This necessarily required the court to consider the adequacy of the Dutch response to climate change in relation to the urgency suggested by climate science.

In building their case, petitioners did not put forward any expert witnesses to discuss climate change: they based their case on official UN and IPCC reports (which the Netherlands has accepted), showing that delayed action on climate change would increase its risks. After reviewing scientific evidence, the court concluded that the Dutch government’s reduction target was “below the standard deemed necessary by climate science and the international climate policy, meaning that in order to prevent dangerous climate change, Annex I countries (including the Netherlands) must reduce [GHG] emissions by 25–40% by 2020 to realize the 2°C target.”⁴⁶² Having made this finding, the court considered whether the State had a legal obligation to pursue a more aggressive emissions reduction target, and found that it had by virtue of “the State’s duty of care.”

The court concluded that the State had “acted negligently and therefore unlawfully towards Urgenda by starting from a reduction target for 2020 of less than 25% compared to the year 1990,” and ordered the State to reduce national emissions by 25% as an “absolute minimum.”⁴⁶³ The court found that mitigation was “the only really effective tool” and thus the State “has a duty of care to mitigate as quickly and as much as possible.”⁴⁶⁴ Further, the court noted that “climate change is a global problem and therefore requires global accountability.”⁴⁶⁵ Because “any anthropogenic [GHG] emission, no matter how minor, contributes to an increase of [CO₂] levels in the atmosphere and

⁴⁶⁰ See *Urgenda Found. v. The Netherlands*, The Hague Dist. Ct. (Chamber for Comm. Aff. June 24, 2015) (Neth.), <http://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBDHA:2015:7145>, translated in <http://www.urgenda.nl/documents/VerdictDistrictCourt-UrgendavStaat-24.06.2015.pdf>. See generally Banda & Fulton at 10122–23.

⁴⁶¹ *Id.* at ¶¶ 4.32, 4.34.

⁴⁶² *Id.* at ¶¶ 4.31, 4.84. By comparison, the State had indicated at the hearing that the expected emissions reduction was 14–17% in 2020 compared to 1990. *Id.* at ¶ 4.26.

⁴⁶³ The court declined to set the higher target of 40% in order not to encroach on the State’s discretionary power. *Id.* at ¶ 4.93.

⁴⁶⁴ *Id.* at ¶¶ 4.73–4.76.

⁴⁶⁵ *Id.* at ¶ 4.79.

therefore to hazardous climate change,” States have a joint and individual responsibility for emissions reductions.⁴⁶⁶

The Hague Court of Appeal upheld the lower court’s decision in October 2018,⁴⁶⁷ one day after the IPCC had issued its *Special Report on Global Warming of 1.5°C* (emphasizing the need to keep global warming below 1.5°C from pre-industrial levels by 2030). The Court of Appeal analyzed, inter alia, obligations that the Netherlands had accepted by acceding to the European Convention of Human Rights (ECHR), including Articles 2 (right to life) and Article 8 (right to private life, family, and home). The court ruled that the State has a positive obligation to protect these rights, emphasizing that “[i]f the government knows that there is a real and imminent threat, the State must take precautionary measures to prevent infringement as far as possible.”⁴⁶⁸

The court first assessed whether climate dangers are imminent. It summarized the evidence as follows:

- There is a direct, linear link between anthropogenic emissions of [GHG], partially caused by combusting fossil fuels, and global warming. Emitted CO₂ lingers in the atmosphere for hundreds of years, if not longer.
- Since pre-industrial times, the Earth has warmed by about 1.1° C. Between 1850 and 1980, the level of global warming was about 0.4° C. Since then and in under 40 years’ time, the Earth has warmed further by 0.7 ° C, reaching the current level of 1.1° C (see the diagram ‘Global warming 1880-2017 (NASA)’, the third slide shown by Urgenda during its oral arguments). This global warming is expected to accelerate further, mainly because emitted [GHGs] reach their full warming effect only after 30 or 40 years.
- If the Earth warms by a temperature of substantially more than 2° C, this will cause more flooding due to rising sea levels, heat stress due to more intensive and longer periods of heat, increasing prevalence of respiratory diseases due to worsened air quality, droughts (accompanied by forest fires), increasing spread of infectious diseases and severe flooding as a result of heavy rainfall, disruption in the food production and potable water supply. Ecosystems, flora and fauna will also be affected, and biodiversity loss will occur. The State failed to challenge Urgenda’s assertions (by stating reasons) regarding these issues nor did it contest Urgenda’s assertion that an inadequate climate policy in the second half of this century will lead to hundreds of thousands of victims in Western Europe alone.
- As global warming continues, not only the severity of its consequences will increase. The accumulation of CO₂ in the atmosphere may cause the climate change process to reach a ‘tipping point’, which may result in abrupt climate change, for which neither mankind nor nature can properly prepare. The risk of reaching such ‘tipping points’ increases ‘at a steepening rate’ with a temperature rise of between 1 and 2 °C (AR5 p. 72).
- On a global scale, [GHG] emissions continue to rise. See, among other things, slide 2 shown by Urgenda during its oral arguments: European Database for Global Atmospheric Research (EDGAR) 2017, ‘*Global greenhouse gas emissions, per type of gas and sources, including LULUCF*’.

⁴⁶⁶ *Id.*

⁴⁶⁷ *Urgenda Found. v. The Netherlands*, No. 200.178.245/01, The Hague Ct. App. (Oct. 9, 2018) (Neth.), *translated in* <https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:GHDHA:2018:2610>.

⁴⁶⁸ *Id.* at ¶ 43.

- The emission of CO₂ in the Netherlands also remains as high as ever. The slight decline in [GHGs] emissions in the Netherlands can only be attributed to the drop in emissions of other, less harmful, [GHGs] (see slide 16 shown by Urgenda in its oral arguments). CO₂ is the main [GHG] and is responsible for 85% of all [GHG] emissions in the Netherlands.
- Even between the parties there is a consensus that the global temperature rise must at least be kept well below 2° C while a ‘safe’ temperature rise should not exceed 1.5° C, each relative to pre-industrial levels.
- In order to achieve the 2° C target, the concentration of [GHGs] in the atmosphere may not exceed 450 ppm. To achieve the 1.5° C target (as set in the Paris Agreement), the global concentration of [GHGs] must be substantially lower, namely less than 430 ppm. The current concentration is about 401 ppm. This means that the concentration of [GHGs] in the atmosphere may only rise slightly. Chances of reaching the 1.5° C target are now slim. Keeping global warming to well below 2° C, to which the Netherlands has also committed with the signing of the Paris Agreement, will at least require a considerable amount of effort.
- The longer it takes to achieve the necessary emission reduction, the greater the total amount of emitted CO₂ and the sooner the remaining carbon budget will have been used up (see also legal ground 4.32 of the contested judgement and the diagrams contained therein).⁴⁶⁹

In light of this evidence, the court concluded that the threat of climate change is real:

*As is evident from the above, the Court believes that it is appropriate to speak of a real threat of dangerous climate change, resulting in the serious risk that the current generation of citizens will be confronted with loss of life and/or a disruption of family life. As has been considered above by the Court, it follows from Articles 2 and 8 ECHR that the State has a duty to protect against this real threat.*⁴⁷⁰

The court also made a number of climate findings in its analysis of whether the State had acted unlawfully by not reducing emissions by at least 25% by the end of 2020 “despite the real and imminent threats” of climate change.⁴⁷¹ Among other things, the court noted a series of facts relating to emission levels, mitigation pathways, and emissions reductions required to keep the global temperature increase to below 2° C, which are excerpted below. In particular, the court weighed and rejected the State’s evidence that negative emission technologies offered a realistic pathway to reduce emissions to what is considered to be a safe level:

47. In the first place, the Court takes as a point of departure that the emission of all [GHGs] combined in the Netherlands had dropped by 13%, relative to 1990, in 2017. Even if the new calculation method was not used for this . . . a significant effort will have to be made between now and 2030 to reach the 49% target in 2030; much more efforts than the limited efforts the Netherlands has undertaken so far. It is also an established fact that it is desirable to start the reduction efforts at as early a stage as possible in order to limit the total emissions in this period. Delaying the reduction will lead to greater risks for the climate. A delay would, after all, allow [GHG] emissions to continue in the meantime; [GHGs]

⁴⁶⁹ *Id.* at ¶ 44.

⁴⁷⁰ *Id.* at ¶ 45 (emphasis added).

⁴⁷¹ As the court noted, “[t]he end goal is clear and is not disputed between the parties. By the year 2100, global [GHG] emissions must have ceased entirely. Nor do the parties hold differing opinions as to the required interim target of 80-95% reduction relative to 1990 by 2050. And Urgenda endorses the reduction target of 49% relative to 1990 by 2030, as established by the government. The dispute between the parties focuses on the question if the State can be required to achieve a reduction of at least 25% relative to 1990 by end-2020.” *Id.* at ¶ 46.

which linger in the atmosphere for a very long time and further contribute to global warming. In that context, the Court would like to point out to the warnings issued by the UNEP, cited in legal grounds 2.29 through to 2.31 of the judgment. See also the report of the PBL of 9 October 2017 (Exhibit 77 of the State) p. 60, where the PBL remarks that achieving the climate targets of the Paris Agreement not necessarily concerns achieving a low emission level in 2050, but rather and particularly achieving low cumulative emissions, considering the fact that each megaton of CO₂ which is emitted into the atmosphere in the short term contributes to global warming. An even distribution of reduction efforts over the period up to 2030 would mean that the State should achieve a substantially higher reduction in 2020 than 20%. An even distribution is also the starting point of the State for its reduction target of 49% by 2030, which has been derived in a linear fashion from the 95% target for 2050. If extrapolated to the present, this would result in a 28% reduction by 2020, as confirmed by the State in answering the Court's questions.

48. In AR4 [the Fourth Assessment Report], the IPCC concluded that a concentration level not exceeding 450 ppm in 2100 is admissible to keep the 2° C target within reach. The IPCC then concluded, following an analysis of the various reduction scenarios . . . , that in order to reach this concentration level, the total [GHG] emissions in 2020 of Annex I countries, of which the Netherlands is one, must be 25-40% lower than 1990 levels. In AR5 [the Fifth Assessment Report], the IPCC also assumes that a concentration level of 450 ppm may not be exceeded in order to achieve the 2° C target.

49. The State has argued that in AR5 multiple emission reduction pathways are presented with which this target may be reached. Based on this, the State is of the opinion that the district court was wrong to take a 25-40% reduction by 2020, as mentioned in AR4, as a starting point. The Court does not endorse the position of the State in this. As has been stated above . . . , 87% of the scenarios presented in AR5 are based on the existence of negative emissions. In the report of the European Academies Science Advisory Council ('Negative emission technologies: What role in meeting Paris Agreement targets?'), entered into evidence by Urgenda as Exhibit 164, the following is noted about negative emissions:

“(. . .) We conclude that these technologies [Court: negative emission technologies, or NETs] offer only limited realistic potential to remove carbon from the atmosphere and not at the scale envisaged in some climate scenarios (. . .)” (p. 1) “Figure 1 shows not only the dramatic reductions required, but also that there remains the challenge of reducing sources that are particularly difficult to avoid (these include air and marine transport, and continued emissions from agriculture). Many scenarios to achieve Paris Agreement targets have thus had to hypothesise that there will be future technologies which are capable of removing CO₂ from the atmosphere.” (p. 5)

“(. . .) the inclusion of CDR [Court: removal of CO₂ from the atmosphere] in scenarios is merely a projection of what would happen if such technologies existed. It does not imply that such technologies would either be available, or would work at the levels assumed in the scenario calculations. As such, it is easy to misinterpret these scenarios as including some judgment on the likelihood of such technologies being available in the future.” (p. 5)

The State has failed to contest this by not providing adequate substantiation. Therefore, the Court assumes that the option to remove CO₂ from the atmosphere with certain technologies in the future is highly uncertain and that the climate scenarios based on such technologies are not very realistic considering the current state of affairs. AR5 might thus have painted too rosy a picture, and it cannot be assumed outright that the 'multiple mitigation pathways' listed by the IPCC in AR5 (p. 20) can lead to the 2° C target. Furthermore, as asserted by Urgenda and not contested by the State by stating reasons, it is plausible that no reduction percentages as of 2020 were included in AR5, because in 2014 the focus of the IPCC was on targets for 2030. In this respect too, the report does not give cause to assume that the reduction scenario in AR4, which does not take account of negative emissions, is

superseded and that today a reduction of less than 25-40% by 2020 would be sufficient to achieve the 2° C target. In order to assess whether the State has met its duty of care, the Court shall take as a starting point that an emission reduction of 25-40% in 2020 is required to achieve the 2° C target.

50. Incidentally, the 450-scenario only offers a more than 50% ('more likely than not') chance to achieve the 2° C target. A real risk remains, also with this scenario, that this target cannot be achieved. *It should also be noted here that climate science has meanwhile acknowledged that a safe temperature rise is 1.5° C rather than 2° C.* This consensus has also been expressed in the Paris Agreement, in which it was agreed that global warming should be limited to well below 2° C, with an aim for 1.5° C. The ppm level corresponding with the latter target is 430, which is lower than the level of 450 ppm of the 2° C target. The 450-scenario and the identified need to reduce CO₂ emissions by 25-40% by 2020 are therefore not overly pessimistic starting points when establishing the State's duty of care.

51. The State has known about the reduction target of 25-40% for a long time. The IPCC report which states that such a reduction by end-2020 is needed to achieve the 2° C target (AR4) dates back to 2007. Since that time, virtually all COPs (in Bali, Cancun, Durban, Doha and Warsaw) have referred to this 25-40% standard and Annex I countries have been urged to align their reduction targets accordingly. This may not have established a legal standard with a direct effect, but *the Court believes that it confirms the fact that at least a 25-40% reduction of CO₂ emissions as of 2020 is required to prevent dangerous climate change.*

52. Finally, it is relevant noting that up to 2011 the Netherlands had adopted as its own target a reduction of 30% in 2020 That was, as evidenced by the letter from the Minister of Housing, Spatial Planning and the Environment dated 12 October 2009, because the 25-40% reduction was necessary 'to stay on a credible track to keep the 2 degrees objective within reach.' No other conclusion can be drawn from this than that the State itself was convinced that a scenario in which less than that would be reduced by 2020 was not feasible. The Dutch reduction target for 2020 was subsequently adjusted downwards. *But a substantiation based on climate science was never given,* while it is an established fact that postponing (higher) interim reductions will cause continued emissions of CO₂, which in turn contributes to further global warming. More specifically, the State failed to give reasons why a reduction of only 20% by 2020 (at the EU level) should currently be regarded as credible, for instance by presenting a scenario which proves how—in concert with the efforts of other countries—the currently proposed postponed reduction could still lead to achieving the 2° C target. The EU itself also deemed a reduction of 30% for 2030 necessary to prevent dangerous climate change⁴⁷²

On this basis, the court concluded that a reduction obligation of at least 25% by the end of 2020, as ordered by the district court, was in line with the State's duty of care.⁴⁷³

The court proceeded to analyze the State's justifications for not taking further reduction measures and found them unavailing.⁴⁷⁴ For example, the Netherlands restated its argument from the proceedings below that its emissions are minimal and that it cannot solve this "global problem" alone.⁴⁷⁵ The court held this was not dispositive: "[T]his does not release the State from its obligation

⁴⁷² *Id.* at ¶¶ 47–52 (internal citations omitted).

⁴⁷³ *Id.* at ¶ 53.

⁴⁷⁴ *See id.* at ¶¶ 54–70.

⁴⁷⁵ *Id.* at ¶ 61.

to take measures in its territory, within its capabilities, which in concert with the efforts of other states provide protection from the hazards of dangerous climate change.”⁴⁷⁶

The government appealed the judgment to the Dutch Supreme Court, but it stated that the appeal “is not about climate policy,” but rather “the basic question whether it is legitimate for an independent legal court to judge on government policy and in doing so, change that policy.”⁴⁷⁷ In December 2019, the Dutch Supreme Court upheld the decisions below, finding that the government had a duty to reduce emissions in line with its human rights obligations.⁴⁷⁸ The Supreme Court relied on the facts and assumptions that were established by the Court of Appeal, and which were not disputed by the parties in cassation.⁴⁷⁹ Among other facts, the Supreme Court noted that:

*Climate science long ago reached a high degree of consensus that the warming of the earth must be limited to no more than 2°C and that this means that the concentration of [GHGs] in the atmosphere must remain limited to a maximum of 450 ppm. Climate science has since arrived at the insight that a safe warming of the earth must not exceed 1.5°C and that this means that the concentration of [GHGs] in the atmosphere must remain limited to a maximum of 430 ppm. Exceeding these concentrations would involve a serious degree of danger that the consequences referred to in ¶ 4.2 will materialise on a large scale.*⁴⁸⁰

The Dutch government, as noted above, did not contest climate science. It argued that the European Convention did not impose the kind of obligations that the plaintiffs claimed. The Supreme Court, however, reaffirmed the decisions below, noting that:

[N]o other conclusion can be drawn but that the State is required pursuant to Articles 2 and 8 ECHR to take measures to counter the genuine threat of dangerous climate change if this were merely a national problem. Given the findings above . . . , after all, this constitutes a “real and immediate risk” . . . and it entails the risk that the lives and welfare of Dutch residents could be seriously jeopardised. The same applies to, inter alia, the possible sharp rise in the sea level, which could render part of the Netherlands uninhabitable. The fact that this risk will only be able to materialise a few decades from now and that it will not impact specific persons or a specific group of persons but large parts of the population does not mean—contrary to the State’s assertions—that Articles 2 and 8 ECHR offer no protection from this threat This is consistent with the precautionary principle. . . . The mere existence of a sufficiently genuine possibility that this risk will materialise means that suitable measures must be taken.⁴⁸¹

⁴⁷⁶ *Id.* at ¶¶ 62–63 (discussing, inter alia, the precautionary principle). *See also id.* at ¶ 64 (noting that inaction on the part of the rest of the global community does not release the Dutch government from its obligations).

⁴⁷⁷ *See* Uclia Wang, *Dutch Court Upholds Urgenda, Says Government Must Reduce Emissions*, CLIMATE LIABILITY NEWS (Oct. 9, 2018) (quoting spokesperson for the Dutch Ministry of Economic Affairs and Climate Policy), <https://www.climateliabilitynews.org/2018/10/09/urgenda-netherlands-climate-emissions/>.

⁴⁷⁸ *Urgenda Found. v. The Netherlands*, No. 19/00135, Sup. Ct. Civ. Div. (Dec. 20, 2019) (Neth.), *translated in* <https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:HR:2019:2007>.

⁴⁷⁹ *See id.* at ¶ 2.1. *See also id.* at ¶ 4.1 (noting “the widely accepted, on climate science derived insights established by the Court of Appeal which the parties do not dispute” underlying the court’s “findings of fact regarding the danger and consequences of climate change”).

⁴⁸⁰ *Id.* at ¶ 4.3 (emphasis added).

⁴⁸¹ *Id.* at ¶ 5.6.2 (internal citations omitted).

The Supreme Court further held that the global nature of climate change (and globally shared responsibility for its mitigation) does not absolve the Dutch government of its duties.⁴⁸²

The *Urgenda* lawsuit has sparked a number of similar actions in other countries, including in Belgium,⁴⁸³ Canada, Colombia, India, Ireland, New Zealand, Norway, Pakistan, Switzerland, and Uganda. Some of these cases are discussed in Section IV.B below.

B. Constitutional and Rights-Based Theories

A number of jurisdictions have express constitutional protections for the environment, which have provided a vehicle for climate litigation. However, even in jurisdictions that do not have an express constitutionally-protected right to a healthy environment, climate suits have been able to proceed where the national judiciaries have interpreted the fundamental right to life and dignity as including such a right. This section reviews how foreign courts in several countries have engaged with climate science in constitutional cases, including in Austria, Colombia, India, Ireland, Norway, Pakistan, Switzerland, and the European Union (EU).

1. Austria

In Austria, individual plaintiffs and NGOs challenged the approval of construction of a third runway at Vienna's airport, alleging in part that it would violate Austria's national and international obligations to mitigate climate change. The Austrian Federal Administrative Court granted the petition in 2017.⁴⁸⁴ In its lengthy opinion, the court made a number of findings relating to climate change and emissions from the proposed construction, including that:

⁴⁸² *Id.* at ¶ 5.7.1. (“[T]he Netherlands is obliged to do ‘its part’ in order to prevent dangerous climate change, even if it is a global problem.”). *See also id.* at ¶ 5.7.7:

Partly in view of the serious consequences of dangerous climate change . . . , the defence that a state does not have to take responsibility because other countries do not comply with their partial responsibility, cannot be accepted. Nor can the assertion that a country's own share in global [GHG] emissions is very small and that reducing emissions from one's own territory makes little difference on a global scale, be accepted as a defence. Indeed, acceptance of these defences would mean that a country could easily evade its partial responsibility by pointing out other countries or its own small share. If, on the other hand, this defence is ruled out, each country can be effectively called to account for its share of emissions and the chance of all countries actually making their contribution will be greatest, in accordance with the principles laid down in the preamble to the UNFCCC

⁴⁸³ A citizen suit similar to *Urgenda* is currently pending in Belgium, in which the judiciary is being asked to order the regional and federal governments to take all measures necessary to ensure that Belgian emissions in 2020 are 40% less than in 1990. After a number of procedural delays, the case is proceeding in the French-language court of first instance in Brussels. *See Climate Case*, KLIMAATZAAK, <https://www.klimaatzaak.eu/en>.

⁴⁸⁴ *See In re Vienna-Schwechat Airport Expansion*, Bundesverwaltungsgericht [BVwG] [Fed. Admin. Ct.], Feb. 2, 2017, No. W109 2000179-1/291E (Austria), at http://blogs2.law.columbia.edu/climate-change-litigation/wp-content/uploads/sites/16/non-us-case-documents/2017/20170202_W109-2000179-1291E_decision-2.pdf (unofficial translation).

Climate change has already had negative effects in Austria and has already had a detrimental impact on people, animals, plants and the landscape.

It can be assumed that climate change will lead to further serious damage in Austria. For people, there will be health impairments associated with deaths; There is a great loss of income and property;

It results in reduced yields in various economic sectors, in particular agriculture, forestry and tourism; Furthermore, there is a decrease in jobs.

The landscape is permanently negatively affected by climate change. Glaciers melt away, changes in the vegetation and the forest composition goes uphill.

To put counter-measures, a substantial amount of public funds must be used. There are migratory movements of climate refugees from regions affected by climate change, which will lead to social tensions.

Climate change also has positive consequences. Thus, plants can be cultivated that have not yet been cultivated in Austria for climatic reasons and, for example, a reduction in heating costs is to be expected.

Furthermore, the year-round tourism and the Alpine area could be favored, in particular, in the Mediterranean summer resorts.

In some areas, the consequences of climate change in Austria have not yet been clarified, because even more research is needed (for example, no reliable statements on extreme events such as storm and hail frequency and erosion due to severe precipitation are possible; A statement on the change in the flood risk for the whole of Austria is currently not possible; Changes in the supply of renewable energy sources such as wind energy, solar energy and biomass have not yet been clarified).

Overall, however, the drastically negative consequences of climate change have far outweighed the possible positive effects.⁴⁸⁵

Having determined that the planned runway would increase Austria's annual emissions, the court proceeded to analyze the resulting climate impacts in the country.⁴⁸⁶ It observed that an "overwhelming majority of scientists" attribute an increasing number of extreme weather events to anthropogenic climate change.⁴⁸⁷ The court ultimately concluded that the new runway would violate national statutory and constitutional law, as well as Austria's commitments under EU law and the Paris Agreement.⁴⁸⁸

⁴⁸⁵ *Id.* at ¶¶ 3.6.1–3.6.6.

⁴⁸⁶ *See id.* at ¶ 3.6.6.

⁴⁸⁷ *Id.* (citing, inter alia, IPCC's Fourth and Fifth Assessment Reports, and describing the IPCC as "the most qualified and specialized global scientific body for the investigation of climate change"). *See also id.*:

According to a large number of studies, it is assumed that climate change has been influenced by humans since the beginning of industrialization and is already taking place. If there are no sustained reductions in GHG emissions, there will be a further rise in temperature with widespread consequences. This has meanwhile become a widely known fact.

⁴⁸⁸ *Id.* at 122–27. *See, e.g., id.* at 127 ("As climate change is associated with severe health damage, with an increase in heat-related deaths as well as severe impairments of the Austrian economy and the agriculture and the project will lead to a significant increase in GHG emissions, the public interest in the realization of the project fall below the public interest in the protection against the negative effects of climate change and land use.").

The Austrian Constitutional Court overturned the Federal Administrative Court’s decision in 2017, citing several “gross” legal errors in its analysis.⁴⁸⁹ The Constitutional Court, however, did not challenge the lower court’s fact-finding relating to climate science. It focused on legal errors, such as the court’s consideration of improper types of emissions (such as cruise emissions, as opposed to emissions from landing and takeoff).⁴⁹⁰ In March 2018, the Administrative Court issued a new decision approving construction of the third runway.

2. Colombia

Colombian courts have also considered climate science in two recent public actions challenging the constitutionality of the State’s measures. In the first case, petitioners challenged the constitutionality of Colombia’s national development plan. As relevant here, petitioners argued that legislative provisions permitting continued oil, gas, and mining operations in Colombia’s *páramo*—a fragile high-altitude ecosystem—violated their constitutional rights to a healthy environment, water, and public patrimony.⁴⁹¹

In February 2016, the Constitutional Court invalidated those provisions, in part citing the nexus between climate change and water and biodiversity in the *páramo*.⁴⁹² The Court observed that the *páramo* ecosystem is of singular importance to Colombia: though *páramo* covers only 2% of Colombia’s territory, it plays a key role in the hydrological cycle and provides drinking water to 70% of Colombia’s residents.⁴⁹³ In addition, the *páramo* is highly susceptible to the effects of climate change at the same time as it is central to the efforts to mitigate it. Under ideal conditions, the *páramo* acts as a significant carbon “sink”; however, if the stored carbon deposits are released into the atmosphere through a loss of surface vegetation, it can also have “grave” consequences for global warming.⁴⁹⁴

In view of this evidence, the Constitutional Court held that the *páramo* is an ecosystem of “special ecological importance” and, as such, is owed a special duty of “direct constitutional

⁴⁸⁹ See Verfassungsgerichtshof [VfGH] [Constitutional Court], June 29, 2017, docket No. E 875/2017-32, E 886/2017-31 (Austria), at http://blogs2.law.columbia.edu/climate-change-litigation/wp-content/uploads/sites/16/non-us-case-documents/2017/20170601_W109-2000179-1291E_decision.pdf (unofficial translation).

⁴⁹⁰ *Id.* at B.1. The Constitutional Court also ruled that the Federal Administrative Court had improperly relied on provisions of treaties and documents that are not directly applicable in Austrian law, such as the Kyoto Protocol and the Paris Agreement. See *id.* at B.2(a).

⁴⁹¹ See generally Banda & Fulton at 10130.

⁴⁹² Corte Constitucional [C.C.] [Constitutional Court], Sala Plena, 8 Feb. 2016, Sentencia C-035/16, Demanda de Inconstitucionalidad Contra el Artículo 108 de la Ley 1450 de 2011, por la Cual Se Aprueba el Plan Nacional de Desarrollo 2010-2014; y Contra los Artículos 20, 49, 50 (parcial), 51, 52 (parcial) y el Parágrafo Primero (parcial) del Artículo 173 de la Ley 1753 de 2015, por la Cual Se Aprueba el Plan Nacional de Desarrollo 2014-2018 (Colom.).

⁴⁹³ *Id.* at ¶¶ 141–43, 149–50, 160 (describing ecosystem services provided by the *páramo*).

⁴⁹⁴ *Id.* at ¶¶ 141–43, 149–50, 156, 157.

protection.”⁴⁹⁵ The court struck down provisions of the law that would have permitted mining and fossil fuel operations even during a transitional period and established “a mechanism to guarantee the protection of the *páramo* ecosystem.”⁴⁹⁶ Specifically, it directed the Ministry of the Environment to follow science-based standards and to justify any departure from scientific expert advice by showing that the standards adopted would provide the greatest degree of protection for this ecosystem.⁴⁹⁷

In the second constitutional challenge, *Demanda Generaciones Futuras v. Minambiente*, a group of Colombian children and youth filed a *tutela* action (a legal mechanism to protect fundamental rights), in which they asked the court to protect their constitutional rights to life, a healthy environment, and to food and water by ordering the government to honor its commitment to tackle climate change.⁴⁹⁸ Specifically, plaintiffs asked the court to order the government to stop deforestation in the Colombian Amazon, which had increased by 44% between 2015 and 2016 despite the government’s promise to achieve net-zero deforestation by 2020. Plaintiffs also emphasized that future generations would suffer the worst effects of climate change.

The lower court ruled against the plaintiffs. In April 2018, the Supreme Court reversed, holding that all levels of government must create and implement plans within five months to stop deforestation in the Amazon. The Supreme Court further held that the Amazon itself enjoys legal rights and protection.⁴⁹⁹ The court ordered the Executive to create an “intergenerational pact for the life of the Colombian Amazon,” with the participation of the plaintiffs, affected communities, scientific organizations, and the public, in order to reduce deforestation to zero and mitigate emissions.⁵⁰⁰

Climate science was central to the plaintiffs’ case, and it was not contested by the State. The court began its analysis by noting that it needs to establish whether a “causal link” exists between climate change induced by a loss of the forest cover (due to an expansion of agricultural boundaries, narcotics production, and mining) and plaintiffs’ rights to a dignified life, food, and water.⁵⁰¹ In this regard, the court also made a number of climate findings. It found that drivers of deforestation in the Amazon constitute an “imminent and grave” danger not only for the plaintiffs but for all present and future generations of Colombians.⁵⁰² Beside other environmental harms, deforestation-caused

⁴⁹⁵ *Id.* at ¶¶ 160, 171–73.

⁴⁹⁶ *Id.* at ¶ 180.

⁴⁹⁷ *Id.* See also *id.* at ¶ 140. The Constitutional Court struck down the proposed delimitation for part of the area in a subsequent ruling in November 2017.

⁴⁹⁸ See *Demanda Generaciones Futuras v. Minambiente* (Future Generations v. Ministry of the Environment and Others), Corte Supreme de Justicia [C.S.J.] [Supt. Ct.], sala de casación civil, abril 5, 2019, M.P.: L.A. Tolosa Villabona, no. 11001-22-03-000-2018-00319-01 (Apr. 5, 2018) (Colom.).

⁴⁹⁹ *Id.* at ¶¶ 12, 14.

⁵⁰⁰ *Id.* at ¶ 14.

⁵⁰¹ *Id.* at ¶ 11.

⁵⁰² *Id.*

emissions are increasing the greenhouse effect, which is transforming the ecosystem, altering the hydrological cycle, and threatening water security.⁵⁰³ In its analysis, the court also considered scientific evidence and government reports outlining the temperature increases that Colombia would experience through 2100 as a result of deforestation.⁵⁰⁴ On this basis, the court concluded that Colombia had disregarded its international obligations and commitments undertaken pursuant to the Paris Agreement, as well as its domestic duties.⁵⁰⁵

3. India

India's courts have also considered climate change in several cases. The national Constitution does not protect a right to a decent environment or a stable climate, but courts have consistently interpreted the fundamental right to life and dignity as including such a right.⁵⁰⁶ Moreover, two constitutional amendments provide additional environmental protections.⁵⁰⁷

In view of these provisions, the National Green Tribunal acted *sua sponte* in ordering the State of Himachal Pradesh to take additional measures to protect the fragile Himalayan ecosystem.⁵⁰⁸ In 2014, the tribunal had considered a number of different sources of environmental harm to the region, including tourism, deforestation, vehicular emissions, and climate change and made a number of factual findings. For example, the tribunal noted that “40% of the glacial retreat could be attributed to Black Carbon [soot] impact and hence Black Carbon emission reduction can lead to near term impact on warming and thus reduce glacier melting.”⁵⁰⁹ With respect to climate change, the tribunal observed:

Global warming has a direct impact on environment and ecology of any zone. Global warming, a succession of hot summers through the 1980s seemed to bear out the conservationist's warning that the earth's climate was warming up. This global warming, if it is indeed the case, is a consequence of the large quantities of [CO₂] released into the atmosphere by industries, power stations and motor vehicles. The earth's temperature will rise, the polar caps will melt, raising sea levels and causing catastrophic

⁵⁰³ *Id.* at ¶¶ 11, 11.1.

⁵⁰⁴ *Id.* at ¶ 11.1.

⁵⁰⁵ *Id.* at ¶¶ 11.3, 13.1–13.4.

⁵⁰⁶ *See, e.g.,* M.C. Mehta v. Union of India (1998) 5 S.C.C. 206 (Sup. Ct.) (India) (treating government's failure to reduce Delhi air pollution as a violation of fundamental constitutional rights).

⁵⁰⁷ *See* Court on its own Motion v. State of Himachal Pradesh & Ors., Application No. 237 (THC)/2013, at ¶ 11 (Nat'l Green Trib. Feb. 6, 2014) (India) (ruling that “[t]he citizens of the country have a fundamental right to a wholesome, clean and decent environment.”). *See also id.* (noting that “the State is under a Constitutional obligation [under Article 48A] to protect and improve the environment and to safeguard the forest and wild life in the country,” and that “the Parliament, with an object of sensitizing the citizens of their duty, incorporated Article 51A in the Constitution, inter alia, requiring a citizen to protect and improve the natural environment including the forests, lakes, rivers and wild life and to have a compassion for living creatures.”).

⁵⁰⁸ *See id.*

⁵⁰⁹ *Id.* at ¶ 4.

flooding in low-lying areas and large areas of productive land will become desert. This global warming—heat—has affected various countries in the world. The glaciers on the Mount Blanc were melting causing slush; the impact of what keeps on happening in the solar atmosphere and the sun directly affects our planet, hence, there is a need to tackle global warming. Environmentalists present a grim picture of the effects of global warming with the mean temperature of the earth increased by about 1.6 degree Celcius. This is a declaration made at a Conference of Parties to the Framework Convention on Climatic Changes. Global warming represents the increase in the average temperature of earth’s near-surface air and oceans.

According to a statistical report from the World Meteorological Organisation, global temperature has registered an increase of more than 0.6 [degree] Celcius in the past 100 years. In the near future, contamination of underground and surface fresh water supplies is likely near coastal areas.

Global warming has its impacts in other parts of the world, as in the Indian sub-continent. It is likely to affect the glaciers. There will be early and untimely melting of ice resulting in various environmental issues. Rohtang Pass being one of the eco-sensitive and fragile areas of the glacier, is likely to get affected more than other areas. Thus, there is a need for evolving schemes and mechanism to take greater care of the glacier in the interest of environmental and ecological balance.⁵¹⁰

In a subsequent ruling, the tribunal held the public trust doctrine “imposes an obligation not only on the State but even at the public at large to maintain its natural assets in a condition in which it was received by them, if not in a better condition, to the next generation.”⁵¹¹ The tribunal cautioned that, if the State failed to comply with its orders, it “would be compelled to pass coercive orders, including stopping tourism activity in the coming season.”⁵¹²

In a separate proceeding, a nine-year-old plaintiff filed a petition before the National Green Tribunal in 2017 against the Union of India, asserting that the government had failed to fulfill its duties to mitigate climate change in violation of her constitutional rights, the public trust doctrine, and the principle of intergenerational equity.⁵¹³ The plaintiff asked the tribunal, inter alia, to prepare emissions targets or a carbon budget for the total amount of CO₂ emissions that India can release between now and 2050 so as to ensure that India shoulders its responsibility to achieve global climate stabilization and reduce atmospheric CO₂ to below 350 ppm by 2100.⁵¹⁴ In 2019, the tribunal dismissed the petition in a summary order without seemingly considering the evidence presented.⁵¹⁵

⁵¹⁰ *Id.* at ¶¶ 31–33 (internal citations omitted).

⁵¹¹ Court on its own Motion v. State of Himachal Pradesh & Ors., Application No. 237 (THC)/2013, at ¶¶ 7–8 (Nat’l Green Trib. May 12, 2016) (India).

⁵¹² *Id.*

⁵¹³ See Pandey v. Union of India & Ors., Application No. 187/2017 (Nat’l Green Trib. Jan. 15, 2019) (India).

⁵¹⁴ *Id.* at ¶ 1.

⁵¹⁵ *Id.* at ¶¶ 2–3 (stating that “[t]he issue of climate change is certainly a matter covered in the process of impact assessment” and holding that it is not “necessary to issue any direction” to the government and that there is “no reason to presume that Paris Agreement and other international protocols are not reflected in the policies of the Government of India or are not taken into consideration in granting environment clearances.”).

4. Ireland

Irish courts have taken a similar approach to their Dutch counterparts, making a series of findings on climate science. In a recent case, *Friends of the Irish Environment v. Ireland*, a nonprofit group sued the Irish government on the grounds that the country's 2017 National Mitigation Plan did not comply with Ireland's obligations under the Paris Agreement and violated the country's 2015 Climate Act, the Irish Constitution, and international human rights obligations.⁵¹⁶ Plaintiffs asked the court to direct the government to produce a more ambitious plan that would tackle climate risks, including flooding and fires.

Plaintiffs had presented a range of evidence to the court. For example, they provided a sworn affidavit averring that the science presented in IPCC's assessment reports is regarded as representing the overwhelming scientific consensus shared by the parties thereto, including Ireland.⁵¹⁷ The IPCC's Fifth Assessment Report (2014) (AR5), the court noted, "outlines in stark terms, the challenges and risks of climate change."⁵¹⁸ Plaintiffs also introduced other official reports, including peer-reviewed research by the World Bank, the International Energy Agency (IEA), and the UN Environmental Programme (UNEP).⁵¹⁹ The State accepted "that the veracity or accuracy of the science referred to in the applicant's affidavit is generally not in dispute," but contended that the proceeding centered on points of law.⁵²⁰

The Dublin High Court dismissed the challenge in September 2019. Mr. Justice Michael MacGrath observed that "[t]his has been a complex case involving very difficult issues of law and science" and that "[t]he threats posed by climate change and the international and national response thereto" were outlined in detail by both parties.⁵²¹ As in the majority of other such cases, climate science was not in doubt. As the court observed:

2. *The threat to the earth, its inhabitants and ecosystems, posed by the effects of climate change is well documented.* The need for action is undoubted. International treaties have been adopted. In 1988 the Intergovernmental Panel on Climate Change ("IPCC"), a scientific international body, was founded. It operates under the auspices of the United Nations and acts as an independent evaluator of published information about climate science. Within the IPCC there are a number of working groups which publish Assessment Reports ("AR"). These reports involve a thorough investigation and analysis of scientific knowledge of climate change, its impacts, risks and future options. A number of relevant reports have been referred to in these proceedings, in particular, AR4 in 2007, and AR5 in 2014. These have been described as the main sources of the undisputed scientific information about climate change. Special Reports ("SR") have also been produced on topics agreed by member governments, in particular a report known as SR15, which followed the Paris Agreement, 2015.

⁵¹⁶ See *Friends of the Irish Env't CLG v. Ireland* [2019] IEHC 747 (Sept. 19, 2019) (H. Ct.) (Ir.).

⁵¹⁷ *Id.* at ¶ 27.

⁵¹⁸ *Id.* at ¶ 28.

⁵¹⁹ *Id.* at ¶¶ 29–32.

⁵²⁰ *Id.* at ¶ 43.

⁵²¹ *Id.* at ¶ 76.

3. Measures have been taken within the European Union and, in this jurisdiction, the Oireachtas has enacted the aforesaid Act of 2015. The Environmental Protection Agency (“EPA”) has produced reports in September, 2017, on the state of knowledge on climate change impacts for Ireland and in December, 2018, dealing with emissions and emission projections in this country. The Climate Change Advisory Council, established under s. 8 of the Act of 2015, has also reported and reviewed the Plan.

4. *The scientific community agrees that global warming can be prevented, mitigated or reduced by ensuring the reduction of the emission of [GHGs] into the atmosphere but significant effort is required.* Adaptation measures may be also taken to counter the consequences of climate change. Further, the scientific community is attempting to develop measures to reduce existing levels of [CO₂] in the atmosphere. This case concerns the former i.e. the plan for mitigation measures.

5. It is self-evident that climate change is a problem of and for the global community. No one country, particularly that of the size of this State, can tackle the problem on its own. That however, does not lessen the requirement to do what is necessary to achieve scientifically advised targets. *This was recognised in The State of the Netherlands v. Urgenda Foundation (C/09/456689/ZA)*, where the court observed that, although a global problem which the State could not solve on its own:—“this does not release the State from its obligations to take measures in its territory within its capabilities which in concert with the efforts of other states provide protection from the hazards of dangerous climate change.”

Indeed, in the introduction to the Plan, it is acknowledged that climate change is already having diverse and wide-ranging impacts on Ireland’s environment, society and on economic and natural resources. Future impacts are predicted to include sea-level rise; more intense storms and rainfall; increased likelihood and magnitude of river and coastal flooding; water shortages in summer; increased risk of new pests and diseases; adverse impacts on water quality; and changes in the distribution and time of lifecycle events of plant and animal species on land and in the oceans. The plan also recognises the limited window for real action to ensure that current and future generations can live sustainably in a low carbon climate resilient world. Acknowledging that impacts will be felt unevenly, and the responsibility to support less developed countries in achieving objectives, nevertheless, it also states that the climate challenge cuts across all sectors of society.

6. *The information and studies opened to this court indicate that there is a relationship between cumulative emissions, temperature rises and global risks to the environment, risk of death, of injury and health particularly in low-lying coastal zones and small island developing states due to storm surges, coastal flooding and sea level rises.* There are also reported risks of mortality and morbidity during periods of extreme heat. Food systems may be at risk and there is a risk of loss of rural livelihoods and income. The more one proceeds to global warming of 2°C higher relative to the beginning of the Industrial Revolution the greater are such risks. AR5 indicates that there is evidence of a strong, consistent, almost linear relationship between cumulative [CO₂] emissions and projected global temperature change to 2100. Representative Concentration Pathways (“RCPs”) which are [GHG] concentration (not emission) pathways, were adopted in AR5. Risks have been identified in all such pathways. . . .

9. The evidence suggests that net negative [CO₂] emissions are required at some point during the century to stay within the 2°C limit. Such scenarios assume that [CO₂] removal technologies such as bioenergy, extensive reforestation and forest growth will be required. Negative emissions are likely to be expensive and technology remains untested. It is therefore submitted that any mitigation plan has to be one that is calculated to achieve substantial emission reductions in the short term and that the State is failing to do that is not controverted. Thus, it is argued that focusing on long-term reduction targets, will lead to early depletion of carbon budgets.

10. *Thus, the problem is clear. No party before this court disputes this. What is in dispute is whether the respondent and its Minister, in making and approving the plan, is doing enough to tackle the problem and,*

*if not, whether this gives rise to a breach of the Act and of the applicant's rights which the courts can entertain and enforce.*⁵²²

The Dublin High Court specifically adopted a number of climate facts laid out in the Dutch Court of Appeal's decision in *Urgenda* (discussed in Section IV.A above):

The court adopts that summary in which it was observed that since the beginning of the Industrial Revolution, mankind has consumed energy on a large scale. Such energy was predominantly generated by the combustion of fossil fuels which process produces [CO₂], some of which is released into the atmosphere where it remains for hundreds of years or perhaps longer. Some of the [CO₂] is absorbed by the oceanic and forest ecosystems. The capacity for absorption has declined due to deforestation and rising sea water temperatures. While [CO₂] is the main greenhouse gas, there are other contributory [GHGs], such as methane, nitrous oxide and fluorinated gases, which produce a different warming effect and degrade at a different rate. The greenhouse effect occurs when [CO₂], together with the other gases, traps the heat emitted by the earth in the atmosphere. The more [CO₂] emitted into the atmosphere, the more global warming becomes exacerbated. The climate system shows a delayed response to the emissions of [GHGs]. Thus, the full warming effect of gases which are emitted today will only become apparent 30 to 40 years from now. At the time of the decision in *Urgenda*, in October 2018, the level of global warming was at approximately 1.1°C higher relative to the beginning of the Industrial Revolution. The concentration of [GHGs], which is measured in parts per million ("ppm"), was approximately 401ppm. Global [CO₂] emissions have increased by 2% annually. Thus, global warming has continued. It was noted that for some time there had been a general consensus in the climate science and world communities that the rise in global temperature should not exceed 2°C. This is referred to as a safe temperature rise target. However, since the Paris Agreement, current scientific thinking is heading in the direction of a lower figure, perhaps somewhere in the region of 1.5°C. As was noted in *Urgenda*, if the concentration of [GHGs] has not exceeded 450ppm in the year 2100, there is a reasonable chance that the 2°C target will be achieved. A safe temperature rise target, not exceeding 1.5°C comes with the lower part per million level, 440ppm. Thus, with such a starting point in mind there is now limited room, or budget, known as a carbon budget, for [GHG] emissions. While the court in *Urgenda* observed the acknowledgement by the worldwide community that action is required to reduce the emission of such [GHGs], it also noted that urgency is differently assessed within the global community.⁵²³

Ultimately, the High Court held that the State did not violate plaintiffs' rights and that it has a certain margin of discretion in taking measures to mitigate climate change. Plaintiffs appealed the decision in November 2019.

In an earlier case, similar to the Austrian litigation, plaintiffs had challenged the proposed construction of an airport runway on the grounds that it would increase emissions and hasten the pace of climate change.⁵²⁴ The High Court made a number of findings of fact relating to climate change. Plaintiffs had presented evidence from the IPCC and a climate scientist concerning aviation emissions, which the court accepted.⁵²⁵ The court noted that IPCC's reports and the testimony "can in truth leave no doubt but that climate change poses a real and immediate risk to, at least, the bodily integrity of

⁵²² *Id.* at ¶¶ 2–10 (emphasis added).

⁵²³ *Id.* at ¶ 76.

⁵²⁴ *Friends of the Irish Env't CLG v. Fingal Cnty. Council* [2017] IEHC 695 (Nov. 21, 2017) (H. Ct.) (Ir.).

⁵²⁵ *Id.* at ¶ 244.

[applicants] . . . as well as to citizens more generally.”⁵²⁶ The court ultimately dismissed the suit for lack of standing, but it also significantly inferred a right to a healthy environment under the Irish Constitution.⁵²⁷

5. Norway

Norwegian courts have considered climate science in the context of domestic oil production. In 2016, for example, the Norwegian Government had awarded additional oil production licenses in the Barents Sea—the first opening to new exploration in the area in some 20 years. Two environmental groups sued, alleging a violation of their constitutional rights. Article 112 of the Norwegian Constitution provides that “every person has the right to an environment that is conducive to health” and that natural resources shall be managed based on long-term considerations which “will safeguard this right for future generations as well.”⁵²⁸ Plaintiffs argued that all emissions from these oil sources are relevant, including emissions derived from Norway’s oil and gas exports.⁵²⁹ The Oslo District Court rejected the claim.

The parties agreed that Article 112 covers “both (traditional) environmental harm and climate deterioration”—and the court did as well.⁵³⁰ However, the parties disagreed over whether Norway’s extraterritorial emissions—GHG emissions caused by combustion of Norwegian oil and gas *abroad*—are covered by Norway’s Constitution.⁵³¹ The court noted the difficulty of controlling what happens with oil and gas exports: while the State has means to reduce *national* emissions (through taxes or emissions allowances), these measures are not “available to Norwegian authorities for emissions from

⁵²⁶ *Id.*

⁵²⁷ *Id.* at ¶ 264, noting that

[a] right to an environment that is consistent with the human dignity and well-being of citizens at large is an essential condition for the fulfilment of all human rights. It is an indispensable existential right that is enjoyed universally, yet which is vested personally as a right that presents and can be seen always to have presented, and to enjoy protection, under Art. 40.3.1 of the Constitution. It is not so utopian a right that it can never be enforced. Once concretised into specific duties and obligations, its enforcement is entirely practicable. Even so, every dimension of the right to an environment that is consistent with the human dignity and well-being of citizens at large does not, for the reasons identified previously above, require to be apprehended and to be described in detail before that right can be recognised to exist. Concrete duties and responsibilities will fall in time to be defined and demarcated. But to start down that path of definition and demarcation, one first has to recognise that there is a personal constitutional right.

⁵²⁸ See *Greenpeace Nordic Ass’n & Nature and Youth v. Min. of Petroleum and Energy*, No. 16-166674TVI-OTIR/06, at ¶ 3.1 (Oslo Dist. Ct. Jan. 4, 2018) (Norway), at https://elaw.org/system/files/attachments/publicresource/OsloDistrictCt_20180104.pdf (unofficial translation).

⁵²⁹ *Id.*

⁵³⁰ *Id.* at ¶ 5.2.2.

⁵³¹ *Id.*

activities abroad.”⁵³² The court concluded that the constitutional duty to conduct an EIA, for example, “does not cover the possible effect of CO₂ emissions from exported oil and gas”⁵³³ Furthermore, the court reasoned that “[u]nder international law, each country is responsible for [GHG] emissions on its territory” and does not “have any duty to take measures to compensate for the effect from oil and gas exported to other countries.”⁵³⁴

The court thus examined possible effects from domestic emissions generated by the decision on Norway’s environmental protection and climate.⁵³⁵ The court emphasized the uncertainty of the oil reserves and the minuteness of Norway’s emissions.⁵³⁶ It found that the Government’s decision would mean “*only an extremely marginal increase of total Norwegian emissions*”⁵³⁷ The court also discussed other environmental impacts, including black carbon’s “great potential for harm in northern areas.”⁵³⁸ Black carbon (soot) is a short-lived climate pollutant—along with methane, tropospheric ozone, and hydrofluorocarbons (HFCs)—that is particularly damaging in the Arctic. The court examined the findings of a report that concluded that climate impacts from the new facilities would be “extremely small,” though that could change “if future emissions from vessel traffic and petroleum activities change composition.”⁵³⁹ In view of the evidence, the court concluded that the risk of environmental harm was “limited.”⁵⁴⁰

Plaintiffs also argued that the Norwegian government’s decision was inconsistent with the State’s obligations under the Paris Agreement and that burning the world’s oil and gas reserves would exceed the remaining carbon budget.⁵⁴¹ However, the court observed that these arguments were not relevant to its assessment of whether the decision had violated Article 112.⁵⁴² Ultimately, the court held that “the decision . . . does not violate Article 112. The risk of both (traditional) environmental

⁵³² *Id.*

⁵³³ *Id.*

⁵³⁴ *Id.* International law, however, also imposes an equally fundamental duty on States not to harm the environment of other States, but the court did not proceed to examine it. *See generally* Maria L. Banda, *Regime Congruence: Rethinking the Scope of State Responsibility for Transboundary Environmental Harm*, 103 MINN. L. REV. 1879 (2019).

⁵³⁵ *Id.* at ¶ 5.2.3. *See also id.* at ¶ 5.2.2 (noting that “[t]raditional environmental harm . . . involves possible harm to what are called particularly vulnerable areas, whereas climate deterioration is related to emissions of [GHGs], where CO₂ is the most important.”).

⁵³⁶ *Id.* at ¶ 5.2.3 (noting that Norwegian CO₂ emissions constitute 0.15% of global emissions in the world, of which 28% stems from the petroleum sector).

⁵³⁷ *Id.* (emphasis added).

⁵³⁸ *Id.*

⁵³⁹ *Id.*

⁵⁴⁰ *Id.*

⁵⁴¹ *Id.* at ¶ 5.2.4.

⁵⁴² *Id.* (“In part it is talk of possible impacts from the Decision that are too remote in relation to the risk that is relevant to assess, and in part the issues involve overall assessments that are better assessed through political processes that the courts are not suited to reviewing.”).

harm and climate deterioration as a result of the Decision is limited, and remedial measures are sufficient.”⁵⁴³

Plaintiffs have appealed, alleging that the district court erred in excluding emissions from the country’s oil and gas exports.⁵⁴⁴ The hearings before the Norwegian Court of Appeal thus far have included testimony from climate scientists to the effect that the world cannot stay within a safe carbon budget if all of the fossil fuel reserves are burned.⁵⁴⁵

6. Pakistan

Pakistan is one of the jurisdictions that does not have an express constitutionally-protected right to environmental quality, but where, as noted above, the courts have interpreted the fundamental right to life and dignity to include such a right. Climate change featured prominently in a recent case, *Leghari v. Pakistan*. There, Pakistani farmer Ashgar Leghari initiated public interest litigation arguing that inaction and delay by the federal and provincial governments in implementing Pakistan’s National Climate Change Policy and Framework (the Climate Framework) violated his constitutional rights to life and dignity.⁵⁴⁶ The Climate Framework provided for a range of adaptation actions in various sectors, including water, agriculture, and livestock.⁵⁴⁷ The government does not appear to have contested the underlying climate science (some of which was reflected in the Climate Framework): at issue was whether the State was complying with its own policy.⁵⁴⁸

In a groundbreaking decision in 2015, the Lahore High Court Green Bench instructed all levels of government to take immediate action to tackle the problem of climate change. In the first order, Judge Syed Mansoor Ali Shah described climate change as “a defining challenge of our time,” which has caused heavy floods and droughts in Pakistan, compromising water and food security.⁵⁴⁹ The court underscored that existing constitutional rights—including the rights to life, human dignity, property, and information, read together with the constitutional values of political, economic, and

⁵⁴³ *Id.* at ¶ 5.2.7.

⁵⁴⁴ See Press Release, Greenpeace, Greenpeace and Nature and Youth take the Norwegian Government to the Supreme Court (Feb. 5, 2018), <https://www.greenpeace.org/norway/pressemelding/544/greenpeace-and-nature-and-youth-take-the-norwegian-government-to-the-supreme-court/>.

⁵⁴⁵ See Dana Drugmand, *Norway: We Are Not Responsible for Climate Impacts of Burning Our Oil*, CLIMATE LIABILITY NEWS (Nov. 14, 2019) <https://www.climateliabilitynews.org/2019/11/14/norway-oil-climate-lawsuit-greenpeace/>.

⁵⁴⁶ See *Banda & Fulton* at 10123–24.

⁵⁴⁷ *Leghari v. Federation of Pakistan et al.*, W.P. No. 25501/2015, Order No. 2, at ¶ 10 (Lahore High Ct. Jud. Dep’t Sept. 14, 2015) (Pak.).

⁵⁴⁸ See *id.* at ¶ 11.

⁵⁴⁹ *Leghari v. Federation of Pakistan et al.*, W.P. No. 25501/2015, Order No. 1, at 6 (Lahore High Ct. Jud. Dep’t Sept. 4, 2015) (Pak.).

social justice—“provide the necessary judicial toolkit to address and monitor the Government’s response to climate change.”⁵⁵⁰

The court concluded that “the delay and lethargy of the State in implementing the Framework offends the fundamental rights of the citizens which need to be safeguarded.”⁵⁵¹ It directed the relevant government agencies to nominate a climate change “focal person” to ensure the implementation of the Framework and assist the court in overseeing its remedy, ordered them to provide a list of actionable priority items, and directed the establishment of a Climate Change Commission (CCC).⁵⁵²

The court issued the terms of reference and appointed the commission’s members in its second order, issued 10 days later, “to expedite the matter and to effectively implement the fundamental rights of the people of Punjab.”⁵⁵³ The CCC was instructed to file interim reports as and when directed by the court, which retained continuing jurisdiction over the matter.⁵⁵⁴ As the court observed in its second order,

For Pakistan, climate change is no longer a distant threat—we are already feeling and experiencing its impacts across the country and the region. The country experienced devastating floods during the last three years. These changes come with far-reaching consequences and real economic costs.⁵⁵⁵

The Lahore High Court treated plaintiff’s environmental public interest petition as a rolling review or as a continuing *mandamus* and a “writ of *kalikasan*” (following the Philippines’ practice); it reviewed a number of CCC reports and ordered additional implementation measures.⁵⁵⁶ In 2018, the court accepted the recommendation of the CCC Chairman to dissolve the Commission and pass the implementation duties to the Government.⁵⁵⁷ In the interim, the court ordered the creation of a Standing Committee on Climate Change to act as the link between the court and the Executive.⁵⁵⁸ Judge Shah also observed that “[c]limate justice is informed by science, responds to science and acknowledges the need for equitable stewardship of the world’s resources” and that a developing country like Pakistan is “predicted to bear the brunt of the effects of global warming.”⁵⁵⁹

⁵⁵⁰ *Id.* at 7.

⁵⁵¹ *Id.* at 8.

⁵⁵² *Id.* at 8(i)–(iii).

⁵⁵³ *Leghari*, Order No. 2, at I–II.

⁵⁵⁴ *Id.* at 11(VII).

⁵⁵⁵ *Id.* at ¶ 3.

⁵⁵⁶ *Leghari v. Federation of Pakistan et al.*, W.P. No. 25501/2015, at ¶ 4 (Lahore High Ct. Jan. 25, 2018) (Pak.).

⁵⁵⁷ *Id.* at ¶ 24 (noting that “Governments have to still implement the Framework, formulate the National Water Policy and ensure that the new Act is actualized and given effect to in letter and spirit.”).

⁵⁵⁸ *Id.* at ¶ 25.

⁵⁵⁹ *Id.* at ¶ 21.

7. Switzerland

In Switzerland, a constitutional petition was filed in November 2016 by a group of senior women alleging that the Swiss government's failure to adopt stronger mitigation targets and measures for 2020 and 2030 is a violation of their fundamental rights to life and health and the principles of precaution and sustainability under the Swiss Constitution, as well as their rights enshrined by the European Convention on Human Rights (ECHR).⁵⁶⁰ Since the Swiss legal system does not recognize a general right to popular action, the petitioners argued that they, as a group of older women between 70 and 90 years of age, were *particularly affected* by climate change (“most vulnerable group”) due to the impact of climate-induced heat waves on their health and life expectancy.⁵⁶¹ Among other things, the petition asked the government to adopt a mitigation target of at least 25% (to 40%) below 1990 levels by 2020 and at least 50% below 1990 levels by 2030.⁵⁶²

This Swiss Department of Environment, Transport, Energy, and Communications (DETEC) dismissed the petition in April 2017 on procedural grounds.⁵⁶³ Specifically, it determined that plaintiffs lacked standing under the Swiss Administrative Procedure Act⁵⁶⁴ and the ECHR.⁵⁶⁵ Climate science was not contested by the parties. At issue was the efficacy of climate measures adopted by the State. The agency reviewed Swiss climate policy and found that the measures adopted were already having an impact.⁵⁶⁶ Plaintiffs appealed.

In November 2018, the Swiss Federal Administrative Court dismissed the appeal, finding that Swiss senior women are not the sole population affected by climate impacts.⁵⁶⁷ The court made a number of findings on climate science, including that:

⁵⁶⁰ See Complaint, Verein KlimaSeniorinnen Schweiz et al. v. Switzerland (Nov. 25, 2016), http://klimaseniorinnen.ch/wp-content/uploads/2016/11/161124-Gesuch-um-Erlass-anfechtbarerVerfuegung_final.pdf. See generally Banda & Fulton at 10124.

⁵⁶¹ See *id.* at ¶¶ 1, 19–20.

⁵⁶² See *id.* at ¶¶ 145, 160.

⁵⁶³ See Verein KlimaSeniorinnen Schweiz et al. v. Switzerland (Apr. 26, 2017) (Switz.), at https://ainees-climat.ch/wp-content/uploads/2019/01/Verfuegung_UVEK_KlimaSeniorinnen.pdf, translated in http://blogs2.law.columbia.edu/climate-change-litigation/wp-content/uploads/sites/16/non-us-case-documents/2017/20170426_No.-A-29922017_order.pdf (unofficial translation).

⁵⁶⁴ The agency noted that the main goal of the petition is to reduce CO₂ emissions worldwide, such that “no individual legal positions are affected in the present case.” *Id.* at ¶ 1.2 (holding that the criterion of “being affected in rights or obligations” was not fulfilled).

⁵⁶⁵ The agency found that petitioners could not make a claim under the ECHR because the solution they were seeking (adoption of legislative measures to reduce emissions) concerns the protection of the general public, whereas “Article 13 ECHR permits only the review of a concrete state act in relation to an individual person.” *Id.* at ¶ 2.

⁵⁶⁶ See Verein KlimaSeniorinnen Schweiz et al. v. Switzerland, Bundesverwaltungsgericht [BVGE] [Fed. Admin. Ct.], Judgment A-2992/2017, at ¶ B (Nov. 27, 2018) (Switz.), at <https://klimaseniorinnen.ch/wp-content/uploads/2019/02/Judgment-FAC-2018-11-28-KlimaSeniorinnen-English.pdf> (unofficial translation).

⁵⁶⁷ See *id.* at ¶ 7.4.1.

Marked changes of both temperature and precipitation during the summer are expected as consequences of climate change. The average temperatures can be expected to increase further over the course of the 21st century across Switzerland, in all regions and seasons. At the same time, the average amounts of precipitation in the summer will probably decrease in all of Switzerland, whereas increasing precipitation in the winter months is to be expected. In addition to this change in average temperature and average precipitation, a change in the nature of extreme events is to be expected: warm periods and heat waves in the summer can be expected to be more frequent, more intense, and of longer duration, whereas in the winter, the number of nights with temperatures below freezing will decrease, especially on the Swiss Plateau. These factors in turn will have impacts, for example on the beginning of plant growth in the spring. In addition, the geographic range of carriers of disease and pathogens is changing

The impacts of climate change on people, animals and plants are hence of a general nature, even if not all are impacted equally. The adverse effects vary among different population groups in terms of economic and health impacts. For the population in cities and agglomerations, for example, heat waves are a health burden because of the formation of heat islands. Heat waves in the summer can put infants and small children at risk as well because of their susceptibility to dehydration, and high ozone levels due to the heat can bring about respiratory disorders and impairment of pulmonary function. In addition, the changed geographic range of carriers of disease such as ticks and mosquitoes will newly affect parts of the population which had previously not been exposed to such risks. Climate change, and in particular the associated change of average temperature and average amounts of precipitation also impact forestry, agriculture, winter tourism and water management, for example. In addition, because of the thawing permafrost, the danger of rockslides is increasing, and particularly in the winter, also the risk of flooding, debris flows and⁵⁶⁸

Since climate change adversely affects different groups in different ways, the court concluded that senior women are not “particularly affected.”⁵⁶⁹ The decision is on appeal before the Swiss Supreme Court.

8. European Union

In 2018, 36 individuals and families from eight countries (Portugal, Germany, France, Italy, Romania, Kenya, Fiji, and a youth association in Sweden) filed a case against the European Parliament and the Council of the EU, alleging that the EU’s emissions reduction targets (to reduce emissions 40% below 1990 levels by 2030) are inadequate and will not protect their fundamental rights to life, health, occupation, and property from the impact of climate change.⁵⁷⁰ Plaintiffs alleged that their present and future living conditions were adversely affected by climate change and filed reports from the World Bank and UNICEF showing the harm caused by heatwaves, especially for children.⁵⁷¹

⁵⁶⁸ *Id.* at ¶ 7.4.2.

⁵⁶⁹ *See id.* at ¶ 7.4.3. *See also id.* at ¶ 9 (dismissing action as an inadmissible *actio popularis*).

⁵⁷⁰ *See* Case T-330/18, *Carvalho et al. v. Parliament and Council (The People’s Climate Case)*, Gen. Ct. (Second Chamber) (May 8, 2019) (E.U.).

⁵⁷¹ *Id.* at ¶ 24.

EU defendants did not challenge the underlying climate science. Indeed, the EU had already taken a number of steps to mitigate climate change.⁵⁷² Rather, they argued that plaintiffs lacked standing: since climate change threatens all people, plaintiffs could not show that they were specifically harmed.⁵⁷³ The European General Court agreed and dismissed the case in May 2019.⁵⁷⁴ Here, the court did not question that climate change would affect the plaintiffs but explained that they had not met the standing test,

*It is true that every individual is likely to be affected one way or another by climate change, that issue being recognized by the European Union and the Member States who have, as a result, committed to reducing emissions. However, the fact that the effects of climate change may be different for one person than they are for another does not mean that, for that reason, there exists standing to bring an action against a measure of general application.*⁵⁷⁵

The plaintiffs appealed to the European Court of Justice in July 2019.

C. Statutory Law

In non-U.S. jurisdictions, as in the United States, courts have also considered climate science in statutory proceedings, many of which have involved permitting decisions and the quality of the government's analysis in environmental impact assessments or the government's implementation of national climate legislation. This section reviews some of those cases, including from Australia, New Zealand, and South Africa.

1. Australia

Australia, the world's fourth-largest coal producer, has seen numerous lawsuits filed in local courts challenging the approval of large-scale coal mining projects on climate and related grounds.⁵⁷⁶ Australian coal is primarily mined for export to overseas markets such as India and China, and plaintiffs have had to demonstrate, as a threshold matter, that extraterritorial emissions generated overseas from the burning of Australian coal were legally relevant. The Australian courts' consideration of basic climate science has evolved considerably in the timeframe covered by this report.⁵⁷⁷

⁵⁷² *See id.* at ¶¶ 2–12.

⁵⁷³ *Id.* at ¶¶ 25–29.

⁵⁷⁴ Under EU law, a natural or legal person may institute proceedings provided that the impugned act is of “direct and individual concern” to them. *See id.* at ¶ 34. Accordingly, plaintiffs have standing to contest an act only where there are “attributes that are peculiar to them or by reason of circumstances in which they are differentiated from all other persons, and by virtue of these factors distinguishes them individually.” *Id.* at ¶ 45.

⁵⁷⁵ *Id.* at ¶ 50 (emphasis added).

⁵⁷⁶ *See* Banda & Fulton at 10126.

⁵⁷⁷ *Compare* Xstrata Coal Queensland Pty Ltd. & Ors v. Friends of the Earth—Brisbane Co-op Ltd. & Ors & Dep't of Env't & Res. Mgmt. [2012] 33 LCR 79, at 503, 557–59 (Austl.) (rejecting climate challenge to approval of the Wandoan Coal Mine on the basis that judicial review of environmental impacts was legislatively limited to the physical activities

For example, in *Hancock Coal*, conservation groups and local ranchers had filed a challenge to the Alpha Coal Mine.⁵⁷⁸ The Land Court found that emissions from transportation and burning of coal from the mine—which would account for as much as 0.16% of global emissions through the burning of 30 million tons of coal per year—were “both real and of concern.”⁵⁷⁹ Nonetheless, the court rejected the climate-based objection on statutory grounds⁵⁸⁰ and made findings of fact, in the alternative, that the mine would not detrimentally affect global emissions.⁵⁸¹

The Supreme Court of Queensland upheld the lower court’s factual findings.⁵⁸² However, it also recognized that “environmental harm that might be caused by another coal mine somewhere else” might well be relevant under state environmental laws.⁵⁸³ Two judges of the Court of Appeal affirmed this interpretation.⁵⁸⁴ As Justice Margaret McMurdo explained, the state’s “environment is part of and affected by the global environment. Harmful global [GHG] emissions from the transportation and burning of coal after its removal clearly has the potential to harm Queensland’s environment.”⁵⁸⁵

In another proceeding, public interest groups argued that the approval of the Carmichael Coal Mine, an open-cut and underground coal mine approved until 2090, was inconsistent with Australia’s environmental legislation and international obligation to protect the Great Barrier Reef, a World Heritage Site, which would be harmed by increased ocean temperature and acidification from climate change.⁵⁸⁶

The Federal Court of Australia dismissed the challenge in 2016, accepting the government’s conclusion that the mine would not have a relevant “impact” on the Great Barrier Reef. The parties did not dispute basic climate science. For example, in issuing the permit, the government had quantified three categories of GHG emissions: Scope 1 emissions created by the proposal, Scope 2

associated with the process of extracting coal and did not encompass effects from overseas use and, in any event, denial of license would have “no impact on climate change” because it would not reduce the global demand for coal), *and Gloucester Resources Ltd. v. Minister for Planning* [2019] NSWLEC 7 (NSW Land & Env’t Ct.) (Austl.) (denying permit due to, inter alia, emissions considerations).

⁵⁷⁸ *Hancock Coal Pty Ltd. v. Kelly & Dep’t of Env’t & Heritage Prot.* [No. 4] [2014] Q.L.C. 12 (Austl.).

⁵⁷⁹ *Id.* at 209, 227. By contrast, the court found that extraction-related emissions associated with the proposed mine were “infinitesimal” as a percentage of global emissions—0.002%. *Id.* at 208.

⁵⁸⁰ *Id.* at 216.

⁵⁸¹ *Id.* at 229–31 (finding that global emissions from transporting and burning coal would not fall if the mine did not proceed “as the coal will simply be sourced from somewhere else . . . [I]t is the demand for coal-fired electricity, and not the supply of coal from coal mines, which is at the heart of the problem.”).

⁵⁸² See *Coast & Country Ass’n of Queensland Inc. v. Smith & Anor*; *Coast & Country Ass’n of Queensland Inc. v. Minister for Env’t & Heritage Prot. & Ors* [2015] Q.S.C. 260 (Queensl. Sup. Ct.) (Austl.).

⁵⁸³ *Id.* at 40, 45–46.

⁵⁸⁴ *Coast & Country Ass’n of Queensland Inc. v. Smith & Ors* [2016] Q.C.A. 242 at 1, 11–13 (Queensl. Ct. App.) (*per* McMurdo JA). See also *id.* (*per* Fraser JA), at 42–46.

⁵⁸⁵ *Id.* at 3.

⁵⁸⁶ See *Australian Conserv. Found. Inc. v. Minister for the Env’t* [2016] F.C.A. 1042 (Fed. Ct.) (Austl.).

emissions generated by the energy required to carry out the proposal; and Scope 3 (overseas) emissions from burning the coal. However, the government concluded that Scope 1 and Scope 2 emissions could be dealt with locally, while overseas emissions, which were “not a direct consequence of the proposed action,” should be addressed overseas. As the court observed, “[i]t was common ground that the relevant events or circumstances here relating to combustion emissions were the physical effects associated with climate change, particularly increased ocean temperature and ocean acidification as well as more extreme weather events.”⁵⁸⁷ However, such “events and circumstances can only be an ‘impact’ if Adani’s action is a substantial cause of those events or circumstances.”⁵⁸⁸ Ultimately, the court agreed with the government that any specific impact on the climate was too speculative.⁵⁸⁹ The court also accepted the government’s submission that any direct or consequential emissions associated with the mine would be “managed and mitigated through national and international emissions control frameworks both in Australia and in overseas countries to which Adani’s coal would be exported.”⁵⁹⁰

The full Federal Court dismissed the appeal in 2017.⁵⁹¹ In upholding the decision below, the court referred to a series of climate facts that the government itself had established, including that “[GHG] emissions pose an existential threat to the Reef,” “the extent and persistence of such impacts depend to a large degree on how effectively the issue of rising levels of [GHGs] is addressed worldwide”; “the transportation and combustion overseas of the coal to be mined, would produce substantial quantities of [GHGs]”; and “those overseas emissions would be indirect consequences of the Proposal.”⁵⁹² However, the court ruled that the government had properly discharged its statutory duty by having taken “into account the possible impacts of the overseas emissions on the level of [GHGs] in the atmosphere, the consequences thereof and their impact on the Reef and on the protected matters.”⁵⁹³

A different outcome was obtained relative to the Rocky Hill Coal Project—the first case in which an Australian court refused to approve a new coal-mining project to prevent, *inter alia*, a new source of emissions.⁵⁹⁴ In 2017, a mining company, Gloucester Resources Ltd., appealed New South

⁵⁸⁷ *See id.* at 158.

⁵⁸⁸ *See id.* at 159.

⁵⁸⁹ *See id.* at 158–62 (accepting the government’s argument that the quantity of overseas emissions was subject to a range of variables such that it was not possible to draw firm conclusions as to the likely contribution of Adani’s action to a specific increase in global temperature and, by extension, to any possible environmental impacts, including the Reef).

⁵⁹⁰ *See id.* at 164–65 (citing the minister’s statement of reason, which explained that international agreements like the UNFCCC and the Kyoto Protocol provide mechanisms to address climate change globally, such that “the nations responsible for burning the coal produced from the proposed mine would be expected to address the emissions from transport by rail, shipping and combustion of the product coal in their own countries”).

⁵⁹¹ *Australian Conservation Found. Inc. v Minister for the Env’t and Energy* [2017] FCAFC 134 (Fed. Ct.) (Austl.).

⁵⁹² *See id.* at ¶ 60.

⁵⁹³ *See id.* at ¶ 61 (noting that “[t]here may be good grounds for disagreeing with the Minister’s decision, but that is not our concern in an appeal limited to the lawfulness of that decision”).

⁵⁹⁴ *Gloucester Resources Ltd. v. Minister for Planning* [2019] NSWLEC 7 (NSW Land & Env’t Ct.) (Austl.).

Wales’s denial of its application to construct an open-cut coal mine, which was expected to produce 2.5 million tons of coal annually over a 21-year period.⁵⁹⁵ A local community group joined the litigation in support of the Government’s denial. The two argued, inter alia, that the proposed project was not in the public interest because “it is contrary to the principles of ecologically sustainable development because the direct and indirect [GHG] emissions of the mine will contribute to climate change.”⁵⁹⁶

Climate science was not in dispute between the parties. The company, for example, “did not contest that climate change is real and happening and that anthropogenic GHG emissions must be reduced rapidly in order to meet the internationally agreed temperature targets of 1.5°C or 2°C. GRL did, however, contest that the Rocky Hill Coal Project needs to be prevented in order to achieve these temperature targets.”⁵⁹⁷ The company argued that there is nothing in the law to specify that Australia’s Nationally Determined Contribution (NDC) emission reductions must be achieved by denying new coal mines.⁵⁹⁸ It further contended that indirect emissions were not relevant to the analysis and that the carbon budget approach was not dispositive.⁵⁹⁹ Both sides marshalled expert evidence.

The Land & Environment Court of New South Wales upheld the denial of the application.⁶⁰⁰ After weighing the mine’s costs and benefits, including its climate impacts and direct and indirect GHG emissions, Chief Justice Brian Preston ruled that the project was not in the public interest under Section 4.15(1) of the Environmental Planning & Assessment Act (EPA Act).⁶⁰¹ The court held that *both* upstream and downstream emissions should be considered because the EPA Act and its regulations require consideration of “the principles of ecologically sustainable development,” including climate impacts.⁶⁰² Chief Justice Preston cited, inter alia, foreign courts’ consideration of climate impacts.⁶⁰³

⁵⁹⁵ *Id.* at ¶¶ 10, 12.

⁵⁹⁶ *Id.* at ¶ 24.

⁵⁹⁷ *Id.* at ¶ 451. The climate argument was primarily presented by the community group. *See id.* at ¶ 57 (“The Minister’s principal contention as to why the [Project] should be refused was the incompatibility of the proposed mine with other land uses in the vicinity”).

⁵⁹⁸ *Id.* at ¶ 453.

⁵⁹⁹ *Id.* at ¶¶ 454–55.

⁶⁰⁰ *Id.* at ¶ 8 (emphasis added) (finding that “[t]he mine will have significant adverse impacts on the visual amenity and rural and scenic character of the valley, significant adverse social impacts on the community and particular demographic groups in the area, and significant impacts on the existing, approved and likely preferred uses of land in the vicinity of the mine. *The construction and operation of the mine, and the transportation and combustion of the coal from the mine, will result in the emission of [GHGs], which will contribute to climate change.* These are direct and indirect impacts of the mine.”). *See also, e.g., id.* at ¶¶ 86, 89, 123, 351, 556.

⁶⁰¹ *See id.* at ¶ 422 et seq.

⁶⁰² *See id.* at ¶¶ 486–88.

⁶⁰³ *See id.* at ¶¶ 507–13 (citing, inter alia, conclusions reached by U.S. courts).

The court further found that all GHG emissions—direct and indirect—contribute to climate change:

All of the direct and indirect GHG emissions of the Rocky Hill Coal Project will impact on the environment. All anthropogenic GHG emissions contribute to climate change. As the IPCC found, most of the observed increase in global average temperatures is due to the observed increase in anthropogenic GHG concentrations in the atmosphere. The increased GHG concentrations in the atmosphere have already affected, and will continue to affect, the climate system. . . .

It matters not that this aggregate of the Project’s GHG emissions may represent a small fraction of the global total of GHG emissions. The global problem of climate change needs to be addressed by multiple local actions to mitigate emissions by sources and remove GHGs by sinks.⁶⁰⁴

The court specifically reaffirmed this finding in the context of the proposed project, relying in particular on expert evidence showing that achieving the goals of the Paris Agreement “implies phasing out fossil fuel use [by the second half of this century]” and therefore leaving “most fossil fuel reserves . . . in the ground, unburned, to remain within the carbon budget and achieve the long term temperature goal.”⁶⁰⁵ The court rejected petitioner’s arguments to the contrary, such as possibility of abatement, market substitution, and carbon leakage, and ruled against the project.⁶⁰⁶ The company did not appeal.

2. New Zealand

In New Zealand’s leading climate case, *Thompson v The Minister for Climate Change Issues*, a law student challenged two decisions relating to the country’s targets for reducing GHG emissions.⁶⁰⁷ Plaintiff argued that the Government should have reviewed New Zealand’s 2050 target, adopted under domestic legislation, following the release of the IPCC’s Fifth Assessment Report (AR5).⁶⁰⁸ Plaintiff further argued that the 2030 target in New Zealand’s NDC (communicated to the UNFCCC Secretariat pursuant to New Zealand’s obligations under the Paris Agreement) was deficient.⁶⁰⁹

The parties only differed on whether the Government’s response to climate change was amenable to judicial review; the basic conclusions of climate science were not in dispute. As Justice Jillian Mallon noted, “[i]t is common ground that climate change presents significant risks and that serious and prompt global action is required if dangerous consequences for the planet and its inhabitants are to be

⁶⁰⁴ See *id.* at ¶¶ 514–15 (referring to expert evidence).

⁶⁰⁵ See *id.* at ¶ 527.

⁶⁰⁶ See *id.* at ¶ 688 (finding “that the negative impacts of the Project, including the planning impacts on the existing, approved and likely preferred land uses, the visual impacts, the amenity impacts of noise and dust that cause social impacts, other social impacts, and climate change impacts, outweigh the economic and other public benefits of the Project.”).

⁶⁰⁷ *Thompson v The Minister for Climate Change Issues* [2017] NZHC 733 (High Ct. Nov. 2, 2017) (N.Z.).

⁶⁰⁸ See *id.* at ¶¶ 73–74.

⁶⁰⁹ See *id.* at ¶¶ 99–100.

prevented.”⁶¹⁰ The Government accepted a series of facts concerning the causes, impacts, and consequences of climate change pleaded by the plaintiff, as set out in the AR5.⁶¹¹ The court described the AR5 as “the most comprehensive assessment of scientific knowledge on climate change”⁶¹² and recited a series of details from the AR5 “about the emissions levels that will have dangerous and irreversible consequences for the earth and its inhabitants and the global mitigation efforts required to avert this (the defendant accepts these matters).”⁶¹³ The court also summarized evidence about climate science presented by the parties’ experts, including areas of scientific uncertainty, such as the extent to which ice sheet loss will contribute to sea level rise.⁶¹⁴

With respect to the 2050 target, the court ruled that the Government has a statutory duty to review (though not necessarily revise) the target when new IPCC reports are released:

The IPCC reports provide the most up to date scientific consensus on climate change. New Zealand accepts this. To give effect to the [Climate Change Response] Act and what New Zealand has accepted, recognised and committed to under the international instruments, and in light of the threat that climate change presents to humankind and the environment, I consider the publishing of a new IPCC report requires the Minister to consider whether a target set under s 224 should be reviewed. That is, it is a mandatory relevant consideration in whether an existing target should be reviewed under s 224(2). The Minister must therefore consider whether information in an IPCC report materially alters the information against which an existing target was set. If it does, a review of the target must be undertaken. That review may or may not lead to a decision to amend an existing target or to set additional targets, depending on the outcome of the review process undertaken.⁶¹⁵

However, the court did not proceed to make any order directing a review of the 2050 target in light of the recently elected Government’s announced intentions to change the target.⁶¹⁶

With respect to the 2030 target, the Government argued that the issue was non-justiciable. The court observed that its power to review the NDC arises from the common law since the 2030 target was not set under domestic legislation⁶¹⁷ and proceeded to review how courts in other jurisdictions have considered the justiciability of government action or inaction on climate change.⁶¹⁸ Based on its review of foreign judicial pronouncements, the court concluded that “it may be

⁶¹⁰ *Id.* at ¶ 2 (emphasis added). *See also id.* at 4 (citing the minister’s affidavit who “accepted the global scientific consensus on climate change as set out in the [AR5]. It is not in doubt that climate change is a global issue that needs to be addressed seriously and promptly by all states if global warming is to be kept at less than 2°C. An increase of more than 2°C would be dangerous.”).

⁶¹¹ *See id.* at ¶ 8.

⁶¹² *Id.* at ¶ 10.

⁶¹³ *See id.* at ¶ 11.

⁶¹⁴ *See id.* at ¶¶ 12–17.

⁶¹⁵ *Id.* at ¶ 94.

⁶¹⁶ *See id.* at ¶¶ 98, 178.

⁶¹⁷ *See id.* at ¶ 101.

⁶¹⁸ *See id.* at ¶¶ 105–32 (discussing, inter alia, *Massachusetts v. EPA*, *Juliana v. United States*, and *Urgenda Foundation v. The Netherlands*).

appropriate for domestic courts to play a role in Government decision making about climate change policy.”⁶¹⁹ As the court stated,

The courts have not considered the entire subject matter is a ‘no go’ area, whether because the state had entered into international obligations, or because the problem is a global one and one country’s efforts alone cannot prevent harm to that country’s people and their environment, or because the Government’s response involves the weighing of social, economic and political factors, or because of the complexity of the science. *The courts have recognised the significance of the issue for the planet and its inhabitants and that those within the court’s jurisdiction are necessarily amongst all who are affected by inadequate efforts to respond to climate change.* The various domestic courts have held they have a proper role to play in Government decision making on this topic, while emphasising that there are constitutional limits in how far that role may extend. The IPCC reports provide a factual basis on which decisions can be made. Remedies are fashioned to ensure appropriate action is taken while leaving the policy choices about the content of that action to the appropriate state body.⁶²⁰

Ultimately, the court was not persuaded that the Government had made any reviewable error in setting the NDC that would warrant judicial intervention.⁶²¹

3. South Africa

South African courts have also considered climate science in their review of permitting decisions. In 2015, South Africa’s Department of Environmental Affairs (DEA) authorized construction of a new 1200MW coal-fired power station in the Limpopo Province pursuant to Section 24 of the National Environmental Management Act (NEMA). The power station was intended to be in operation until at least 2061. After the Minister of Environmental Affairs upheld the decision, an environmental group sought judicial review of the grant and the Minister’s appeal decision.⁶²² Plaintiff argued, *inter alia*, that the agency had failed to consider the power station’s climate impacts in the EIA, as required under Section 24(1) of NEMA.⁶²³

The dispute in *EarthLife Africa* centered on whether the government could issue an environmental authorization before knowing the outcome of the climate impact assessment.⁶²⁴ The government did not contest the reality of climate change, or the fact that “coal-fired power stations

⁶¹⁹ *See id.* at ¶ 133.

⁶²⁰ *Id.* (emphasis added).

⁶²¹ *See id.* at ¶¶ 138 et seq. (discussing economic modelling, climate impacts on Tokelauans, and the insufficiency of NDCs submitted under the Paris Agreement). *See also id.* at ¶ 179.

⁶²² *See EarthLife Africa Johannesburg v. Minister of Env’tl. Affairs & Others* (65662/16) [2017] 2 All SA 519 (GP) (High Ct. Mar. 8, 2017) (S. Afr.).

⁶²³ *Id.* at ¶¶ 4–5.

⁶²⁴ *See, e.g.*, at ¶ 16 (noting the Government’s argument that there is no provision in domestic legislation or international law requiring that a climate change assessment must be conducted before the grant of an environmental authorization and that “South Africa’s international obligations to reduce GHG emissions . . . fall within the government’s discretion” and that “the government is taking steps to address the issue of climate change and is in the process of developing a complex set of mitigation measures.”).

are heavy GHG emitters.”⁶²⁵ Indeed, in the appeal decision, the Minister recognized that climate impacts of the proposed power-station were not “comprehensively assessed and/or considered” prior to the issuance of the environmental authorization and thus inserted an extra condition requiring the developer to undertake a “climate change impact assessment prior to the commencement of the project.”⁶²⁶ However, the government maintained that the project’s contribution to GHG emissions would be “relatively small” in the national and global context and that its indirect impacts would be “low.”⁶²⁷

The High Court in Pretoria made a number of findings relating to climate change, including that:

25. South Africa is significant contributor to global GHG emissions as a result of the significance of mining and minerals processing in the economy and our coal-intensive energy system. Coal is an emissions-intensive energy carrier and coal-fired power stations emit significant volumes of GHGs, which cause climate change. Coal-fired power stations are the single largest national source of GHG emissions in South Africa. South Africa is therefore particularly vulnerable to the effects of climate change due to our socio-economic and environmental context. Climate variability, including the increased frequency and intensity of extreme weather events will be consequential for society as a whole. South Africa is moreover a water-stressed country facing future drying trends and weather variability with cycles of droughts and sudden excessive rains. *Coal-fired power stations thus not only contribute to climate change but are also at risk from the consequences of climate change.* As water scarcity increases due to climate change, this will place electricity generation at risk, as it is a highly water intensive industry.

26. Be that as it may, coal-fired power stations are an essential feature of government medium-term electricity generation plans. . . . [T]he [National Climate Change Response White Paper of 2012] expressly recognizes that South Africa’s reliance on coal for electricity generation will continue to be a significant contributor to GHG emissions. A shift to low-carbon electricity generation options will only be possible in the medium term, and not immediately. Consequently, South Africa’s GHG emissions are expected to increase and peak in the short term, before plateauing and declining over time.⁶²⁸

The court also observed that development of coal-fired power plants is not inconsistent with South Africa’s international obligations, as the NDC that South Africa submitted under the Paris Agreement expressly anticipates the establishment of further coal-fired power stations and an increased emission rate until 2020.⁶²⁹

Further, in considering whether climate impacts had to be considered in granting the environmental authorization, the court observed:

A plain reading of . . . NEMA confirms that climate change impacts are indeed relevant factors that must be considered. The injunction to consider any pollution, environmental impacts or environmental degradation logically expects consideration of climate change. *All the parties accepted in argument that the emission of GHGs from a coal-fired power station is pollution that brings about a change in the*

⁶²⁵ *Id.* at ¶ 17.

⁶²⁶ *See id.* at ¶¶ 7–8.

⁶²⁷ *Id.* at ¶ 51.

⁶²⁸ *Id.* at ¶¶ 25–26 (emphasis added).

⁶²⁹ *See id.* at ¶ 35.

environment with adverse effects and will have such an effect in the future. All the relevant legislation and policy instruments enjoin the authorities to consider how to prevent, mitigate or remedy the environmental impacts of a project and this naturally, in my judgement, entails an assessment of the project's climate change impact and measures to avoid, reduce or remedy them.⁶³⁰

The court also noted the duty to interpret legislation in accordance with South Africa's Bill of Rights, including "the fundamental justiciable environmental right in section 24 of the Constitution."⁶³¹ In that regard, the court stated that

Section 24 recognises the interrelationship between the environment and development. Environmental considerations are balanced with socio-economic considerations through the ideal of sustainable development. This is apparent from section 24(b)(iii) which provides that the environment will be protected by securing ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. *Climate change poses a substantial risk to sustainable development in South Africa. The effects of climate change, in the form of rising temperatures, greater water scarcity, and the increasing frequency of natural disasters pose substantial risks.* Sustainable development is at the same time integrally linked with the principle of intergenerational justice requiring the state to take reasonable measures protect the environment 'for the benefit of present and future generations' and hence adequate consideration of climate change. Short-term needs must be evaluated and weighed against long-term consequences.⁶³²

The court held that under NEMA climate impacts of coal-fired power stations are relevant factors that must be considered before granting environmental authorization,⁶³³ and that the Government had acted irrationally in concluding, without a full assessment, that the project's climate impacts would be relatively small.⁶³⁴

CONCLUSION

This report opened with the following question: how are courts and litigants generally dealing with questions of climate science? It answers the question rather definitively: with remarkable consistency, U.S. and foreign courts are treating as valid and authoritative the science that says that the climate is warming, that human activity is driving the observed and anticipated changes, and that those changes will have a variety of adverse impacts in the United States and globally.⁶³⁵

⁶³⁰ *Id.* at ¶ 78.

⁶³¹ *Id.* at ¶ 81.

⁶³² *Id.* at ¶ 82 (emphasis added).

⁶³³ *Id.* at ¶ 91.

⁶³⁴ *Id.* at ¶ 101. *See also id.* at ¶ 116.

⁶³⁵ As discussed above, courts have described evidence of climate change as "compelling," "voluminous," and "overwhelming." *See, e.g.,* Juliana v. United States, No. 18-36082, slip op. at 15 (9th Cir. Jan. 17, 2020) (stating that plaintiffs have compiled an "extensive record" which "leaves little basis for denying that climate change is occurring at an increasingly rapid pace"); *State v. Ward*, 438 P.3d 588, 592 (Wash. Ct. App.); *In re Vienna-Schwechat Airport Expansion*, Bundesverwaltungsgericht [BVwG] [Fed. Admin. Ct.], Feb. 2, 2017, No. W109 2000179-1/291E (Austria). Courts have in turn characterized the dangers posed by climate change as "imminent and grave," "real and immediate," and "substantial." *See, e.g.,* *Demanda Generaciones Futuras v. Minambiente* (Future Generations v. Ministry of the

Moreover, despite the opportunities that advocates and courts themselves have had to entertain or advance the skeptical view challenging these climate science basics, in the period covered by this report, there have been very few instances in which skeptical arguments have been made in court and no judicial decision that gives any credence to those arguments. Rather, the cascade of judicial pronouncements since 2015 has increasingly treated climate science as being beyond reasonable dispute. This is a major change from a decade ago, when *Massachusetts v. EPA* was decided.⁶³⁶ This judicial consensus, however, has not translated into judicial intervention in most of the cases brought to date. At the appellate level, the judiciary, especially in the United States, has exercised restraint, largely deferring to the representative branches of government to bring forward solutions to the climate challenge.

The report also shows that the courts' engagement with climate science has generally been detailed, comprehensive, and thoughtful. Courts have struggled with scientific uncertainty in relatively few areas, such as long-term projections and localized impacts, which rely on complex modelling and assumptions,⁶³⁷ and have in such cases generally deferred to agency expertise when supported by the best scientific data. However, climate science is rapidly evolving, and the area of scientific uncertainty shrinking.⁶³⁸

Equally, as the discussion above indicates, skepticism about climate science that is frequently encountered in the public debate has not characterized the litigants' arguments in court—even litigants whose legal interests might be served by making such claims. This could be understood in three different ways. First, it could reflect the operation of the ethics-based filter that counsel must honor. As discussed above, counsel are officers of the court, and their special duties of candor require them to preserve the integrity of the judicial process. As such, counsel may be reluctant to make skeptical factual arguments because they are too infirm to advance in court. Second, in some circumstances, the litigants themselves could be making a political judgment not to advance skeptical claims for fear of reputational impact, or to avoid an adverse judgment or precedent.⁶³⁹ Finally, as the analysis also shows, U.S. federal agencies have generated a vast amount of climate data in carrying out their

Environment and Others), Corte Suprema de Justicia [C.S.J.] [Supt. Ct.], sala de casación civil, abril 5, 2019, M.P.: L.A. Tolosa Villabona, no. 11001-22-03-000-2018-00319-01 (Apr. 5, 2018) (Colom.); Friends of the Irish Env't CLG v. Fingal Cnty. Council [2017] IEHC 695 (Nov. 21, 2017) (H. Ct.) (Ir.); *EarthLife Africa Johannesburg v. Minister of Envtl. Affairs & Others* (65662/16) [2017] 2 All SA 519 (GP) (High Ct. Mar. 8, 2017) (S. Afr.).

⁶³⁶ See *supra* note 394 and accompanying text.

⁶³⁷ See USGCRP, THE FOURTH NATIONAL CLIMATE ASSESSMENT, *supra* note 8, at 41 (explaining that, despite “inherent uncertainty in climate science,” “there is high confidence in our understanding of the greenhouse effect and the knowledge that human activities are changing the climate in unprecedented ways. There is enough information to make decisions based on that understanding.”).

⁶³⁸ See *id.* at 65–68 (noting that “our understanding of and experience with climate science, impacts, risks, and adaptation in the United States have grown significantly since [the last report], advancing our knowledge of key processes in the earth system, how human and natural forces are changing them, what the implications are for society, and how we can respond” and identifying areas of key scientific advances, such as detection and attribution of the human influence for individual climate and weather extreme events, and localized information on climate impacts).

⁶³⁹ See, e.g., *supra* note 383 and accompanying text.

statutory duties, such that the administrative records and findings issued by the federal government have provided a key source of data on climate science in U.S. courts (as well as in foreign courts). This evidence has served to limit the scope of plausible arguments that federal defendants and other litigants could raise in court—or that courts could find persuasive.

If there is a judicial consensus on climate science in the U.S. and internationally, as this report finds, this raises a further question: should judicial fact-finding on climate science be more influential in the public conversation about the subject? There are several reasons why the answer to this question should be “yes.”

The courts remain among the most respected and trusted of public institutions.⁶⁴⁰ As discussed above, they are also a setting that demands fidelity to facts and truth, and where there is meaningful accountability for veracity that helps push judicial process towards the best view of operative facts.⁶⁴¹ Courts thus have an important role to play in a democratic society in separating fact from fiction. Their conclusions about climate science could serve an important public education role, and thus help move public consensus to align more fully with the emerging judicial consensus. Moreover, while visibly alarmed by the findings of climate science and often critical of the political branches’ response, as the report shows, U.S. courts have largely been deferential to the representative branches of government for purposes of fashioning solutions. Greater understanding of how the courts are crunching climate facts might also help increase leadership accountability and spur the political branches to action, to the extent that it can help overcome the distortions that serve to impede the sense of urgency needed for the very political solutions for which the courts are waiting.⁶⁴²

⁶⁴⁰ In the United States, “[t]rust in the judicial branch has consistently been the highest of the three branches” of federal government. See Megan Brenan, *Trust in U.S. Legislative Branch 40%, Highest in Nine Years*, GALLUP (Oct. 1, 2018), <https://news.gallup.com/poll/243293/trust-legislative-branch-highest-nine-years.aspx>. However, confidence in public institutions, including courts, has been declining. See *id.*

⁶⁴¹ See *supra* § I.A.1. Continued public trust in the judiciary, in turn, depends on the courts’ faithful performance of their duties. See, e.g., ADMINISTRATIVE OFFICE OF THE U.S. COURTS, STRATEGIC PLAN FOR FEDERAL JUDICIARY: ISSUE 7: ENHANCING PUBLIC UNDERSTANDING, TRUST, AND CONFIDENCE (2015), <https://www.uscourts.gov/statistics-reports/issue-7-enhancing-public-understanding-trust-and-confidence> (noting that “[t]he ability of courts to fulfill their mission and perform their functions is based on the public’s trust and confidence in the system. In large part, the judiciary earns that trust and confidence by faithfully performing its duties, adhering to ethical standards, and effectively carrying out internal oversight, review, and governance responsibilities.”).

⁶⁴² *Cf.* *Juliana v. United States*, No. 18-36082, slip op. at 15 (9th Cir. Jan. 17, 2020) (noting that “it will be increasingly difficult in light of that [evidentiary] record for the political branches to deny that climate change is occurring, that the government has had a role in causing it, and that our elected officials have a moral responsibility to seek solutions.”).



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