ELR®

August 2023
Volume 53 No. 8
www.elr.info

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ENVIRONMENTAL LAW & POLICY ANNUAL REVIEW

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ARTICLES AND COMMENTS

HONORABLE MENTIONS

ENVIRONMENTAL LAW AND POLICY ANNUAL REVIEW

2022-2023

ELR

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About ELR® . . .

ELR®—The Environmental Law Reporter® is an essential online research tool edited by attorneys that provides the most-often cited analysis of environmental, sustainability, natural resources, energy, toxic tort, and land use law and policy. *ELR* has three components:

• Our highly respected monthly journal, *ELR®—The Environmental Law Reporter®*, provides insightful features relevant to both legal practice and policy on today's most pressing environmental topics. The journal is available in print as well as online.

• *ELR UPDATE* provides expert summaries three times a month of the most important federal and state judicial and administrative developments as well as federal legislative and international news. Highlights from E*LR UPDATE* may also appear in our monthly journal, but all of the material can be found on our website.

• *ELR Online*, available at www.elr.info, is a one-stop environmental law and policy research site with access to 50 years of ELR articles and analysis; extensive links to statutes, regulations, and treaties; a comprehensive subject matter index to cases and articles; and many other tools.

Submissions . . .

ELR invites readers to submit articles and comments, which are shorter features, for publication. Manuscripts may be on any subject of environmental, sustainability, natural resources, energy, toxic tort, or land use law or policy. Citations should conform to *A Uniform System of Citation* (the "Bluebook") and should include *ELR* citations for materials that we have published. Manuscripts should be submitted by e-mail attachment to austin@eli.org. We prefer that the file be in Microsoft Word® format.

Opinions are those of the authors and not necessarily those of the Environmental Law Institute or of funding organizations.

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ELR Online: $2,195
ELR Update: $800
ELR: $800

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ELR—The Environmental Law Reporter® (ISSN 0046-2284) is published monthly.

ELR Staff

Publisher: Jordan Diamond
Editor-in-Chief: Jay Austin
Vice President, Publications: Rachel Jean-Baptiste
Senior Editor: Hunter Leigh Jones
Editorial & Production Asst.: William J. Straub
Editorial Assistants: Sarah Backer, Elly Beckerman, Tori Rickman, and Ella Stack
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Postmaster

Send address changes to:
Environmental Law Reporter®
1730 M Street, NW, Ste. 700
Washington, DC 20036
(202) 939-3800
Fax (202) 939-3868

Periodicals postage paid at Washington, D.C., and at additional mailing offices.

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ENVIRONMENTAL LAW AND POLICY ANNUAL REVIEW

Dear Readers:

The *Environmental Law and Policy Annual Review* (ELPAR) is published by the Environmental Law Institute's (ELI's) *Environmental Law Reporter (ELR)* in partnership with Vanderbilt University Law School. For more than a decade, ELPAR has provided a forum for presentation and discussion of the best environmental law and policy-relevant ideas from the legal academic literature. Published as an annual special issue of *ELR*, ELPAR is designed to fill the same important niche by helping to bridge the gap between academic scholarship and environmental policymaking.

ELI and Vanderbilt formed ELPAR to accomplish three principal goals. The first is to provide a vehicle for moving ideas from the academy to the policymaking realm. Academicians in the environmental law and policy arena generate hundreds of articles each year, many of which are written in a dense, footnote-heavy style that is inaccessible to policymakers with time constraints. ELPAR selects the leading ideas from this large pool of articles and makes them digestible by reprinting them in a short, readable form accompanied by expert, balanced commentary.

The second goal is to improve the quality of legal scholarship. Professors have strong institutional incentives to write theoretical work that ignores policy implications. ELPAR seeks to shift these incentives by recognizing scholars who write articles that not only advance legal theory, but also reach policy-relevant conclusions. By doing so, ELPAR seeks to induce them to generate new policy ideas and to improve theoretical scholarship by asking them to account for the hard choices and constraints faced by policymakers. And the third and most important goal is to provide a first-rate educational experience to law students interested in environmental law and policy.

To select candidate articles for inclusion, the ELPAR Editorial Board and Staff conducted a key word search for "environment!" in an electronic database. The search was limited to articles published from August 1, 2021 through July 31, 2022, in the law reviews from the top 100 *U.S. News and World Report*-ranked law schools and the "environment, natural resources and land use law" journals ranked by the Washington & Lee University School of Law. Journals that are solely published online were searched separately. Student scholarship and non-substantive content were excluded.

The Vanderbilt students then screened articles for consistency with the ELPAR selection criteria. They included only those articles that met the threshold criteria of addressing an issue of environmental quality and offering a law or policy-relevant solution. Next, they considered the articles' feasibility, impact, creativity, and persuasiveness.

Through discussion and consultation, the students ultimately chose 20 articles for review by ELPAR's Advisory Committee members, who provided invaluable insights on article selection. Vanderbilt University Law School Prof. Michael Vandenbergh, ELI Senior Attorney Linda Breggin, and *ELR* Editor-in-Chief Jay Austin also assisted in the final selection process. Five articles were selected, and three received honorable mentions. Commentary on several of the selected papers then was solicited from practicing experts in both the private and public sectors.

On March 31, 2023, ELI and Vanderbilt cosponsored a hybrid conference where some of the authors of the articles and comments presented their ideas to an audience of business, government (federal, state, and local), think-tank, media, and nonprofit participants. The featured articles were *4°C*; *How Algorithm-Assisted Decisionmaking Is Influencing Environmental Law and Climate Adaptation*; and *Do ESG Mutual Funds Deliver on Their Promises?* The conference was structured to encourage dialogue among presenters and attendees. In addition, on February 27, 2023, ELI and Vanderbilt cosponsored a webinar featuring the article *Building a New Grid Without New Legislation*.

The students worked with the authors to shorten the original articles and to highlight the policy issues presented, as well as to edit the comments received. These edited articles and comments are published here as ELPAR, which is also the August issue of *ELR*. Also included is a comment on environmental legal scholarship, which is based on the data collected through the ELPAR review process. We are once again pleased to present the results of this year's efforts.

Linda K. Breggin, Senior Attorney, Environmental Law Institute;
Lecturer in Law, Vanderbilt University Law School

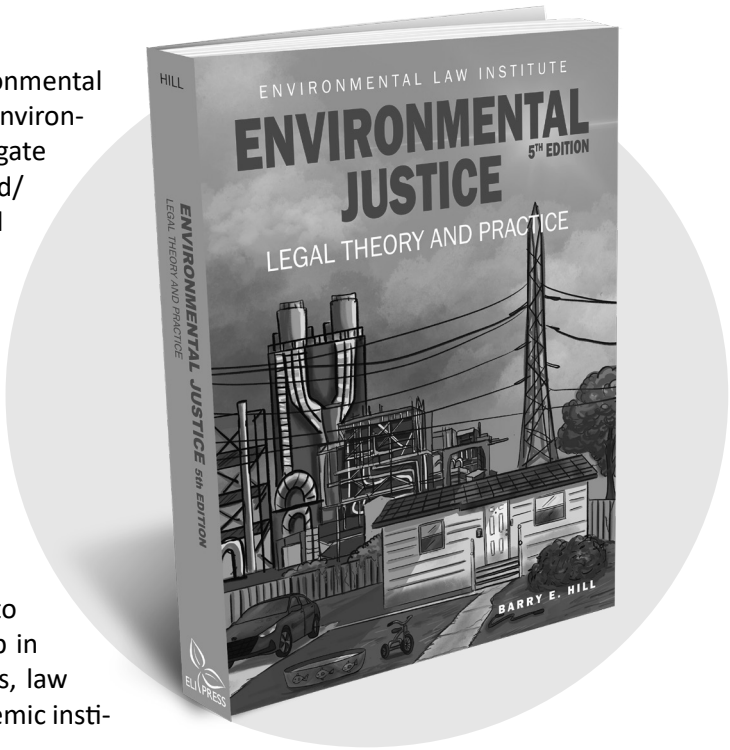
Jay E. Austin, Editor-in-Chief, *Environmental Law Reporter*

Michael P. Vandenbergh, David Daniels Allen Distinguished Chair of Law,
Vanderbilt University Law School

ENVIRONMENTAL JUSTICE:

LEGAL THEORY AND PRACTICE, 5TH EDITION

by BARRY E. HILL



Race and socioeconomic status should not dictate the environmental health risks we face. Yet, too often this is not the case. The environmental justice movement seeks to avoid, minimize, and mitigate disproportionately high and adverse impacts on minority and/or low-income communities and to ensure that disadvantaged communities are engaged meaningfully in environmental decisionmaking processes.

Environmental Justice: Legal Theory and Practice provides a thought-provoking exposition and comprehensive review of the complex mixture of environmental laws and civil rights legal theories that are central to this still-evolving area of law. The book, now in its 5th edition, includes all of the significant cases and developments that have occurred since the prior edition. Readers will come away with a deep understanding of the dynamics of environmental justice and gain insight as to how best to address the issue through enlightened leadership in our communities, government agencies, state bar associations, law offices and legal services providers, law school clinics and academic institutions, and corporations.

"As the great civil rights issue of the 21st century, environmental justice has become an increasingly crucial law school course, and Prof. Barry Hill's book continues to serve as an essential primer for law students and seasoned practitioners alike. In this newest edition, Professor Hill meticulously details the societal context and 'hard law' of environmental justice—through the perspectives of social justice, geographic justice, and procedural justice—to help stakeholders better understand the dynamics of this ever-evolving and expanding body of law."

—Benjamin Wilson, Adjunct Professor of Environmental Justice,
Howard University School of Law

ISBN: 978-1-58576-241-5 | 1698 pages | Price $74.95

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COMMENT

ANALYSIS OF ENVIRONMENTAL LAW SCHOLARSHIP 2021-2022

by Linda K. Breggin, Kristen Sarna, Henry Woods, and Michael P. Vandenbergh

Linda K. Breggin is a Senior Attorney with the Environmental Law Institute and Lecturer in Law, Vanderbilt University Law School. Kristen Sarna and Henry Woods are recent graduates of Vanderbilt University Law School. Michael P. Vandenbergh is the David Daniels Allen Distinguished Chair of Law and Co-Director of the Energy, Environment, and Land Use Program, Vanderbilt University Law School.

The *Environmental Law and Policy Annual Review* (ELPAR) is published by the Environmental Law Institute's (ELI's) *Environmental Law Reporter* in partnership with Vanderbilt University Law School. ELPAR provides a forum for the presentation and discussion of some of the most creative and feasible environmental law and policy proposals from the legal academic literature each year. The pool of articles that are considered includes all environmental law articles published in select law journals during the previous academic year.[1] The law journal articles that are re-published and discussed are selected by Vanderbilt University Law School students with input from their course instructors and an outside advisory committee of experts.

The purpose of this Comment is to highlight the results of the ELPAR article selection process and to report on the environmental legal scholarship for the 2021-2022 academic year, including the number of environmental law articles published in general law reviews versus environmental law journals, and the topics covered in the articles. We also present the top 20 articles that met ELPAR's criteria of persuasiveness, impact, feasibility, and creativity, from which five articles were selected to re-publish in shortened form, some of them with commentaries from leading practitioners and policymakers. Thus, the goal of this article is to provide an empirical snapshot of the environmental legal literature during the past academic year, as well as provide information on the top articles chosen by ELPAR.

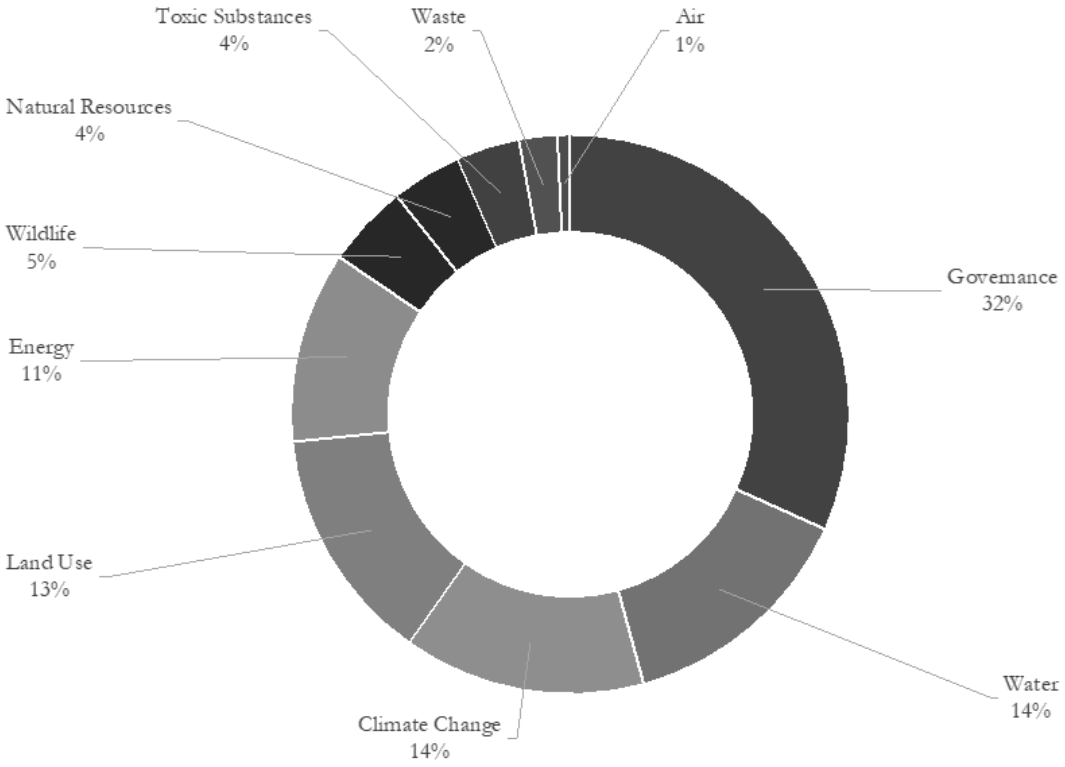
I. Methodology

A detailed description of the methodology is posted on the Vanderbilt University Law School and ELI websites.[2] In brief, the initial search for articles that qualify for ELPAR review is limited to articles published from August 1 of the prior year to July 31 of the current year, roughly corresponding to the academic year. The search is conducted in law reviews from the top 100 law schools, as ranked by *U.S. News and World Report* in its most recent report, counting only articles from the first 100 schools ranked for data purposes (i.e., if there is a tie and over 100 schools are considered top 100, those that fall in the first 100 alphabetically are counted). Additionally, journals listed in the "Environment and Land Use Law" and "Energy and Natural Resources Law" subject areas of the most recent rankings compiled by Washington & Lee University School of Law are searched,[3] with certain modifications.[4]

The ELPAR Editorial Board and staff start with a keyword search for "environment!" in an electronic legal scholarship database.[5] Articles without a connection to the natural environment (e.g., "work environment" or "political environment") are removed, as are book reviews, eulo-

1. *See Environmental Law and Policy Annual Review Publications*, Env't L. Inst., https://www.eli.org/environmental-law-policy-annual-review/publications (last visited Mar. 30, 2023) [hereinafter ELPAR Methodology].
2. ELPAR Methodology, *supra* note 1; *Environmental Law & Policy Annual Review Online Supplements*, Vand. L. Sch., http://law.vanderbilt.edu/academics/academic-programs/environmental-law/environmental-law-policy-annual-review/online-supplements.php (last visited Mar. 30, 2023).
3. *W&L Law Journal Rankings: Ranking Methodology*, Wash. & Lee Sch. of L., https://managementtools4.wlu.edu/LawJournals/ (last visited Mar. 30, 2023).
4. *See* ELPAR Methodology, *supra* note 1.
5. ELPAR members conduct a search in the spring semester of articles published between August 1 and December 31 of the previous year. In the fall semester, members search each journal for articles published earlier that year, between the days of January 1 and July 31. The exact date of access for each journal varies according to when each individual ELPAR member performed the searches on their assigned journals, but the spring searches were performed in the 3rd week of January 2022, and the fall searches were performed in the fourth week of August 2022. In order to collect articles from "embargoed" journals, which are only available on Westlaw after a delay, as well as articles from journals that are published after their official publication date, a Westlaw Alert is set up to provide notification when an article meeting ELPAR search criteria is uploaded to Westlaw after ELPAR members conducted initial searches. A Westlaw Alert was set up for the spring search on January 24, 2022, and ran until August 31, 2022. An alert was set up for the fall search on September 1, 2022, and ran until September 13, 2022. Articles caught by the Westlaw Alert system were subsequently considered for selection by ELPAR and added to the data analysis. Law reviews of schools added to the *U.S. News and World Report* Top 100 are searched for the entire year in the fall, and schools removed from the top 100 after the spring search are not considered.

Figure 1. 2021-2022 Articles Categorized by Primary Topic



gies, non-substantive symposia introductions, case studies, presentation transcripts, and editors' notes. Student scholarship is excluded if the piece is published as a note or comment by a student who is a member of the staff of the publishing journal. We recognize that all ranking systems have shortcomings and that only examining top journals imposes limitations on the value of our results. Nevertheless, this approach provides a useful glimpse of leading scholarship in the field.

For purposes of tracking trends in environmental scholarship, the next step is to cull the list generated from the initial search to ensure that the list contains only those articles that qualify as "environmental law articles." Determining whether an article qualifies as an environmental law article is more of an art than a science, and our conclusions should be interpreted in that light. However, we have attempted to use a rigorous, transparent process. Specifically, an article is considered an "environmental law article" if environmental law and policy are a substantial focus of the article. The article need not focus exclusively on environmental law, but environmental topics should be given more than incidental treatment and should be integral to the main thrust of the article. Many articles in the initial pool, for example, address subjects that influence environmental law, including administrative law topics (e.g., executive power and standing) and tort law topics (e.g., punitive damages). Although these articles may be considered for inclusion in ELPAR and appear in our selection of top articles, they are not included for purposes of tracking environmental law scholarship since environmental law is not the main thrust of these articles.

Each article in the data set is categorized by environmental topic to allow for tracking of scholarship by topic area. The 10 topic categories are adopted from the *Environmental Law Reporter* subject matter index: air, climate change, energy, governance, land use, natural resources, toxic substances, waste, water, and wildlife.[6] ELPAR students assign each article a primary topic category and, if appropriate, a secondary category. ELPAR students also assign each article a sub-category.[7]

The ELPAR Editorial Board and Staff work in consultation with the course instructors, Prof. Michael P. Vandenbergh and ELI Senior Attorney Linda K. Breggin, to determine whether articles should be considered environmental law articles and how to categorize the article by environmental topic for purposes of tracking scholarship. The articles included in the total for each year are identified on lists posted on the Vanderbilt University Law School website.[8]

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6. *Subject Matter Index,* ELR, https://www.elr.info/subject-matter-index/articles (last visited Mar. 30, 2023).
7. *ELR* subject matter index includes subtopics for each topic. For example, subtopics for the governance topic include: administrative law, agencies, bankruptcy, constitutional law, courts, enforcement and compliance, environmental justice, environmental law and policy/governance, infrastructure, institutional controls, insurance, international, liability, private governance, public participation, risk assessment, states, sustainability, tax, trade, tribes, and U.S. government. For a list of all the subtopics in each topic, please see the following *ELR* link. *Subject Matter Index*, ELR, https://www.elr.info/subject-matter-index/articles (last visited Mar. 30, 2023) [https://perma.cc/9RWZ-2RXP].
8. *Environmental Law & Policy Annual Review Online Supplements*, Vand. L. Sch., http://law.vanderbilt.edu/academics/academic-programs/environmental-law/environmental-law-policy-annual-review/online-supplements.php (last visited Mar. 30, 2023).

Figure 2. 2021-2022 Articles Categorized by Primary and Secondary Topic

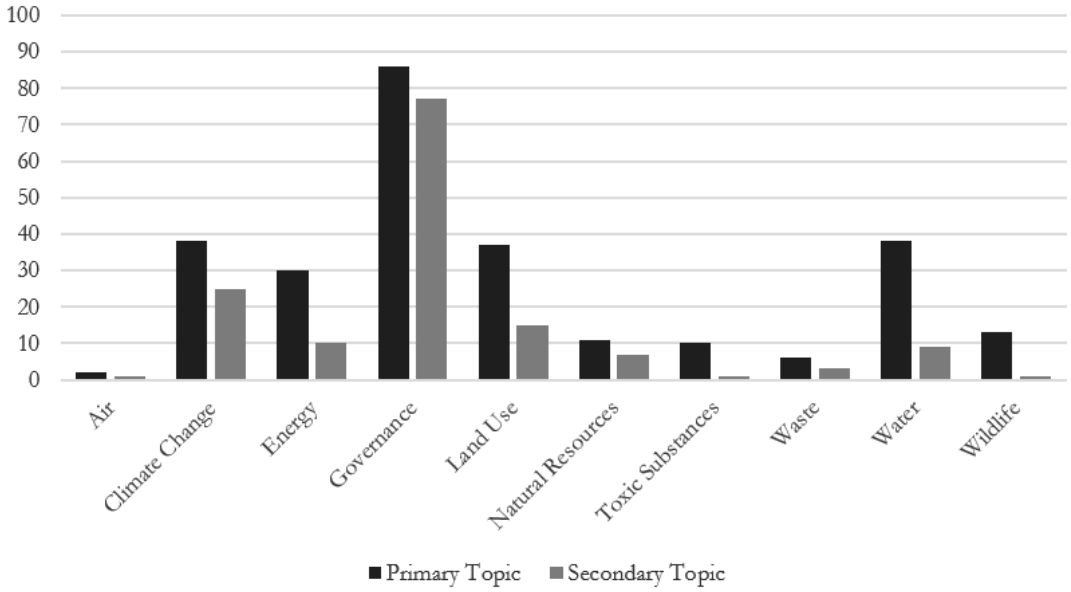
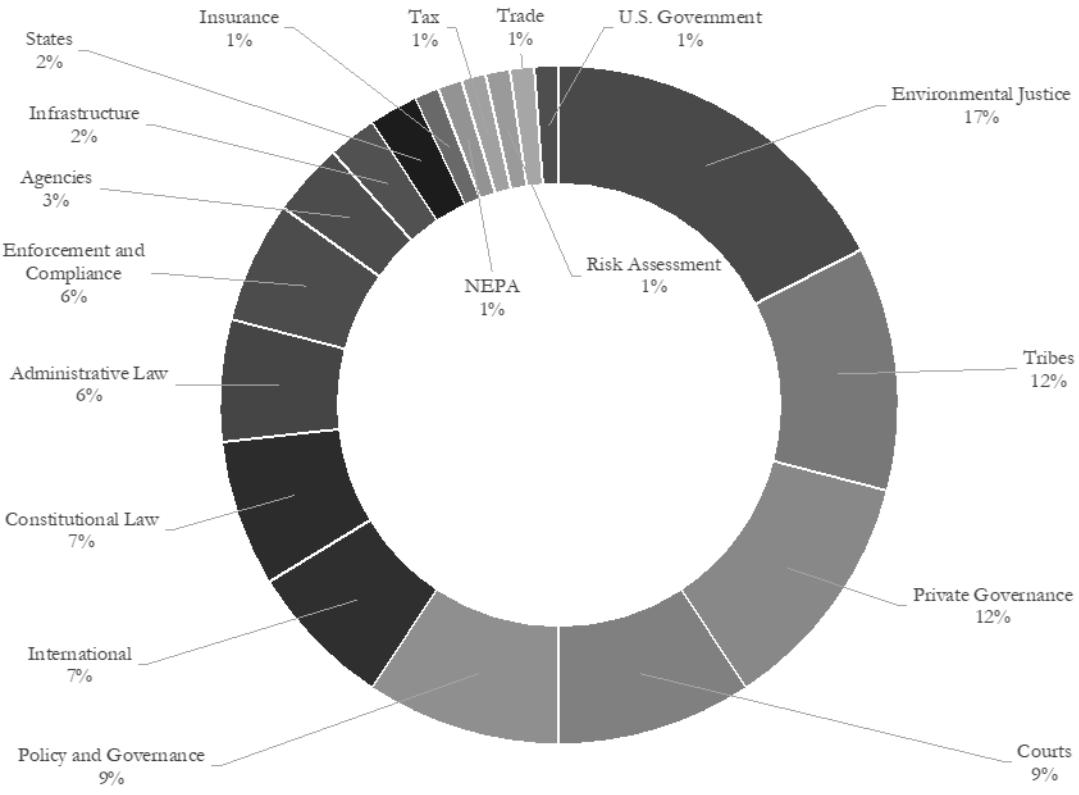


Figure 3. 2021-2022 Governance Articles Categorized by Sub-Topic



II. Data Analysis on Environmental Legal Scholarship

For the 2021-2022 ELPAR review period (August 1, 2021, to July 31, 2022), we identified 271 environmental articles published in top law reviews and environmental law journals. Two hundred of these articles were published in journals that focus on environmental law, and 71 were published in general law reviews.

The primary topics of the 271 environmental articles published in 2021-2022 were as follows (see Figure 1): 86 governance articles (31.7%), 38 water articles (14.0%), 38 climate change articles (14.0%), 37 land use articles (13.7%), 30 energy articles (11.1%), 13 wildlife articles

(4.8%), 11 natural resource articles (4.1%), 10 toxic substances articles (3.7%), six waste articles (2.2%), and two air articles (.7%). In addition, 149 articles were identified as including a secondary topic, categorized as follows (see Figure 2): 77 governance articles, 25 climate change articles, 15 land use articles, 10 energy articles, nine water articles, seven natural resources articles, three waste articles, one wildlife article, one air article, and one toxic substances article. Accordingly, the most common topic category was governance, followed by water and climate change. Figure 3 shows the breakdown of governance articles by sub-topic, which demonstrates the wide variety of governance subject areas in the pool this year.

III. Top 20 Articles Analysis

The top 20 articles chosen from the pool of eligible environmental law and policy-related articles published during the 2021-2022 academic year can be found in Table 1. Of the top 20 outlined below, 11 articles proposed federal action from agencies and the U.S. Congress, two articles called for changes in judicial interpretation, two articles focused on state or local policy solutions, and five articles offered private environmental governance solutions. Many article proposals incorporated federal, state and local, and private entity actions.

Primary topics identified in the top 20 articles were as follows: six energy articles, five governance articles, five climate change articles, two land use articles, one natural resources article, and one water article. Secondary topics were also identified for several articles: five governance, four climate change, one waste, and one land use.

This year's pool of top articles came from both general and environmental law journals. Six of the top 20 articles were published in environmental law journals. Fourteen of the top 20 articles were published in general law reviews. The lead authors of the top articles came from a range of law schools and academic backgrounds.

Table 1 below lists every article included in the top 20, with a brief description of each article's big idea. The descriptions of the big ideas were drafted by the student editors and reflect the key points they thought made an important contribution to the environmental law and policy literature. Links are provided to the full articles and most of the links contain the author's abstract.

Table 1: Article Overview Chart

Author(s)	Title	Citation and URL	Topic	The Big Idea
Arnold, Craig A. (Tony)	*Resilience Justice and Urban Water Planning*	52 Seton Hall L. Rev. 1399 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4167206	Water (safe drinking water)/Governance (environmental justice)	To address the current urban water planning crisis, policymakers, and planners should integrate "resilience justice" into their plans—which focuses on the adaptive capacities and vulnerabilities of marginalized communities—by considering seven questions and implementing a co-governance model whereby local governments partner with residents as "co-policymakers."
Boyd, William	*Climate Liability for Wildfire Emissions From Federal Forests*	48 Ecology L.Q. 981 https://www.ecologylawquarterly.org/wp-content/uploads/2022/06/48.4_Boyd_Internet.pdf	Natural Resources (forests)/Climate Change	Congress should adopt legislation that creates a new strict liability regime for greenhouse gas emissions from unintentional wildfires on federal public lands (or "federal facilities") that requires the federal government to pay the social cost of carbon for these emissions as an automatic budgetary obligation into a dedicated fund for forest restoration.
Coleman, James W.	*State Energy Cartels*	42 Cardozo L. Rev. 2233 http://cardozolawreview.com/wp-content/uploads/2022/01/Website-3_COLEMAN.42.6.8.DONE-.pdf	Energy	States should harness the self-interest of private enterprise to achieve climate goals and to end the current endemic, wasteful, and environmentally destructive practice of natural gas "flaring" by creating state energy cartels that would give oil and gas companies an economic incentive to slow production while also protecting consumers.
Curtis, Quinn Fisch, Jill E. Robertson, Adriana Z.	*Do ESG Mutual Funds Deliver on Their Promises?*	120 Mich. L. Rev. 393 https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=3301&&context=faculty_scholarship	Governance (private governance)	A first-of-its-kind empirical study indicates that environmental, social, and governance (ESG) mutual funds are consistent with their labeling—they offer investors increased ESG exposure, vote their shares differently from non-ESG funds, are more supportive of ESG principles, and do not increase costs or reduce returns—and regulators such as the Securities Exchange Commission (SEC) and the U.S. Department of Labor should adopt a presumption against special regulations for these ESG mutual funds.

DuVivier, K.K.	*Preventing Wind Waste*	71 Am. U. L. Rev. 1 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3873006	Energy	To encourage the development of virtually untapped offshore wind resources, the federal government should promulgate regulations pursuant to the Outer Continental Shelf Lands Act that draw on lessons learned from common-law waste and state oil and gas waste statutes, as well as federal oil and gas regulations, to maximize the quantity of recoverable resources and avoid the public and private costs of constructing unnecessary harvesting infrastructure.
Ho, Virginia H.	*Modernizing ESG Disclosure*	2022 U. Ill. L. Rev. 277 https://illinoislawrev.web.illinois.edu/wp-content/uploads/2022/01/Harper-Ho.pdf	Governance (private governance)	The SEC should modernize ESG disclosures by adopting a two-tiered approach that standardizes reporting by building on existing third-party standards and introducing core ESG disclosures on climate-related financial risk, human capital, and related corporate governance matters for all reporting companies (in addition to requiring sector-specific reporting on a comply-or-explain basis)— and Congress should back these measures and consider additional actions such as providing temporary liability exemptions during initial rule implementation.
Klass, Alexandra B. Macey, Joshua Welton, Shelley Wiseman, Hannah	*Grid Reliability Through Clean Energy*	74 Stan. L. Rev. 969 https://review.law.stanford.edu/wp-content/uploads/sites/3/2022/05/Klass-et-al.-74-Stan.-L.-Rev.-969.pdf	Energy	To achieve the twin aims of reliability and low-carbon energy and shift authority within and among the current regulatory "silos," nine "broad" and 20 "specific" law and governance reforms should be adopted that address market structure, transmission planning, siting, and financing, reliability regulation, and Regional Transmission Organization governance.
Lin, Albert C.	*Making Net Zero Matter*	79 Wash. & Lee L. Rev. 679 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3921225	Climate Change/ Governance (private governance)	To foster achievement of net zero goals adopted by dozens of countries and thousands of businesses: (1) private entities should develop uniform disclosure frameworks and benchmarks to standardize net zero commitments to increase transparency; (2) private enforcement should focus on the use of securities fraud litigation, consumer protection suits, and contracts, including loan agreements; and (3) commitments should set distinct targets for carbon mitigation and removal to deter the use of carbon removal in lieu of mitigation.
Marchant, Gary E. Cooper, Zachary Gough-Stone, Philip	*Bringing Technological Transparency to Tenebrous Markets: The Case for Using Blockchain to Validate Carbon Credit Trading Markets*	62 Nat. Res. J. 159 https://digitalrepository.unm.edu/cgi/viewcontent.cgi?article=4123&&context=nrj cgi?article=4123&&context=nrj	Climate Change/ Governance (private governance)	Players in the carbon credit markets should be open to experimentation with new blockchain applications and smart contracts should be adopted as an industry standard, because these technologies can address monitoring and transparency shortcomings, such as double counting and fraud, thereby increasing the credibility and veracity of carbon reduction claims.
Pidot, Justin R. Peterson, Ezekiel A.	*Conservation Rights-of-Way on Public Lands*	55 U.C. Davis L. Rev. 89 https://lawreview.law.ucdavis.edu/issues/55/1/articles/files/55-1_Pidot_Peterson.pdf	Land Use (public lands)	To protect ecological systems and resolve the mismatch between conservation policies and active use, the Bureau of Land Management should issue rights-of-way over public lands under Title V of the Federal Land Management & Policy Act for conservation purposes, including land use planning, facilitating wildlife migration, and authorizing mitigation banks.
Righetti, Tara K. Schremmer, Joseph A.	*Waste and the Governance of Private and Public Property*	93 U. Colo. L. Rev. 609 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3806009	Governance (courts)/Waste	Courts should revitalize the common-law waste doctrine for purposes of environmental and natural resources management, because it: (1) provides an accepted framework that balances competing common interests in land; (2) provides a legal remedy for emerging environmental issues, such as natural gas venting/flaring and per- and poly- fluoroalkyl substances contamination; and (3) can be quickly and universally adopted in the U.S. judicial system.

Rossi, Jim Panfil, Michael	*Climate Resilience and Private Law's Duty to Adapt*	100 N.C. L. Rev. 1135 https://scholarship.law.unc.edu/cgi/viewcontent.cgi?article=6884&&context=nclr	Energy/Climate Change	As climate change-induced extreme weather events create new and often foreseeable risks for the energy grid such as service interruptions, courts should extend the traditional utility "duty to serve" and recognize a new, additional "duty to adapt" that includes accounting for changing conditions in utility operations, planning, and investments.
Ruhl, J.B. Craig, Robin Kundis	*4°C*	106 Minn. L. Rev. 1757 https://libpubsdss.lib.umn.edu/minnesotalawreviewprod/wp-content/uploads/2022/07/2-Stokes_MLR.pdf	Climate Change	The scientific evidence indicates that the planet is well on its way to at least 4°C of warming—a scenario that presents categorically different adaptation challenges including large migrations within U.S. boundaries and suggest that a range of anticipatory governance practices to facilitate "redesign adaptation" should be initiated now, beginning with a new national foresight research program.
Stokes, Danielle	*Renewable Energy Federalism*	170 U. Pa. L. Rev. 991 https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=9774&&context=penn_law_review	Energy/Climate	To foster consistent and efficient large-scale renewable energy project siting, Congress, in coordination with state and local governments, should establish a collaborative federalism regime that would only limit state and local authority that "impedes" development and that relies on: (1) coordinated federal zoning and planning guidelines that incorporate place-based nuances; and (2) national or regional centralized siting agencies.
Sunstein, Cass R.	*Arbitrariness Review and Climate Change*	170 U. Pa. L. Rev. 991 https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=9774&&context=penn_law_review	Climate Change/ Governance (administrative law)	Federal agencies should develop a social cost of greenhouse gas emissions that will withstand an "arbitrariness" judicial review that contains a "procedural (rather than substantive) hard look" not by "backing out" a social cost of carbon from a specific target, but by using: a global number rather than domestic number; a low discount rate of two percent; reasoned justifications for scientific, economic, and equity-related approaches.
Vail, John P.	*The Need for a Sustainability Pledge: Fighting Planned Obsolescence*	13 Geo. Wash. J. Energy & Env't L. 1 https://gwjeel.com/wp-content/uploads/2022/05/JEEL-Vol.-13-Issue-1.pdf	Climate Change/ Governance (administrative law)	Federal agencies should develop a social cost of greenhouse gas emissions that will withstand an "arbitrariness" judicial review that contains a "procedural (rather than substantive) hard look" not by "backing out" a social cost of carbon from a specific target, but by using: a global number rather than domestic number; a low discount rate of two percent; reasoned justifications for scientific, economic, and equity-related approaches.
Washburn, Kevin K.	*Facilitating Tribal Co-Management of Federal Public Lands*	170 U. Pa. L. Rev. 991 https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=9774&&context=penn_law_review	Governance (private governance)	Given that businesses are not "sustainable" if they practice "planned obsolescence," whereby their products are designed to become prematurely out-of-date to promote consumption of newer products, companies should adopt a Sustainability Pledge that commits to the following: (1) creating durable products that are reusable or repairable; (2) providing information on the repair process and replacement parts; (3) selling products that are disposable in an environmentally friendly manner; (4) introducing new versions of products only if they meaningfully add benefits to consumers; (5) eliminating software in products that would make them less efficient over time; and (6) planning processes to produce their products that have a "net zero impact" on the planet.
Wright, Claire	*Combatting Climate Change Through Conservation Easements*	23 Minn. J.L. Sci. & Tech. 175 https://scholarship.law.umn.edu/cgi/viewcontent.cgi?article=1511&&context=mjlst	Climate Change/ Land Use	The U.S. government should modify the Internal Revenue Code to allow owners of fossil fuel resources to take a credit on their federal tax return for the entire value of their operations in exchange for granting a conservation easement that would prohibit future exploitation of those resources.

Zevin, Avi Walsh, Sam Gundlach, Justin Carey, Isabel	*Building a New Grid Without New Legislation: A Path to Revitalizing Federal Transmission Authorities*	48 Ecology L.Q. 169 https://www.ecologylawquarterly.org/wp-content/uploads/2021/09/48.1_Zevin_Internet.pdf	Energy	Rather than relying on Congress to pass new legislation to proliferate long-distance, high-voltage transmission lines that are needed for effective decarbonization efforts, the Federal Energy Regulatory Commission and the U.S. Department of Energy (DOE) should rely on available authorities under the Federal Power Act and the Energy Policy Act to pursue 20 recommended policy actions that provide significant control to federal agencies to reduce obstacles to transmission, designate transmission corridors, permit transmission projects, enter into partnership projects between DOE and private developers, and explore Power Market Administration transmission projects.
Ziaja, Sonya	*How Algorithm-Assisted Decisionmaking Is Influencing Environmental Law and Climate Adaptation*	48 Ecology L.Q. 899 Https://Scholarworks.law.ubalt.edu/Cgi/Viewcontent.cgi?Article=2171&&Context=All_fac	Governance (administrative law)/ Climate Change	To assess the existence of bias and hidden values in algorithm-based decision tools that are increasingly used in the development and implementation of environmental law and regulation, advocates and legal practitioners should employ a six-part framework consisting of a series of concrete interrogatives that assess how effectively an algorithm and its design process address issues of uncertainty, transparency, and stakeholder collaboration.

ARTICLE

DO ESG MUTUAL FUNDS DELIVER ON THEIR PROMISES?

by Quinn Curtis, Jill Fisch, and Adriana Z. Robertson

Quinn Curtis is The Honorable Albert V. Bryan Jr. '50 Research Professor of Law and Associate Dean for Curricular Programs at the University of Virginia School of Law. Jill Fisch is the Saul A. Fox Distinguished Professor of Business Law and Co-Director of the Institute for Law and Economics at the University of Pennsylvania Carey Law School. Adriana Z. Robertson is the Donald N. Pritzker Professor of Business Law at the University of Chicago Law School.

Corporations have received growing criticism for their role in climate change, perpetuating racial and gender inequality, and other pressing social issues. In response, shareholders are increasingly focusing on environmental, social, and corporate governance (ESG) criteria in selecting investments, and asset managers are responding by offering a growing number of ESG mutual funds.

But are these funds giving investors what they promise? This question has attracted the attention of regulators, with the U.S. Department of Labor (DOL) and the Securities and Exchange Commission (SEC) both taking steps to regulate ESG funds.

Combining comprehensive data on mutual funds with proprietary data from several of the most significant ESG ratings firms, we provide a unique picture of the current ESG environment with an eye to informing regulatory policy. We find that ESG funds offer their investors increased ESG exposure, vote their shares differently from non-ESG funds, and are more supportive of ESG principles. We also find that they do so without increasing costs or reducing returns.

We conclude that ESG funds generally offer investors a differentiated and competitive investment product that is consistent with their labeling and see no reason to single out ESG funds for special regulation.

I. Empirical Analysis

This section presents our empirical analysis of the differences between ESG funds and other mutual funds. We find that ESG funds generally deliver greater ESG exposure in their portfolio allocations than non-ESG funds, that they are more likely than other funds to oppose management in the proxy voting, particularly when votes are salient to ESG issues, and that they do not cost more or perform worse than similar non-ESG funds.

Table 1: ESG Mutual Funds in Our Sample

Panel A: Number of ESG Funds in Final Sample, by Type	
Identified by Fund Name	204
Identified Using Morningstar	241
Identified Using Either	303
Panel B: Selected Sub-Types of ESG Fund	
"Environmental" Funds	48
Indexed ESG Funds	69
Specialized ESG Funds	88

A. Portfolio Composition

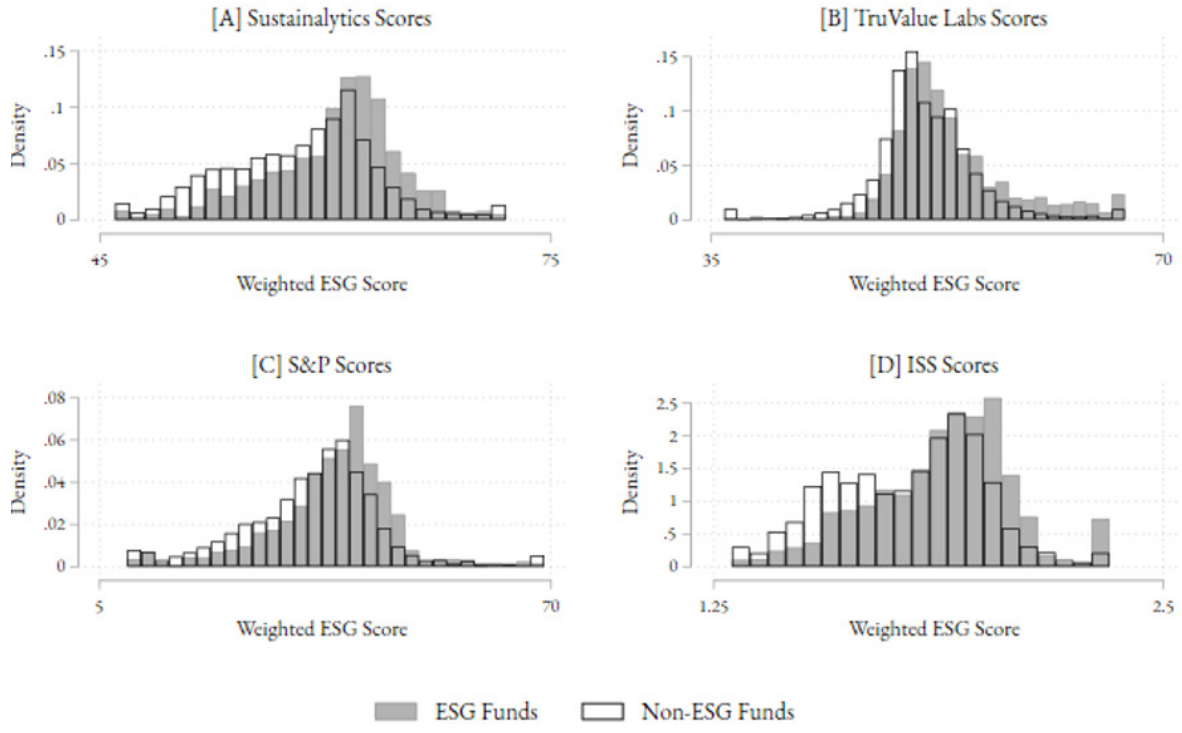
We start by calculating what we term a fund's "ESG tilt"—the asset-weighted average of the ESG scores of the fund's portfolio companies, using ESG scores from four separate rating providers. We compare that tilt to the non-ESG funds in our sample. Figure 1 contains histograms using weighted issuer-level ESG. The shaded histograms represent the distribution of ESG funds, and the transparent histograms represent conventional funds. "ESG funds" refer to funds that either identify themselves as ESG by their name or are identified by Morningstar as ESG funds. The non-ESG funds include all funds in the Center for Research in Security Prices (CRSP) Survivorship Bias Free Mutual Fund Database (other than ESG funds) with enough data to produce a portfolio tilt score. The histograms are constructed using quarterly fund-level data.

The striking thing about Figure 1 (next page) is the consistency across the panels. Issuer-level ESG ratings are often criticized for being inconsistent with one another, yet using any of the measures of ESG tilt, we find that ESG funds have portfolios with higher ESG scores, on average, than non-ESG funds. The general shapes are similar,

Editors' Note: This Article is adapted from Quinn Curtis, Jill Fisch, and Adriana Z. Robertson, *Do ESG Mutual Funds Deliver on Their Promises?,* 120 MICH L. REV. 393 (2021), *and used with permission.*

Authors' Note: The authors thank ISS, S&P, and TruValue for providing us with eheir ESG ratings.

Figure 1: ESG TILT Mutual Fund Portfolio: Weighed ESG Scores



but the distribution for ESG funds is shifted slightly to the right of the non-ESG distribution in all four panels. Notwithstanding this shift, there are some ESG funds with low ESG tilts, just as there are some funds that are not classified as ESG funds that have high ESG tilts. As a result, even if the average ESG fund has increased exposure to strong ESG companies, there could be a group of ESG funds that are conventional funds masquerading as ESG funds. We note, however, that different funds generally score in the bottom quartile, depending on which ESG rating is used to measure tilt.

There are some limitations to simply examining histograms. We therefore estimate a series of regressions and present the results in Table 2 (page 10632). The results are strikingly consistent. Using all four ESG ratings, and in both panels A and B, we find that ESG funds have portfolios that are substantially more tilted toward companies with high ESG ratings than non-ESG funds. The coefficients on the dummy variables are large and highly statistically significant These relationships are unlikely to be the result of chance: the p-values associated with all 16 of the coefficients are smaller than 0.001.

The category of "ESG funds" is extremely broad, and environmental concerns can be qualitatively different from governance concerns. We therefore investigate this issue further. We manually identify environmental funds by reading the summary prospectus of each ESG fund. We construct the "E-tilt" of each fund in a manner analogous to the ESG-tilt measures discussed above, using each provider's environmental scores. We then estimate a version of the regressions presented in Table 3 (page 10633), where the dependent variable is the environmental tilt of the fund, rather than the ESG tilt, and the independent variable of interest is an indicator variable for the relevant type of environmental funds.

The results are presented in Table 3. Using either Sustainalytics, S&P, or ISS scores, environmental funds tilt substantially more toward issuers with high environmental ratings than comparable non-environmental funds.

The biggest difference is in columns 3 and 4. Using environmental scores constructed using data from TruValue Labs, environmental funds identified using the names (column 3) have a slightly higher environmental tilt in their portfolios, although this difference is not statistically significant. Using funds identified by Morningstar, we find that while the point estimates are negative, the t-statistics are quite small, indicating that the relationship is null. This result may be related to inherent features of the TruValue ratings. Unlike the other ratings providers, TruValue's emphasis is on SASB categories, and it did not provide us with "pure" environmental ratings. We constructed the TruValue environmental ratings by identifying and aggregating the relevant SASB categories. This may have introduced noise into our measure, which would undermine the reliability of the estimates in columns 3 and 4.

B. ESG Fund Voting Behavior

We turn next to the question of whether ESG funds vote the shares in their portfolio companies differently from non-ESG funds. There are at least three reasons why we might expect ESG funds to vote against management. First, many ESG funds claim to be seeking to persuade

Table 2: ESG Portfolio Tilts—ESG/Non-ESG Funds

	Sustainalytics Scores		TruValue Labs Scores		S&P Scores		ISS Scores	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG Name	1.775***		2.223***		3.048***		0.101***	
	(7.01)		(7.03)		(5.38)		(7.96)	
Morningstar		1.212***		1.539***		2.515***		0.051***
		(3.97)		(6.56)		(4.22)		(4.61)
Objective Code x Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES
N	46,432	46,432	50,658	50,658	41,778	41,778	48,304	48,304
adj. R-sq	0.071	0.071	-0.002	-0.002	-0.002	-0.002	0.046	0.046
Number of ESG Funds	174	200	189	218	164	186	182	211

Panel B: ESG Tilt Measured by ESG Percentile

	Sustainalytics Scores		TruValue Labs Scores		S&P Scores		ISS Scores	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG Name	12.377***		14.899***		11.873***		13.273***	
	(7.90)		(8.23)		(6.60)		(9.01)	
Morningstar		9.018***		12.355***		9.105***		7.498***
		(5.41)		(8.49)		(4.86)		(4.88)
Objective Code x Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES
N	46,432	46,432	50,658	50,658	41,778	41,778	48,304	48,304
adj. R-sq	0.381	0.380	0.247	0.246	0.263	0.261	0.402	0.399
Number of ESG Funds	174	200	189	218	164	186	182	211

t-statistics, computed using standard errors clustered by fund, in parentheses. * p<0.05, ** p<0.01, *** p<0.001

corporations to align their behavior with ESG values.[1] We would expect such funds to disagree with management about issues with high ESG salience. Second, fund voting behavior might be more salient to the investors in ESG funds than it is to the investors in conventional mutual funds. ESG funds market themselves as advancing certain social goals, and their investors may expect the funds' votes to align with those goals, leading ESG funds to vote against management more often. Finally, ESG funds might simply be more independent of management because they are operated by companies that are less likely to seek out 401(k) business from their portfolio companies, which is often argued to induce funds to toe the management line.

We investigate whether ESG funds vote differently by regressing a variable indicating that the fund voted against management's recommendation on a variable indicating that the fund is an ESG fund. In models one through three, we use company-year dummy variables to control for the average characteristics of each portfolio company. This allows us to compare ESG funds' votes with the votes of conventional funds *at each particular company*. This control is important because of the propensity of ESG funds to hold different portfolios from conventional funds.

In the first three regressions, we include an indicator variable that takes the value 1 if the fund is part of an ESG family (more than 50% ESG funds based on the CRSP data) or 0 otherwise. This is important because mutual fund voting has historically been highly correlated at the family level, with many fund families voting in lockstep. By including separate variables to identify ESG funds and funds in ESG families, it is possible to determine whether ESG voting patterns are entirely driven by ESG-specialist fund families.

In columns 4 through 6, we replace the company-year dummy variables with dummy variables identifying unique combinations of companies and fund families in a particular year. This provides additional robustness against the possibility that ESG fund support for ESG issues is driven solely by ESG-focused families.

Table 4 (page 10634) presents the results. Column 1 examines the relationship between classification as an ESG fund and the propensity to support shareholder proposals over management objections. The results show that ESG funds are substantially more likely to oppose management by supporting shareholder proposals than other funds invested in the same company.

Column 2 examines the subset of ESG funds we identify as having an explicit environmental focus ("E" funds). These tests focus on shareholder proposals with ESG salience, but this regression controls for funds with an explicit environmental focus and shareholder proposals that raise environmental issues. The results show that E funds

1. *See* Khurram Gillani et al., *Active Engagement: How Top ESG Managers Make a Difference*, John Hancock Inv. Mgmt. (June 2, 2017), https://www.jhinvestments.com/viewpoints/esg/active-engagement-how-top-esg-portfolio-managers-make-a-difference [perma.cc/R4BV-8NYD].

Table 3: Environmental Portfolio Tilts—Environmental / Non-Environmental Funds

Panel A: E Tilt Measured by Weighted E Scores

	Sustainalytics Scores		TruValue Labs Scores		S&P Scores		ISS Scores	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG Name x Environmental Fund	3.723***		1.644		5.488***		0.283***	
	(5.68)		(0.89)		(3.75)		(4.61)	
Morningstar x Environmental Fund		1.897*		-1.627		5.128*		0.156*
		(2.10)		(-0.64)		(2.46)		(2.22)
Objective Code x Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES
N	46,432	46,432	50,658	50,658	41,778	41,778	48,304	48,304
adj. R-sq	0.106	0.106	0.021	0.021	0.004	0.004	0.062	0.061
Number of E Funds	38	19	41	21	36	18	40	20

Panel B: E Tilt Measured by E Percentile

	Sustainalytics Scores		TruValue Labs Scores		S&P Scores		ISS Scores	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG Name x Environmental Fund	14.290***		2.058		11.647***		19.336***	
	(5.36)		(0.68)		(3.34)		(6.29)	
Morningstar x Environmental Fund		6.650		-2.556		8.968		9.387*
		(1.81)		(-0.60)		(1.88)		(2.30)
Objective Code x Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES
N	46,432	46,432	50,658	50,658	41,778	41,778	48,304	48,304
adj. R-sq	0.106	0.106	0.021	0.021	0.004	0.004	0.062	0.061
Number of E Funds	38	19	41	21	36	18	40	20

t-statistics, computed using standard errors clustered by fund, in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

are statistically no more or less likely than conventional funds to oppose management on shareholder proposals in general. However, when the shareholder proposals address environmental issues, "E" funds are far more likely than other funds to oppose management.

Column 3 looks at fund votes in uncontested director elections. The results in Column 3 show that ESG funds vote differently from non-ESG funds in these elections and are about twice as likely to withhold votes in an uncontested director election.

Columns 4 through 6 run the same set of regressions but with fixed effects at the firm x fund family x year level. The results are robust to these controls and are not driven by family effects.

In summary, we find substantial differences between the voting behavior of ESG and non-ESG funds. There is compelling evidence that they vote differently from their peers, and that a typical ESG fund's mission involves voting policies as well as stock selection.

C. Performance and Fees

We now ask whether ESG funds charge higher fees than comparable non-ESG funds. We consider both risk and opportunity cost, asking whether the returns offered by ESG funds differ systematically from those of comparable non-ESG funds. We adjust these returns for risk and look for differences between ESG and non-ESG funds.

We do not seek to settle the question of whether ESG investing is an advisable strategy here. Our goal is much narrower and more modest: to evaluate whether the empirical claims that underlie DOL's concerns about the inclusion of ESG funds in 401(k) plans are supported by the evidence. In other words, we look at ESG fund performance over our sample period for evidence suggesting that investors in such funds are bearing short-term costs in terms of reduced performance or increased risk.

To assess ESG fund fees, we regress expense ratios on our identifiers of ESG funds and present the results in Table 5 (page 10635). In this analysis we use fund class x year level observations, that is, one observation per fund share class per year. We also include a series of additional control variables and fixed effects in the regressions. First, we include objective code x year fixed effects. As in the tilt regressions presented in Tables 2 and 3, this allows us to ensure that we are comparing apples to apples by comparing the expenses of funds with similar investment objectives at the same time. We also control for whether a fund is an index fund.

We include three different controls for size, since fund fees are known to vary systematically by size.[2] First, we

2. Mutual funds enjoy economies of scale at both the fund level and the sponsor level. Vanguard founder Jack Bogle testified before the U.S. Congress that there are "staggering" economies of scale in the mutual fund industry. *Mutual Fund Industry Practices and Their Effect on Individual Investors: Hearing Before the Subcomm. on Cap. Mkts., Ins. & Gov't Sponsored Enters. of the H. Comm. on Fin. Servs.*, 108th Cong. 78 (2003) (statement of John C. Bogle, Founder, Vanguard Group); *see also* John A. Haslem, *Mutual Fund Economies of Scale:* Nature and Sources, J. Wealth Mgmt., Summer 2017, at 97.

Table 4: Likelihood of Voting Against Management Recommendation (LPM)—ESG/Non-ESG Funds

	Shareholder Props.		Unopposed Director Elections	Shareholder Props.		Unopposed Director Elections
	(1)	(2)	(3)	(4)	(5)	(6)
ESG Fund Indicator	0.126***		0.020***	0.117***		0.019***
	(4.16)		(3.29)	(5.55)		(4.71)
Enviro Fund Indicator		-0.036			0.063	
		(-1.02)			(1.25)	
Enviro Issue Indicator		-0.064***			-0.064***	
		(-18.63)			(-17.50)	
Enviro Fund x Enviro Issue		0.126**			0.137*	
		(3.07)			(2.51)	
ESG Family Indicator	0.271***	0.387***	0.238***			
	(7.95)	(17.75)	(6.16)			
Constant	0.460	0.469	0.060	0.463***	0.471***	0.061***
Firm x Year FE	Yes	Yes	Yes	No	No	No
Fund Fam. x Firm x Yr. FE	No	No	No	Yes	Yes	Yes
Observations	788,913	788913	14,438,612	788,913	788913	14,438,612
R-squared	0.283	0.282	0.205	0.653	0.652	0.515
Number of ESG Funds	231	223	223	231	223	223

t statistics, computed using standard errors clustered by fund, in parentheses. * p<0.05, ** p<0.01, *** p<0.001

include a control variable for the total net asset value of all funds managed by the fund manager. Second, we control for the total net asset value of the fund by adding up the size of all the fund's classes. Finally, we control for the total net asset value invested in the particular class itself. For all three of these variables, we use the natural logarithm of the size. We cluster standard errors by fund. The results in Table 5 show no evidence that ESG funds are more expensive, as measured by their expense ratios, than non-ESG funds.

In Table 6 (p. 10635), we present similar regressions to the expense-ratio regressions in Table 5. We use returns as the dependent variable in columns 1 and 2. In columns 3 and 4, we adjust these returns for risk by computing Sharpe ratios. An investment's Sharpe ratio, defined as its return divided by its standard deviation, is a common risk-adjusted performance measure. The Sharpe ratio captures the incremental return that an investor receives per unit of risk. A higher Sharpe ratio implies a higher risk-adjusted return. Because return data are available at the monthly level, we use fund class x month level observations and objective code x month fixed effects. Like Table 5, we control for objective codes and whether the fund is an index fund using fixed effects, and we include the manager, fund, and class controls for size. We cluster the standard errors by fund and month.

The results in Table 6 suggest that investors in ESG funds do not give up returns. Both returns and Sharpe ratios are higher for funds identified as ESG by their names (columns 1 and 4), and the point estimates are also positive for the funds identified by Morningstar, although the results are not statistically significant.

As in the portfolio tilt analysis, where we looked specifically at environmental funds, we repeat our analyses of costs and performance, focusing on two categories of funds. First, we investigate the differences, if any, between indexed ESG funds and actively managed funds with respect to fees and performance. Second, we investigate whether there are differences between "generic" ESG funds and specialized funds in terms of costs and performance.

We begin by splitting out indexed ESG funds from their actively managed competitors. We then repeat the analyses in Tables 5 and 6, this time including a variable indicating that a particular ESG fund is indexed. Because we are already including a variable to control for whether a fund is an index fund, adding in this new variable allows us to answer the question: do indexed *ESG* funds behave differently from actively managed ESG funds, in terms of either expenses or performance? The answer, with respect to fees, is no.

We also find that ESG index funds perform slightly better than actively managed ESG funds. This incremental performance boost is statistically significant at the 5% level with respect to raw returns (the analogue to columns 1 and 2 in Table 6), and is marginally significant (i.e., significant at the 10% level) with respect to Sharpe ratios. We hasten to add that these performance results are, by necessity, short-term, and may reflect a time period during which stocks in ESG funds performed particularly well. Nevertheless, they suggest that concerns about the performance of ESG funds may be overblown.

What about highly specialized ESG funds? We repeat the analysis presented in Tables 5 and 6, including a variable indicating that the fund is *both* an ESG fund *and* that

Table 5: Expense Ratios—ESG/Non-ESG Funds

	(1)	(2)
ESG Name	-0.00049	
	(-1.47)	
Morningstar		0.00017
		(0.70)
Class Size Control	Yes	Yes
Fund Size Control	Yes	Yes
Manager Size Control	Yes	Yes
Objective x Year FE	Yes	Yes
Index Fund FE	Yes	Yes
Observations	52,592	52,592
Adjusted R-squared	0.340	0.340
Number of ESG Funds	178	218

Table 6: Returns and Sharpe Ratios—ESG/Non-ESG Funds

	(1)	(2)	(3)	(4)
ESG Name	0.00214*		0.04917*	
	(2.62)		(2.80)	
Morningstar		0.00090		0.01647
		(1.86)		(1.62)
Class Size Control	Yes	Yes	Yes	Yes
Fund Size Control	Yes	Yes	Yes	Yes
Manager Size Control	Yes	Yes	Yes	Yes
Objective x Month FE	Yes	Yes	Yes	Yes
Index Fund FE	Yes	Yes	Yes	Yes
Observations	721305	721305	721186	721186
Adjusted R-squared	0.651	0.651	0.780	0.780
Number of ESG Funds	202	234	201	233

it is a highly specialized ESG fund, allowing us to investigate whether highly specialized funds behave differently than generic ESG funds.

Our findings are quite favorable for specialized funds. These specialized funds have lower expenses than either non-ESG funds or even generic ESG funds, although this difference is only statistically significant when we identify funds using the Morningstar list. Turning to performance, we find no statistically significant difference in any of the four specifications.

The results in this subsection indicate that ESG funds, on average, do not cost investors more than comparable funds in terms of higher fees, reduced returns, or diminished risk-adjusted performance.

II. The Implications of These Findings for Regulatory Policy

Our results stand in contrast to the criticisms of high costs, reduced performance, and greenwashing and generally point to a functional market.

As a result, we question the need for ESG-specific regulatory interventions. Rather, we argue that regulators should adopt a presumption against such interventions in the absence of clear evidence of ESG-specific problems. If there are issues with transparency around names or problems with fund costs, regulators should begin by questioning whether those issues are unique to ESG funds before making new rules targeting this segment of the market. Our results suggest that the answer to that question is generally "no."

A. The Empirical Picture

ESG funds offer their investors different portfolio and voting policies aligned with ESG goals as measured by ESG ratings, without higher fees, lower returns, or uncompensated risk. There is no evidence that ESG funds are not performing on ESG-specific matters, or that they are any worse than the rest of the mutual fund market on matters that are not ESG-specific.

The role of third-party information providers in improving the market is notable. Morningstar and ESG ratings providers have constructed extensive disclosure mechanisms well beyond what regulations require. These evaluations are inputs into our empirics. Our results should provide some comfort that this privately ordered system of information production is succeeding in providing useful information to investors.

B. The Pecuniary Benefits Debate

Much has been made of the possibility that ESG funds pursue social benefits at the cost of economic returns. If certain ESG funds are explicitly making decisions that sacrifice returns, we agree that this information should be disclosed to investors. And indeed, some funds do disclose on their websites that their investment strategy might lead them to sacrifice returns.[3] This disclosure should provide fiduciaries with clear and explicit notice that the funds' investment strategy might not be appropriate for an employer-sponsored pension plan under the Employee Retirement Income Security Act (ERISA). There is no need for any sort of ESG-specific rule here: plan sponsors can straightforwardly apply standard fiduciary principles in light of this disclosure and might reasonably exclude the fund from a 401(k) plan menu.

As a category, at least during the time period of our study, ESG funds performed a little better than other funds and cost about the same. If ESG funds do not seem

3. *See e.g.*, Eaton Vance, Calvert Balanced Fund Fact Sheet (2021), https://www.calvert.com/media/public/23932.pdf [perma.cc/YZ5S-L3WG].

to be making short-term financial sacrifices, the case for subjecting them to special scrutiny, as the originally proposed DOL rule sought to do, seems weak.

DOL should be conscious of a countervailing risk as well. If including ESG funds in retirement plans carries heightened liability risk for plan fiduciaries, such funds may simply be excluded from plan menus. ERISA fiduciary duties are backed by a private right-of-action, and plaintiffs' attorneys have enjoyed success in a recent wave of 401(k) lawsuits alleging excessive fees.[4] This has led 401(k) plans to simplify and streamline their menus,[5] often dropping high-fee options. Few will lament striking high cost-funds from plan menus,[6] but our results show that ESG funds offer something different from conventional funds without increased costs. Many savers *want* options attuned to ESG issues and offering these options may be a critical ingredient in encouraging younger investors to save.[7]

C. The Diversity of ESG Ratings

Some critics have called out the variety and low correlation of ESG ratings as suggesting that ESG investing lacks discernible content.

From an investor point of view, it seems less important that ESG ratings agree about individual companies than that they have consistency at the portfolio level. This portfolio-level consistency is what we find. While ratings are heterogenous, ESG funds tend to have higher ESG-tilt across the ratings we measure.

ESG fund managers might be diversifying across ESG ratings in portfolio selection, so that they exhibit ESG-tilt regardless of the ratings provider used to evaluate the fund. Alternatively, it may be the ESG fund managers are engaging in their own independent evaluations of companies so that their portfolios exhibit a commitment to ESG in aggregate that the various ratings providers successfully measure.

Neither of these hypotheses is consistent with greenwashing, or even "lazy" ESG investing where fund managers delegate portfolio management to ESG rating providers. Instead, it is most consistent with the idea of fund managers taking the information contained within these ratings into account in making their investing decisions either explicitly or implicitly through independent research.

D. An ESG-Neutral Agenda for Regulators

Our results suggest that the market for ESG mutual funds is functioning reasonably well, and regulators should be responsive to that reality.

In our view, the most productive approach regulators can take when it comes to ESG funds is to adopt a presumptive stance of "ESG neutrality." Notably, this is the approach that DOL took in its rule on financial considerations in asset selection for retirement plans. The initial draft of the rule emphasized that ESG funds could only be included in plans if fiduciaries conducted sufficient diligence to establish that such funds would ultimately generate an optimal trade off of risk and return for investors.[8] In the final version of the rule, DOL instead focused on the types of diligence that prudent fiduciaries should conduct before selecting an investment option, regardless of the strategy.[9]

In our view, neutrality rather than special scrutiny is the correct approach. The SEC's "Names Rule" for mutual funds is an example.[10] The inclusion of ESG terminology in a fund name provides investors with limited information about a fund's investment approach. But the same is true of many other terms that are commonly used in fund names: "growth," "capital preservation," and "blue-chip" all connote strategies in broad terms but are hardly concrete. The vagueness of ESG names seems no worse to us than other types of names suggesting investment strategies.

We find no evidence that "sustainable" funds present a more pressing informational problem than more conventional terms like "growth," or that investors are more likely to be misled by one name than the other.

III. Conclusion

We collected data on ESG funds and provided a framework for interrogating these concerns. Our empirical results provide no justification for regulatory invention. Analysis reveals that ESG funds do not present distinctive concerns from either an investor protection or a capital markets perspective. Funds that market themselves as employing an ESG investment strategy invest and vote differently from funds that do not purport to do so. ESG funds do not appear to be charging investors higher fees or sacrificing returns relative to their traditional counterparts. Our findings suggest caution in curbing the marketing of ESG products or limiting their use by ERISA fiduciaries.

4. *See* George S. Mellman & Geoffrey T. Sanzenbacher, Ctr. for Ret. Rsch., 401(k) Lawsuits: What Are the Causes and Consequences? (2018), https://crr.bc.edu/wp-content/uploads/2018/04/IB_18-8.pdf [perma.cc/76H2-CAKU].
5. *See* Jamie McAllister & Greg Ungerman, Callan Inst., 2019 Defined Contribution Trends Survey (2019), https://www.callan.com/uploads/2020/05/8d05737f54f9edfccfb9db29d070ff67/callan-dc-trends-survey-2019.pdf [perma.cc/V6HM-JVW8].
6. *See* Ian Ayres & Quinn Curtis, *Beyond Diversification: The Pervasive Problem of Excessive Fees and "Dominated Funds" in 401(k) Plans*, 124 Yale L.J. 1346 (2015).
7. *See, e.g.*, Melissa Karsh & Emily Chasan, *BlackRock, Wells Fargo Are Betting on Ethical Investing Funds for 401(k)s*, Bloomberg (June 13, 2018, 10:54 AM), https://bloomberg.com/news/articles/2018-06-13/blackrock-wells-fargo-are-said-to-push-esg-funds-for-401-k-s [perma.cc/229T-WTGR].
8. Financial Factors in Selecting Plan Investments, 85 Fed. Reg. 39113, 39115 (proposed June 30, 2020) (to be codified at 29 C.F.R. pt. 2550).
9. *See* Financial Factors in Selecting Plan Investments, 85 Fed. Reg. 72846 (Nov. 13, 2020) (to be codified at 29 C.F.R. pt. 2509, 2550).
10. Investment Company Names, 66 Fed. Reg. 8509 (Feb. 1, 2001).

COMMENT

REGULATION OF ESG INVESTING IS STILL NECESSARY

by Stephen Hall

Stephen Hall is Legal Director and Securities Specialist at Better Markets.

I. Introduction

Environmental, social, and governance (ESG) investing is a strategy for allocating investment funds on the basis of the extent to which the operations of a company, or a portfolio of companies, affect the environment, advance social justice, or follow good corporate governance practices. It is of intense and increasing interest to millions of investors who seek to minimize financial risks and maximize their financial returns. It also appeals to investors who seek to align their investments with their core personal values.

An important question is how the Securities and Exchange Commission (SEC)—and to a lesser degree, the U.S. Department of Labor (DOL)—should regulate ESG investment offerings in mutual funds and other types of funds. Three distinguished scholars have conducted some empirical analysis to gauge the need for additional regulatory oversight in this area.[1] Taken at face value and without delving into any aspect of the methodology, the findings themselves are encouraging, at least as far as they go. Their analysis indicates that ESG mutual funds really do offer their investors increased ESG exposure, vote shares in ways that support the ESG principles, and do so without increasing costs or reducing returns for investors. If true, these findings bode well for the ESG investment movement.

But a key question is what conclusions follow from these findings. The authors contend that, in light of their study, there is no reason to single out ESG funds for special regulation or what they refer to as "regulatory intervention."

Here, we part company, at least to a degree. First, let's note some common ground. To the extent the authors oppose regulatory attempts to limit investor access to ESG products or to curtail their use by Employee Retirement Income Security Act (ERISA) fiduciaries, we agree. For that reason, we opposed the DOL's ideological and misguided attempt to inhibit the use of ESG investments by ERISA fiduciaries. Fortunately, the DOL under the Joseph Biden Administration has amended that rule, and in March it survived a Congressional Review Act resolution of disapproval thanks to President Biden's veto.

However, our core point is that there are still good reasons for additional regulatory requirements governing ESG funds. Such measures are necessary for at least three reasons: to protect investors from abuse; to bring order to a complex and confusing market by requiring clear, standardized, and comparable disclosures; and to maintain investor confidence in the integrity of this evolving market so that ultimately it can fulfill its potential. In short, regulation in the ESG market is necessary not only to protect investors, but also to foster an environment in which it can thrive. And indeed, the SEC has headed in this direction by proposing two important rules, one to prevent the use of misleading fund names and the other to provide investors in ESG funds with more detailed, consistent, and comparable disclosures.

II. The Nature of the ESG Market Makes Regulation Necessary and Appropriate

Before briefly fleshing out these points, it is important to highlight the attributes of ESG investing that influence our thinking on the need for additional regulation. ESG investing is in huge demand; it is experiencing explosive growth; it is attracting trillions of dollars of investor funds; it has spawned a confusing and complex ESG investment industry; it offers attractive profits for funds that can take advantage of investors' enormous appetite for ESG investing; and there is every reason to believe that the trend will continue, as the vast majority of millennials favor ESG investing.

At the same time, investors are confronted by a daunting array of investment options and a lack of clear and consis-

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Author's Note: Better Markets is a nonprofit, non-partisan, and independent organization founded in the wake of the 2008 financial crisis to promote the public interest in the financial markets. A substantial amount of our advocacy is focused on improving the securities markets, and that includes fighting for important investor protections, including anti-fraud provisions and clear and comprehensive disclosures that investors need to make informed financial decisions.

1. *See* Quinn Curtis et al., *Do ESG Funds Deliver on Their Promises?* 120 Mich. L. Rev. 393 (2021).

tent information about those options. There are hundreds of ESG mutual funds, hundreds of ESG rating providers using different methodologies, and countless ESG indexes that track companies using various ESG metrics. And as the authors note in their article, there isn't even a common, clear definition of exactly what ESG means.

Given this backdrop, the threat of investor abuse remains high. In addition, the need for greater clarity, uniformity, and comparability in the disclosure of information about ESG investing should be clear.

The case gets even stronger given the appropriate role for preventive regulation. The authors' perspective reflects too much of the "fingers crossed, let's leave well enough alone" approach. Given the massive scale, popularity, and importance of ESG investing, the optimal approach is to get ahead of potential and foreseeable problems. As the U.S. Court of Appeals for the District of Columbia (D.C.) Circuit has said, regulatory agencies have the latitude to "adopt prophylactic rules to prevent potential problems before they arise. An agency need not suffer the flood before building the levee."[2] Thus, even if the ESG fund marketplace were generally in good order, the SEC would be justified in establishing guardrails to head off future problems.

Let's now turn to the three specific reasons why regulation relating to ESG funds is warranted—investor protection, disclosure, and market confidence.

III. Targeted Regulation Will Help Curb Abuses

With respect to investor protection, there have been and continue to be patterns of misconduct in the world of ESG-focused funds, warranting vigilant enforcement as well as additional regulatory measures. The SEC's actions reflect these concerns.

In March 2021, the Commission announced the creation of the Climate and ESG Task Force within the Division of Enforcement to focus on inadequate disclosures and material misstatements in ESG-related disclosures.[3] One month later, in April 2021, the SEC's Division of Examinations issued a Risk Alert. It found that the "rapid growth in demand, increasing number of ESG products and services, and lack of standardized and precise ESG definitions present certain risks."[4] The Alert went on to discuss several specific "observations of deficiencies and internal control weaknesses" identified during the examinations of investment advisers and funds with respect to ESG investing. These risks included unsubstantiated or misleading claims of ESG approaches, proxy voting inconsistent with ESG strategy, inadequate internal controls, weak or unclear documentation, and more. The Commission has also issued a number of Investor Bulletins and other releases focused on concerns surrounding ESG investing. It continues to bring enforcement actions against issuers and funds for misconduct in climate and ESG-related disclosures, including cases against BNY Mellon[5] in May 2022 and against Goldman Sachs[6] in November 2022.

Beyond enforcement, the SEC has also taken regulatory action to address potential abuses in the ESG marketplace. In June 2022, it published a rule proposal to fortify what is known as the Names Rule.[7] That rule already requires funds to adopt a policy to invest at least 80% of their assets in accordance with the investment focus that the fund name suggests. The recent proposal would expand this requirement and apply it to fund names suggesting a focus on investments that have particular characteristics, including names indicating that the fund's investment decisions incorporate one or more ESG factors. The rule would also require enhanced disclosures about how fund names track their investments, prospectus definitions of the terms used in a fund's name, and the retention of records regarding how a fund complies with the rule.

This effort to curtail the use of misleading fund names stems from the reality that fund names have an exceptionally powerful influence on investors. Evidence shows that with the mere mention of the ESG factors in a name, funds can almost instantly attract huge inflows from investors.[8]

IV. Targeted Regulation Will Ensure Investors Receive the Clear and Consistent ESG Disclosures They Need and Want

Another area where regulatory intervention is especially important is in the realm of disclosure. The fact is that investors do not have access to clear, consistent, and comparable information on which to base their investment decisions when it comes to ESG investments. The SEC has moved on this front as well. In June 2022, along with the Names Rule, it published a proposal that would require investment companies to disclose to investors, and report to the SEC, additional information regarding their ESG investment strategies, depending on the extent to which a fund uses the ESG factors in its investment selection and

2. Stilwell v. Office of Thrift Supervision, 569 F.3d 514, 519 (D.C. Cir. 2009).
3. U.S. Securities and Exchange Commission, *SEC Announces Enforcement Task Force Focused on Climate and ESG Issues*, https://www.sec.gov/news/press-release/2021-42 (last visited May 21, 2023).
4. U.S. Securities and Exchange Commission Division of Examinations, *The Division of Examinations' Review of ESG Investing* 2, https://www.sec.gov/files/esg-risk-alert.pdf (Apr. 9, 2021).
5. U.S. Securities and Exchange Commission, *SEC Charges BNY Mellon Investment Adviser for Misstatements and Omissions Concerning ESG Consideration*, https://www.sec.gov/news/press-release/2022-86 (last visited May 21, 2023).
6. U.S. Securities and Exchange Commission, *SEC Charges Goldman Sachs Asset Management for Failing to Follow Its Policies and Procedures Involving ESG Investments*, https://www.sec.gov/news/press-release/2022-209 (last visited May 21, 2023).
7. Investment Company Names (File No. S7-16-22, RIN 3235-AM72); 87 Fed. Reg. 36594 (June 17, 2022), https://www.sec.gov/rules/proposed/2022/33-11067.pdf.
8. *See* Better Markets, *Re: Investment Company Names (File No. S7-16-22, RIN 3235-AM72); 87 Fed. Reg. 36,594 (June 17, 2022)* [Better Markets' Aug. 16, 2022 Comment Letter to the SEC on Investment Company Names], https://bettermarkets.org/wp-content/uploads/2022/08/Better_Markets_Comment_Letter_SEC_Investment_Company_Names.pdf (last visited May 21, 2023).

engagement process, framed in terms of integration funds, ESG focused funds, and ESG impact funds.[9]

The rule would require additional specific disclosures regarding ESG strategies in fund prospectuses, annual reports, and adviser brochures; implement tabular disclosures to allow investors to compare ESG funds at a glance; and require certain environmentally focused funds to disclose the greenhouse gas emissions associated with their portfolio investments. Finally, the Proposal would require funds to use formats that provide investors with machine-readable data for their ESG disclosures.[10] The SEC's release clearly sets forth the rationale for the rule:

> The proposed amendments to these forms and associated rules seek to facilitate enhanced disclosure of ESG issues to clients and shareholders. The proposed rules and form amendments are designed to create a consistent, comparable, and decision-useful regulatory framework for ESG advisory services and investment companies to inform and protect investors while facilitating further innovation in this evolving area of the asset management industry.[11]

V. Targeted Regulation Will Help ESG Thrive

The SEC's reference to innovation is a good segue to the last reason why we support additional reform in the ESG investment market: Strong regulation of ESG funds will actually help this important movement thrive. New protections and requirements, including those the SEC has recently proposed, will satisfy investor demand for the accurate and complete information they need to make optimal investment decisions, and it will fortify investor confidence in the integrity of the ESG market. In short, strong regulation means investor trust, which means greater investor participation, which means more robust and efficient capital allocation, better returns, and more social good. These benefits accrue whether investors are seeking ESG-related investments to save the planet or to reap better financial returns from companies that are positioned to adapt and profit from climate change and other trends.

VI. The Industry's "Sky Is Falling" Strategy Is Baseless

It is important to emphasize one more point that underlies much of the debate surrounding the wisdom of new regulation. So often, attempts to fend off new rules are premised on the notion that regulation imposes crushing burdens on the financial industry or even harms investors by reducing choices and stifling innovation.

These dire predictions are seldom if ever borne out. Recall just this one early example: When the state and federal securities laws first emerged a century ago, they were greeted with howls of protest portraying them as attacks on legitimate businesses that would stifle capitalism. Yet, it is precisely those laws that have created the environment in which our markets and ultimately our economy have thrived. The SEC and all of us must view these attacks with skepticism and follow the goals that underlie the securities laws, which are protecting investors, preserving the integrity of the markets, and promoting robust capital formation.

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9. Enhanced Disclosures by Certain Investment Advisers and Investment Companies About Environmental, Social, and Governance Investment Practices (File No. S7-17-22, RIN 3235-AM96); 87 Fed. Reg. 36654 (June 17, 2022), https://www.sec.gov/rules/proposed/2022/33-11068.pdf.
10. *See* Better Markets, *Re: Enhanced Disclosures by Certain Investment Advisers and Investment Companies About Environmental, Social, and Governance Investment Practices* [Better Markets' Aug. 16, 2022 Comment Letter to the SEC on Enhanced Disclosures by Certain Investment Advisers and Investment Companies About Environmental, Social, and Governance Investment Practices], https://bettermarkets.org/wp-content/uploads/2022/08/Better_Markets_Comment_Letter_ESG_Disclosures.pdf (last visited May 21, 2023).
11. 87 Fed. Reg. at 36654.

COMMENT

ESG IS INVESTMENT STRATEGY

by Anne Kelly

Anne Kelly is Vice President of Government Relations at Ceres and leads the Ceres Policy Network, Business for Innovative Climate and Energy Policy.

The authors' article, *Do ESG Mutual Funds Deliver on Their Promises*, is a timely and insightful piece with several important conclusions. I have three principal observations to add to the commentary on the paper: (1) Securities and Exchange Commission (SEC) regulations that would require stricter definitions and more robust disclosure are important for the health and legitimization of the ESG market; (2) climate risk is financial risk—investors want to make money, and the ESG market is providing them with an opportunity to do so; and (3) despite the positive results identified by studies like that conducted by Curtis et al., at the state level, several problematic bills have been passed to restrict investment practices by prohibiting the consideration of ESG and other factors, and these bills are projected to cost taxpayers millions of dollars. I address these points below.

First, robust disclosure is essential for the decisionmaking of investors, and enhanced climate risk disclosure will enhance the ESG market by allowing investors to understand the nature of climate risk and make decisions accordingly. There is an important distinction between the valuable disclosure requirements that are emerging from the SEC and the efforts to regulate ESG by state legislatures that I mention below. Informing investors is critically important given that the area of ESG investing is growing and evolving rapidly. Heightened transparency would help fortify the role of ESG investing, and the SEC's proposed regulations take an important step in that direction. They should be finalized quickly and without watering down the core climate risk and greenhouse gas disclosure provisions.

Second, several experienced investors have spoken on the topic of ESG investing and have emphasized that climate risk is investment risk. Investors strive to make profitable returns and must consider the long-term impacts of their investments. They use investment strategies and make decisions that revolve around prudent risk management and opportunity optimization. Thus, as climate change worsens and the marketplace shifts in response to climate and related risks, investors can be expected to increase their interest in the investment opportunities offered by ESG funds.

Third, despite the favorable performance of ESG funds identified in the Curtis et al. study and the growing importance to investors of climate change and the energy transition, ESG opponents have introduced roughly 140 bills in state legislatures this year that would limit state investment practices by prohibiting the consideration of non-pecuniary factors. Many of these bills appear to target ESG factors in particular. They miss the mark because, as I noted above, climate risk and financial risk are inherently intertwined and climate risk can only be expected to grow. Legislators are increasingly realizing that ESG investing is risk-based investing, though, and Ceres is leading an initiative called "Freedom to Invest," which points out that politicians should not be telling investors what considerations they should include in their private investment decisions and state pensioners should not be losing their retirement funds because of the politicians' preferences. Fortunately, many of the ESG restriction efforts have been scuttled amid revelations about the millions of dollars in additional taxpayer costs that would arise from these policies.

In short, the Curtis et al. paper is an important contribution to our understanding of the importance and effects of ESG investing. Policymakers at the federal and state levels would do well to allow financial disclosure to do what it does best: enable investors to make informed choices to reduce financial risk, which these days must include climate risks.

Editors' Note: Anne Kelly's Comment is based on an edited transcription of her remarks at the Environmental Law and Policy Annual Review conference. See 2022-2023 Environmental Law and Policy Annual Review Conference, available at https://www.eli.org/environmental-law-and-policy-annual-review.

ARTICLE

4°C

by J.B. Ruhl and Robin Kundis Craig

J.B. Ruhl is the David Daniels Allen Distinguished Chair of Law at Vanderbilt University Law School. Robin Kundis Craig is the Robert C. Packard Trustee Chair in Law at the University of Southern California Gould School of Law.

I. Introduction

Accelerating ice loss and expanding wildfire zones are potential markers of what are known as tipping points—thresholds along a nonlinear pattern of system change that accelerate the pace of change.[1] Scientists are concerned that our global climate system is dangerously close to passing these points.[2]

This trend has significant implications for governance and law. Climate change disruptions will extend beyond biophysical systems to social systems, including systems of governance.[3] Failing to anticipate and adaptively plan for that future presents an existential threat to democratic governance.

There is now widespread agreement mitigation and adaptation must be *concurrent* governance efforts.[4] However, adaptation inherently requires *present* governance institutions to anticipate uncertain *future* conditions in constant flux. *Anticipatory governance* reflects this challenge of formulating adaptation policy strategies built around possible future scenarios.[5]

The standard mitigation policy goal has been to contain the global average increase in temperature to 1.5° Celsius (°C) above pre-industrial levels ideally, and to 2°C at worst.[6] Adaptation policy has likewise focused on the measures needed to adjust to this relatively limited amount of warming.[7] Yet, research increasingly identifies warming of 2°C as a likely tipping point threshold for many ecological systems, with cascading effects on social systems, and things only get worse as the temperature keeps increasing.[8]

The vision of a 1.5-2°C future has played out in adaptation policy through three interconnected adaptation modes. First, to *resist* the impacts of climate change. Second, to build the *resilience* of social-ecological systems. Third, to *retreat* from unavoidable impacts.[9]

Moving past 2°C will require adding a fourth adaptation mode—*redesign*. By "redesign," we mean transformational adaptation measures needed to reconfigure and relocate our nation's population distribution, land uses, infrastructure, economic and production networks, and natural resource management.[10] Engaging *now* in anticipatory adaptation is the best chance of avoiding a breakdown in democratic governance.

Editors' Note: This Article is adapted from J.B. Ruhl & Robin Kundis Craig, *4°C*, 106 Minn. L. Rev. 191 (2021), *and used with permission.*

1. *See* Marten Scheffer et al., *Early-Warning Signals for Critical Transitions*, 461 Nature 53, 53 (2009).
2. *See* Timothy M. Lenton et al., *Climate Tipping Points—Too Risky to Bet Against*, 575 Nature 592, 592-95 (2019) (corrected Apr. 9, 2020). Michalea D. King et al., *Dynamic Ice Loss From the Greenland Ice Sheet Driven by Sustained Glacier Retreat*, 1 Commc'ns Earth & Env't 1, 1 (2020) (corrected Sept. 4, 2020). Romain Hugonnet et al., *Accelerated Global Glacier Mass Loss in the Early Twenty-First Century*, 592 Nature 726, 726 (2021).
3. *See generally The Ocean and Cryosphere in a Changing Climate: A Special Report of the Intergovernmental Panel on Climate Change*, Intergovernmental Panel on Climate Change 85 (2019), https://www.ipcc.ch/site/assets/uploads/sites/ 3/2019/12/SROCC_FullReport_FINAL.pdf [https://perma.cc/C6XJ-KNAJ].
4. *See Climate Change 2014: Synthesis Report*, Intergovernmental Panel on Climate Change 17 (2014), https://www.ipcc.ch/site/assets/uploads/2018/02/ SYR_AR5_FINAL_full.pdf [https://perma.cc/XFT5-EKAN].
5. *See, e.g.*, Karlijn Muiderman et al., *Four Approaches to Anticipatory Climate Governance: Different Conceptions of the Future and Implications for the Present*, 11Wires Climate Change, Oct. 9, 2020, at 2; Ray Quay, *Anticipatory Governance: A Tool for Climate Change Adaptation*, 76 J. Am. Planning Ass'n 496, 498-99 (2010); Joost Vervoort & Arti Gupta, *Anticipating Climate Futures in a 1.5°C Era: The Link Between Foresight and Governance*, 31 Current Op. in Envt'l Sustainability 104, 105 (2018). *See, e.g.*, David H. Guston, *Understanding "Anticipatory Governance*, 44 Soc. Stud. Sci. 218, 219 (2014).
6. *Global Warming of 1.5 °C*, Intergovernmental Panel on Climate Change 56 (2018), https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf [https://perma.cc/5L7C-M4WK] [hereinafter *2018 IPCC 1.5°C Report*].
7. *See generally* The Law of Adaptation to Climate Change: U.S. and International Aspects (Michael B. Gerrard & Katrina Fischer Kuh eds., 2012) [hereinafter Law of Adaptation].
8. Will Steffen et al., *Trajectories of the Earth System in the Anthropocene*, 115 Proc. Nat. Acad. Sci. 8252, 8253-54 (2018).
9. *See infra* Part III.A.3. We acknowledge there are other ways to name these modalities. *See, e.g.*, Katharine J. Mach & A.J. Siders, *Reforming Strategic, Managed Retreat for Transformative Climate Adaptation*, 372 Sci. 1294, 1294 (2021).
10. *See infra* Part III.C (discussing the redesign adaptation mode).

II. Embracing 4°C: Why 2°C Is Too Conservative for Anticipatory Adaptation Governance

A. *Where Are We Now? The Current Increase and Trends in Global Average Temperature*

At current rates, global average temperatures will be 2°C warmer by 2067. However, "[e]stimated anthropogenic global warming is currently increasing at 0.2°C (likely between 0.1°C and 0.3°C) per decade due to past and ongoing emissions (*high confidence*)."[11]

B. *Where Are We Going? Committed Warming and Projections for Global Average Temperatures*

In 2017, researchers estimated by 2100 "[t]he likely range of global temperature increase is 2.0-4.9°C, with a median of 3.2°C . . . ."[12] Barring rapid global political, social, and technological transformations, we will be fortunate to limit temperature rise to 2.6°C, and the possibility of reaching 4.0°C cannot be ignored.

III. Anticipating 4°C: What Does the World Look Like Beyond 2°C?

Climate change is, well, *change*. Envisioning governance of the United States at 4°C requires adaptation planners to imagine an accelerating *process* of discontinuous transformation.

A. *Coming to Grips With Nonlinear Change*

The impacts from a steadily increasing mean global average temperature are *nonlinear* in two senses. First, the amount of change occurring is often geometric. Second, at some point the changes fundamentally alter social-ecological systems.[13] Beyond 2°C, the world is likely to look profoundly different.[14] First, humans will be migrating *en masse*, as middle latitudes become increasingly uninhabitable. Second, food insecurity will become problematic.[15] Third, sea-level rise, melting ice, and severe storms will transform the coasts.[16] Fourth, the rest of the biosphere will suffer from climate change itself and from humanity's attempts to adapt.[17]

B. *Imagining the United States When the World Is 4°C Warmer*

What will a 4°C warmer United States look like? Although the direct impacts may be uneven across the nation and across economic sectors, climate-induced impacts in one region or sector undoubtedly will have effects elsewhere.[18]

The impacts of domestic climate-induced inter-regional migration within the United States have been ignored in adaptation planning. New adaptation governance will be necessary to cope with migration impacts and the other transformations in a 4°C world.[19]

IV. Adapting to 4°C: Reorienting Adaptation Policy for Anticipatory Redesign

A. *Resistance, Resilience, and Retreat*

Current adaptation policy can be sorted into three modes: *resistance*, *resilience*, and *retreat*.[20]

1. Resistance

Resistance policies focus on building infrastructure and other mostly technological defenses to climate change impacts in order to protect human communities.[21] Resistance strategies often take the form of "hard" infrastruc-

11. *See, e.g.*, *Global Warming of 1.5°C*, Intergovernmental Panel on Climate Change 56 (2018), https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf. [hereinafter *2018 IPCC 1.5° Report*], at 4.
12. Adrian E. Raftery et al., *Less Than 2°C Warming by 2100 Unlikely*, 7 Nature Climate Change 637, 639 (2017).
13. *See* Mark Stafford Smith et al., *Rethinking Adaptation for a 4°C World*, 369 Phil. Transactions Royal Soc'y A 196, 196 (2011).
14. *See* Mark New et al., *Four Degrees and Beyond: The Potential for Global Temperature to Increase Four Degrees and Its Implications*, 369 Phil. Transactions Royal Soc'y A 6, 6 (2011).
15. Gaia Vince, *The Heat Is On Over the Climate Crisis. Only Radical Measures Will Work*, Guardian (U.K.) (May 18, 2019), https://www.theguardian.com/environment/2019/may/18/climate-crisis-heati-is-on-global-heating-four-degrees-2100-change-way-we-live [https://perma.cc/R9AK-ZZQY]; *see also* Éva Plagányi, *Climate Change Impacts on Fisheries*, 363 Sci. 930, 930-31 (2019).
16. Vince, *supra* note 15.
17. *Id.*
18. *See* Rachel Warren, *The Role of Interactions in a World Implementing Adaptation and Mitigation Solutions to Climate Change*, 369 Phil. Transactions Royal Soc'y A 217, 219-33 (2011).
19. W. Neil Adger et al., *Urbanization, Migration, and Adaptation to Climate Change*, 3 One Earth 396, 396 (2020).
20. *See* J.B. Ruhl, *Climate Change Adaptation and the Structural Transformation of Environmental* Law, 40 Env't L. 363, 387-89 (2010) (using the terms resist, transform, move); *see also* Robert R.M. Verchick & Joel D. Scheraga, *Protecting the Coast*, *in* Law of Adaptation, *supra* note 7, at 239 (using the terms resistance, adjustment, and retreat); Trip Pollard, *Damage Control: Adapting Transportation to a Changing Climate*, 39 Wm. & Mary Env't L. & Pol'y Rev. 365, 378 (2015) (listing the various terms); Mark Scott & Mick Lennon, *Climate Disruption and Planning: Resistance or Retreat?*, 21 Plan. Theory & Prac. 125, 130 (2020) (using a variety of these terms); A.R. Siders & Jesse M. Keenan, *Variables Shaping Coastal Adaptation Decisions to Armor, Nourish, and Retreat in North Carolina*, 183 Ocean & Coastal Mgmt., Jan. 1, 2020, at 2.
21. *See* Ruhl, *supra* note 20, at 385-86; *see also* Robert R.M. Verchick & Joel D. Scheraga, *Protecting the Coast*, *in* Law of Adaptation, *supra* note 7, at 235-37; Mach & Siders, *supra* note 9.

ture, which comes with significant environmental impacts and economic costs.[22]

2. Resilience

Climate resilience policies are designed to facilitate a community's capacity to cope with climate change where impacts cannot be avoided or effectively resisted.[23] Enhancing resilience capacity technology and response management strategies has long been a focus of public policy independent of climate change.[24]

3. Retreat

Retreat policies focus on intentionally abandoning areas subject to harms and relocating the people and structures to less vulnerable locations.[25] Retreat is increasingly recognized as a necessary mode of adaptation, while accommodating a variety of social values, including increased equity.[26]

B. The Three Rs Versus 4°C

Current adaptation policy proposes deploying the Three Rs to manage the key drivers of adaptation need.[27] This focus on incremental adaptation carried out largely at state and local scales has led to a heavy emphasis on "climate proofing" at a small scale through resistance and resilience strategies,[28] with an assumption that adaptation will continue to occur in situ.

However, the 2°C mark is likely the threshold at which climate change takes on new and unmanageable properties and mass migrations occur with increasing frequency.[29] Consequently, transformational adaptation policies will need to operate at larger scales, introduce novel strategies, and contemplate major changes.[30]

C. Reframing Adaptation for Redesign

The Three Rs are not aimed at managing the fundamental redesign of biophysical systems that 4°C will impose, and an anticipatory adaptation policy must also prepare to redesign *social* systems.[31] Redesign is about designing and facilitating relocations and reconfigurations necessary for successful adaptations for a "beyond 2°C" world.

The scale of redesign adaptation requires shifting the primary policy locus from local and state to regional and national.[32] Local adaptation planning will still look inward to manage local needs, but it will also need to look *outward* to plan coherently with larger-scale redesign needs.

V. Governing at 4°C: Conceptualizing, Planning, and Implementing Redesign Adaptation

The most important consequence of transformational 4°C warming for conceptualizing the governance of redesign adaptation is massive human migration within the United States.[33] Preservation of a functional democracy imposes two additional requirements. First, governance of these changes must be legitimate, so citizens accept and comply with the changes. Second, governance of these changes must be equitable.[34]

That leaves two last questions: First, How should the United States plan, finance, and coordinate this national-scale adaptation effort?; and, second: Who's in charge?[35] Given the scale of redesign adaptation, we posit the answer to both questions will lie primarily in the federal government. Human migration within the United States will require a national perspective, coordination, and budget.[36] The governance challenges and solutions from the Great

22. *See* Robert R.M. Verchick & Joel D. Scheraga, *Protecting the Coast*, *in* Law of Adaptation, *supra* note 7, at 240-41.
23. *See* Ruhl, *supra* note 20, at 385-86; Robert R.M. Verchick & Joel D. Scheraga, *Protecting the Coast*, *in* Law of Adaptation, *supra* note 7, at 239; *see also* Mach & Siders, *supra* note 9.
24. *See* Sierra C. Woodruff et al., *Adaptation to Resilience Planning: Alternative Pathways to Prepare for Climate* Change, J. Plan. Educ. & Rsch. 1, 1-3.
25. *See* Ruhl, *supra* note 20, at 388-89; Robert R.M. Verchick & Joel D. Scheraga, *Protecting the Coast*, *in* Law of Adaptation, *supra* note 7, at 239; Mach & Siders, *supra* note 21.
26. Mach & Siders, *supra* note 9, at 1296-99.
27. *See Climate Change Impacts in the United States: The Third Climate Assesment*, U.S. Glob. Change Rsch. Program U.S. 9 (2014), https://nca2014.global-change.gov/downloads/high/NCA3_Climate_Change_Impacts_in_the_United%20States_HighRes.pdf[https://perma.cc/DV6W-6CF3] [hereinafter 2014 U.S. Climate Impact Report], at 201-02, 671-706 (discussing "[a]daptation in the context of biodiversity and natural resource management"); *Adapt Now: A Global call for Leadership on Climate Resiliance*, Glob. Comm'n on Adaptation 3, 9-11, 19-21, 31-34 (2019), https://gca.org/wp-content/uploads/2019/09/ClobalCommission_Report_FINAL.pdf [https://perma.cc/9GYN-969W] [hereinafter *Adapt* Now].
28. *See generally* Robert W. Kates et al., *Transformational Adaptation When Incremental Adaptations to Climate Change Are Insufficient*, 109 Proc. Nat. Acad. Sci. 7156 (2012); Mark Scott & Mick Lennon, *Climate Disruption and Planning: Resistance or Retreat?*, 21 Plan. Theory & Prac. 125, 142 (2020). *See* Justine Bell & Mark Baker-Jones, *Retreat From Retreat—The Backward Evolution of Sea-Level Rise Policy in Australia, and the Implications for Local Government*, 19 Loc. Gov't L.J. 23, 24-30 (2014).
29. *See* Steffen et al., *supra* note 8, at 8254-56.
30. Kates et al., *supra* note 28, at 7158; *see also* Kirstin Dow et al., *Limits to Adaptation to Climate Change: A Risk Approach*, 5 Current Op. Env't Sustainability 384, 385-86 (2013); Alark Saxena et al., *Knowledge, Attitudes and Practices of Climate Adaptation Actors Towards Resilience and Transformation in a 1.5°C World*, 80 Env't Sci. & Pol'y 152, 157-58 (2018); Giacomo Fedele et al., *Transformative Adaptation to Climate Change for Sustainable Social-Ecological Systems*, 101 Env't Sci. & Pol'y 116, 116-20 (2019); Tyler Felgenhauer, *Addressing the Limits to Adaptation Across Four Damage-Response Systems*, 50 Env't Sci. & Pol'y 214, 214-15 (2015).
31. *See* Kates et al., *supra* note 28, at 7159.
32. *See generally* Kates, *supra* note 28 ("In some places . . . vulnerabilities and risks may be so sizeable that they can be reduced only by novel or dramatically enlarged adaptation.").
33. *See generally* Warren, *supra* note 18, at 228 (discussing cross-regional migration resulting from 4°C warming consequences).
34. Iselin Theien, *Food Rationing During World War Two: A Special Case of Sustainable Consumption?*, Anthropology Food S5, Sept. 2009, at ¶ 31; Wendy Moore, *Oh! What a Lovely Diet*, Guardian (U.K.) (Jan. 13, 2001), https://www.theguardian.com/theobserver/2001/jan/14/life1.lifemagazine5 [https://perma.cc/974K-7E2B].
35. *See* Robert L. Glicksman, *Climate Change Adaptation: A Collective Action Perspective on Federalism Considerations*, 40 Env't L. 1159 (2010); *see also* Alejandro E. Camacho & Robert L. Glicksman, Reorganizing Government: A Functional and Dimensional Framework 197-205 (2019).
36. Exec. Order No. 14008, 86 Fed. Reg. 7619 (Jan. 27, 2021) [hereinafter Biden Climate Change E.O.] at §§102(f), 202, 203.

Depression, Dust Bowl, and World War II provide historical precedents for redesign adaptation.

However, that is not to say transitioning to governance for a 4°C nation will be easy. There are four critical starting points. Our public and private governance institutions must recognize: (1) transformative change will occur in diverse modalities simultaneously, complicating the governance of redesign adaptation; (2) the various governance tools available require careful deployment toward coordinated goals; (3) such deployment will require a coherent, anticipatory model for designing policy strategies around the intersections of change modes with governance modes; and (4) there is a need *now* to actively plan for redesign adaptation and its governance.

A. *Different Modes of Change: A Planning Typology for Redesign*

The decision to migrate or stay in the face of a climate-induced threat is influenced by a complex interaction of forces.[37] Geographer Robert McLeman outlines a progression of thresholds:

> Six types of thresholds in response to climate hazards are identified: (1) Adaptation becomes necessary; (2) Adaptation becomes ineffective; (3) Substantive changes in land use/livelihoods become necessary; (4) In situ adaptation fails, migration ensues; (5) Migration rates become non-linear; and (6) Migration rates cease to be non-linear.[38]

Collectively, McLeman's six stages embody the three modes of change resulting from climate change-induced human migration. Baseline linear change remains the dominant mode of migration in stages 1-3, which might look little different from current baseline population movement patterns in the United States. Nonlinear change begins in stage 4 and continues into stage 5, the stage representing the concern for 4°C adaptation.[39] By stage 6, cascade change becomes the dominant mode, during which human migration triggers numerous other system changes.[40]

1. Baseline Linear Change

Many of the direct effects of climate change will transpire in incremental, linear trends over relatively long time frames.[41] Long-term effects of baseline linear migration, such as movement from rural to urban areas, thus eventually can present policy challenges from accumulating effects, such as increased competition for employment and housing.[42]

2. Nonlinear Change

Climate change already is having effects departing from baseline linear change,[43] such as population migration. Sea-level rise is expected to produce this kind of nonlinear migration wave.[44] Policy issues are sure to arise as out-migration threatens economic and social prosperity in some areas and influxes of population in other regions stress housing supply, employment opportunity, and infrastructure capacity.[45]

3. Cascade Change

Rising temperatures will cause ecological and social systems to cross tipping points. Such tipping point "sudden onset" events have triggered migration cascades in the past, such as the Dust Bowl and post-Katrina relocations.[46]

B. *The Toolbox: An Implementation Typology for Redesign*

1. Laissez-Faire

Faith in the invisible hand of the market may work surprisingly well to push and pull adaptation in the right directions. One important player in climate-affected markets is likely to be the private insurance industry. An important adaptation role for private insurance companies is as market signalers of when in situ adaptation is becoming too expensive to be profitable.[47] [48]

2. Planning and Prodding

A soft mode of government intervention involves planning to guide public policy and prodding to guide private actors into stepping in line with those policies.

37. *See* Mathew E. Hauer et al., *Sea-Level Rise and Human Migration*, 1 Nature Revs. Earth & Env't 28, 29 (2020).
38. Robert McLeman, *Thresholds in Climate Migration*, 39 Population & Env't 319, 319 (2018).
39. *Id.* at 324.
40. *Id.* at 325-26.
41. *See* Andrew C. Kemp & Benjamin P. Horton, *Contribution of Relative Sea-Level Rise to Historical Hurricane Flooding in New York City*, 28 J.Q. Sci. 537, 539 (2013) (charting linear sea-level rise since 1775); *see also* Syun-Ichi Akasofu, *On the Present Halting of Global Warming*, 1 Climate 4, 5 (2013); *see also* John P. McCarty, *Ecological Consequences of Recent Climate Change*, 15 Conservation Biology 320, 323 (2001) (cataloguing effects of climate change on various species).
42. Michelle Leighton, *Population Displacement, Relocation, and Migration*, *in* Law of Adaptation, *supra* note 7, at 693-94.
43. Robin Kundis Craig, *"Stationarity Is Dead"—Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 Harv. Env't L. Rev. 9, 23-27 (2010); P.C.D. Milly et al., *Stationarity Is Dead: Whither Water Management?*, 319 Sci. 573, 573-74 (2008).
44. *See* Matthew E. Hauer, *Migration Induced by Sea-Level Rise Could Reshape the US Population Landscape*, 7 Nature Climate Change 321, 321-25 (2017).
45. Qin Fan et al., *Climate Change, Migration and Regional Economic Impacts in the United States*, 5 J. Ass'n Env't & Res. Economist 643, 644-45 (2017).
46. McLeman, *supra* note 38, at 324-27; Robert A. McLeman et al., *What We Learned From the Dust Bowl: Lessons in Science, Policy, and Adaptation*, 35 Population & Env't 417, 429, 433-34 (2014).
47. Christopher Flavelle, *California Bars Insurers From Dropping Policies in Wildfire Areas*, N.Y. Times (Nov. 5, 2020), https://www.nytimes.com/2020/11/05/climate/california-wildfire-insurance.html [https://perma.cc/VD64-VX7Y].
48. Rebecca Moybray, *Five Years After Hurricane Katrina, Home Insurance Prices Remain Astronomical*, NOLA.com (June 25, 2019), https://www.nola.com/news/business/article_a6b466ee-28c4-5096-a6bf-0baa7565bd98.html [https://perma.cc/83TV-N6VS].

a. Planning

Redesign adaptation will require massive planning. First, redesign adaptation requires a spatial rearrangement of both people and land uses on a national scale.

Second, there is considerable agreement the United States' basic infrastructure already warrants increased investment. The bipartisan appeal of investment makes infrastructure a leading candidate to kickstart adaptation.[49] [50]

Third, redesign adaptation will require increased and directed research across the sciences and engineering to better project climate change impacts; to identify important tipping points and thresholds; and to both identify and develop tools for the multiple transitions.

Finally, redesign adaptation requires significant amounts of money. Thus, financial planning must also be part of the adaptation toolbox.

b. Prodding

Disaster relief is another area governments could adjust to better serve adaptation, taking the form of relocating destroyed communities and retraining and education for victims.

Tax incentives can help incentivize voluntary contributions to redesign adaptation. State and federal governments could conceivably add their own tax inducements encouraging businesses to begin the migration to redesign-desirable new locations.

A final incentive includes land swaps. Government-owned land can once again become a tool to effectuate policy, this time incentivizing settlement into safer areas while simultaneously shifting other kinds of public uses to depopulated regions.

3. Preemption and Mandates

The United States is no stranger to more forceful modes of public governance intervention, including mandates and preemption. Although controversial, it is difficult to imagine how adaptation policy could succeed without such measures.

a. Cooperative Federalism

Cooperative federalism embedded in multiple environmental and natural resources statutes provides one tested mechanism for coordinating federal and state governments toward a common goal. The U.S. Congress generally uses its constitutional authority to force all states into baseline protections, but leaves each state free to enact more stringent protections.[51]

b. Public Works Programs

If the federal government is going to fund redesign adaptation infrastructure, it might consider doing so through a public works program creating paying jobs and providing training in skills that remain employable throughout the nation's adaptation curve. The most obvious model for this program is President Franklin Delano Roosevelt's "alphabet soup" of programs during the Great Depression.

This alphabet soup could start with an infrastructure focus. First steps include upgrading infrastructure capacity in the areas of future concentrated human settlement and building the infrastructure necessary to decarbonize the energy system. Additionally, the federal government could build on its existing authority under federal pollution statutes to anticipatorily clean up toxic hotspots.[52] New programs could encourage farmers and universities to diversify agricultural production with climate-resilient crops and promote deepwater marine aquaculture.[53]

c. Social Support Networks

The envisioned migration scenario will be disruptive. Governments will need to expand social support networks. Fully portable health coverage would be beneficial. Personal migration financing may become a financial planning specialty and require governmental underwriting.

d. National Economic Policy

The federal government played a key leadership role in preparing the nation economically for World War II.[54] The economic conversion was matched, moreover, by a new wartime administrative bureaucracy.[55]

Redesign adaptation will require a similar scale of economic and societal conversion. This scale of redesign is best coordinated from the national government.

C. Anticipatory Governance: Building Future Scenarios for Policy Strategy Design

Anticipatory adaptation policy design must anticipate both multi-modal change and governance. For that purpose, our vastly simplified models of three modes of change and three modes of governance produce a three-by-three matrix of intersection possibilities, as shown in Table 1 (next page).

Two important points can be derived from this exercise. First, state and local governments are unlikely to be able to manage these nine change-governance modal intersections, meaning that anticipatory redesign governance needs to occur

49. Jeff Stein, *Trump's 2016 Campaign Pledges on Infrastructure Have Fallen Short, Creating Opening for Biden*, Wash. Post (Oct. 18, 2020), https://www.washingtonpost.com/us-policy/2020/10/18/trump-biden-infrastructure-2020/ [https://perma.cc/63HX-GL8F].
50. Biden Climate Change E.O., *supra* note 36, at §§212, 213.
51. *E.g.*, Clean Water Act, 33 U.S.C. §1370.
52. 42 U.S.C. §§9601-9675.
53. *Q&A With Aquaculture Policy Expert Kat Montgomery*, Stronger Am. Through Seafood (Jan. 29, 2021), https://www.strongerthroughseafood.org/tipping-the-scales/2021/2/1/qampa-with-aquaculture-policy-expert-kat-montgomery [https://perma.cc/9A2W-J38G].
54. Christopher J. Tassava, *The American Economy During World War II*, EH.Net Encyclopedia (Feb. 10, 2008), https://eh.net/encyclopedia/the-american-economy-during-world-war-ii/ [https://perma.cc/CM52-G8W5].
55. *Id.*

Table 1: Change Mode and Governance Mode Intersections

	Laissez Faire	Planning and Prodding	Preemption and Mandates
Baseline Linear	Potentially effective in most circumstances but would still benefit from coordination and/or agreed adaptation goals.	Serves an educational function and allows for the building of legitimacy and public consensus; allows equity measures to be put in place early to incentivize the most vulnerable to improve their positions; allows early adopters to prove the advantages.	Probably overkill until the trickle of changes build up over the longer term.
Nonlinear	Inadequate, because ad hoc and market policies are likely to produce uncoordinated and even contradictory responses.	Necessary to coordinate adaptation responses, promote equity, and minimize conflicts; preserves some voluntariness in individual response; provides mass incentives to induce individuals and sectors to follow preferred adaptation pathways.	Increasingly necessary in regions where nonlinear change occurs on a large scale; precautionary measures provide warning of future adaptation requirements and increase motivation to engage early with the "prods."
Cascades	Potentially disastrous, because changes are occurring too rapidly, too transformatively, and on too large a scale for adaptation to occur equitably without significant government involvement.	Incentives aligned with the overall adaptation redesign can still help to motivate and incentivize certain groups of individuals and entities to engage in redesign adaptation semi-voluntarily.	Necessary, because at this point transformative change is happening so fast and on such a large scale that far more centralized control is necessary to achieve redesign adaptation equitably and relatively peacefully.

within a national policy framework.[56] Second, adaptation planning must explicitly build nonlinear and cascade change into adaptation plans. The next section presents our proposal for how to begin.

D. An Initial Step: Creating a National Foresight System for 4°C Adaptation Planning

Anticipatory governance is "a mode of decision-making that perpetually scans the horizon" in order to develop a data-driven "foresight system," integrates foresight into policymaking, and uses feedback to assess and adjust policy implementation.[57] We propose the federal government construct a robust national foresight system as the first step for redesign adaptation.

To be effective, such a system must be broadly multidisciplinary, uniting climate scientists predicting climate impacts with anthropologists predicting human responses with technologists developing the predictive analytics they and the other represented disciplines will use. We propose the research be anchored and directed through a new or expanded science-based research bureau or service within the federal government, akin to the U.S. Geological Survey, rather than as a multiagency task force between existing agencies. Ideally, people with policy experience would also be key members of the research community.

This foresight system initiative thus would address a broad array of questions relevant to the next step in anticipatory governance—namely, integrating the foresight into policymaking. To anticipate how to manage redesign adaptation in the "beyond 2°C" world, it will be essential for the new research bureau to build scenarios of national-scale social and economic responses that are not constrained by existing policy limits, and it must not be punished for doing so.

VI. Conclusion

Even well-functioning democratic governance systems will need to adapt in order to manage a 4°C world effectively. Our democracy focuses on preserving individual choice and protection of private property, often at the expense of public values.[58] It will take a long time to reach 4°C, but the tipping points along the way will lead to cascades of change in social-ecological systems rivaling the pandemic in their flash point disruption effects. If we had developed a robust national foresight system for pandemics and followed through with planning and implementation, the experience might have been much different. Knowing that, we can do better to prepare the nation for the path to 4°C.

56. *See* Quay, *supra* note 5, at 499-505 (presenting case studies of Denver, New York, and Phoenix).
57. Stefano Maffei et al., *Data-Driven Anticipatory Governance. Emerging Scenarios in Data for Policy Studies*, 3 Pol'y Design & Prac. 123, 125 (2020).
58. *See generally* Beckett G. Cantley, *Environmental Preservation and the Fifth Amendment: The Use and Limits of Conservation Easements by Regulatory Taking and Eminent Domain*, 20 Hastings W. Nw. J. Env't L. & Pol'y 215 (2014); Robert Meltz et al., The Takings Issue: Constitutional Limits on Land Use Control and Environmental Regulation (1999). For discussions of standing limitations, see generally, for example, Jeffrey T. Hammons, *Public Interest Standing and Judicial Review of Environmental Matters: A Comparative Approach*, 41 Colum. J. Env't L. 515 (2016); Robin Kundis Craig, *Removing "the Cloak of a Standing Inquiry": Pollution Regulation, Public Health, and Private Risk in the Injury-in-Fact Analysis*, 29 Cardozo L. Rev. 149 (2007); Jeffrey W. Ring & Andrew F. Behrend, *Using Plaintiff Motivation to Limit Standing: An Inappropriate Attempt to Short-Circuit Environmental Citizen Suits*, 8 J. Env't L. & Litig. 345 (1994).

COMMENT

ANTICIPATING AND PREPARING FOR CLIMATE CHANGE

by Joel D. Scheraga

Joel D. Scheraga is Senior Advisor for Climate Adaptation at the U.S. Environmental Protection Agency.

J.B. Ruhl and Robin Kundis Craig have written a very thought-provoking article. As they acknowledge in their article, the Earth's climate is changing at an increasingly rapid rate, outside the range to which society has adapted in the past. Since the Industrial Revolution, the Earth has warmed an average of 1.1° Celsius (°C). It has been estimated by the Intergovernmental Panel on Climate Change (IPCC) that global average temperatures will rise 1.5°C (2.7°F) above pre-industrial levels sometime around the first half of the 2030s due to the burning of fossil fuels.[1]

The Paris Agreement that was adopted in December 2015 by 196 parties to the UN Climate Change Conference (COP21) addressed concerns about the increasing risks posed by climate change. The overarching goal of the treaty is to limit "the increase in the global average temperature to well below 2°C above pre-industrial levels."[2] The treaty also called for virtually every nation to pursue efforts to hold global warming to 1.5°C. The treaty entered into force in November 2016.[3]

Surpassing the 1.5°C level doesn't mean that humanity is doomed. However, beyond 1.5°C, the impacts of climate change, including heat waves, drought, wildfires, more frequent and intense storms and flooding, sea-level rise and damaging storm surges, crop failures and resulting malnutrition, and species extinctions, will become significantly harder for human society to handle.

Realistically, achieving the goal set in the 2015 Paris Agreement of limiting global warming to 1.5°C will be almost unattainable without drastic actions to reduce greenhouse gas emissions. In the absence of any additional efforts to reduce emissions, existing and currently planned fossil fuel infrastructure will produce enough greenhouse gases to warm the planet roughly 2°C this century.

Ruhl and Craig acknowledge these trends and highlight the critical importance of concurrent governance efforts to both mitigate emissions of greenhouse gases to limit the rate of warming and anticipatorily adapt for inevitable impacts. This call for action is to be applauded. As noted in the IPCC's 2023 AR6 Synthesis Report,

> Climate change is a threat to human well-being and planetary health (very high confidence). There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all (very high confidence). Climate resilient development integrates adaptation and mitigation to advance sustainable development for all, and is enabled by increased international cooperation including improved access to adequate financial resources, particularly for vulnerable regions, sectors and groups, and inclusive governance and coordinated policies (high confidence). The choices and actions implemented in this decade will have impacts now and for thousands of years (high confidence).[4]

Ruhl and Craig go a step further. They argue that barring rapid global political, social, and technological transformations, we will be fortunate to limit temperature rise to 2.0°C and the possibility of reaching 4°C cannot be ignored.

Reaching a 4°C world would certainly have potentially catastrophic consequences. However, as suggested in the IPCC AR6 Synthesis Report, many of the most dire climate scenarios once feared by scientists, such as 4°C or more, now look unlikely. Nations are investing more heavily in clean energy, which has become more cost competitive. At least 18 countries, including the United States, have managed to reduce their emissions for more than a decade.

Whether or not one believes a 4°C world is likely, investments in anticipatory adaptation are critically important now. As noted in the IPCC AR6 Report, "Risks and projected adverse impacts and related losses and damages from climate change escalate with every increment of global

Author's Note: The views expressed in this Comment are the author's alone and do not necessarily reflect the position of EPA.

1. *See* Intergovernmental Panel on Climate Change, *Summary for Policymakers*, *in* Global Warming of 1.5°C 1, 4 (2022), https://doi.org/10.1017/9781009157940.001.
2. What Is the Paris Agreement?, https://unfccc.int/process-and-meetings/the-paris-agreement.
3. *See id.*
4. Intergovernmental Panel on Climate Change, Climate Change 2023 Synthesis Report: Summary for Policymakers 24 (2023), https://www.ipcc.ch/report/sixth-assessment-report-cycle/.

warming (very high confidence)."[5] Ruhl and Craig suggest that scientists are concerned that we are dangerously close to passing critical tipping points. I argue that we have *already* passed critical tipping points and are continuing to do so. This point is reinforced in the IPCC AR6 Synthesis Report, which states, "Climate change has caused substantial damages, and increasingly irreversible losses, in terrestrial, freshwater, cryospheric, and coastal and open ocean ecosystems (high confidence)."[6]

Whether or not a tipping point exists and whether it has been exceeded depends on the individuals, communities, and ecosystems you are talking about, their geographic location, the particular climatic risks they are facing, and the values they hold about the things that might be lost. I suggest, for example, that the tribal community of Shishmaref in Alaska, whose elders voted in 2016 to move their entire community to another location—despite the precious cultural resources that will be lost—would say they've passed a critical threshold.[7]

Impacts are already occurring, and both physical and socioeconomic thresholds are being exceeded. These trends also have significant implications for governance and law. They strengthen the argument made by Ruhl and Craig that concurrent governance efforts to mitigate greenhouse gas emissions and adapt to climate change are essential. They also reinforce the reality that engaging now in anticipatory adaptation is the best chance of avoiding a breakdown in democratic governance. It is true, as noted in the AR6 Report, that "[s]ome future changes are unavoidable and/or irreversible but can be limited by deep, rapid and sustained global greenhouse gas emissions reduction."[8] But significant investments in anticipatory adaptation are essential and are urgently needed. As noted in the AR6 Report, "Adaptation options that are feasible and effective today will become constrained and less effective with increasing global warming."[9]

Immediate investments in anticipatory adaptation are smart government and smart business. The question is how to do it.

Given their focus on 4°C, Ruhl and Craig recommend reorienting adaptation policy for anticipatory redesign away from incremental adaptation that is carried out largely at state and local scales to one that is more regional and national. I suggest to you that this reorientation is already beginning. Many of the items in their "toolbox" for redesigning adaptation are already being implemented in the United States by both the federal government and the private sector.

President Joseph Biden's "Executive Order on Tackling the Climate Crisis at Home and Abroad," issued during his first week in office in 2021, made clear that the policy of the Administration was:

> to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; increases resilience to the impacts of climate change; protects public health; conserves our lands, waters, and biodiversity; delivers environmental justice; and spurs well-paying union jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure.[10]

The Executive Order went further and acknowledged the importance of partnerships with all levels of government and the private sector. It reinforced that "[s]uccessfully meeting these challenges will require the Federal Government to pursue such a coordinated approach from planning to implementation, coupled with substantive engagement by stakeholders, including State, local, and Tribal governments."[11]

Landmark legislation like the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) have since provided historic financial resources to put these mechanisms at the national and regional level in motion.

Ruhl and Craig highlight the value of letting the market direct investments in adaptation in the right ways. Financial markets are already responding to the increasing risks posed by climate change to municipalities. The National Oceanic and Atmospheric Administration (NOAA) has reported that since 1980, the United States has incurred over $1.5 trillion in damages from weather and climate disasters, each of which cost at least $1 billion. The economic impacts have become so severe that the vulnerability of local communities to future impacts is now influencing credit ratings for municipal bonds.[12]

The financial markets care.

Ruhl and Craig also argue that planning and prodding by the federal government to guide private actors to make climate-smart decisions and investments is critically important. They note that there is considerable agreement that the United States' basic infrastructure already warrants increased investment. That is why the 2022 IIJA provides billions of dollars for federal agencies to provide resources to states, tribes, and local communities to invest in infrastructure, with a concurrent focus on advancing environmental justice. A huge focus is being placed by federal agencies and the recipients of the funds on ensuring these investments lead to outcomes that are resilient to the impacts of climate change.

The U.S. Environmental Protection Agency (EPA), which received approximately $60 billion from the IIJA,

5. *Id.* at 14.
6. *Id.* at 5.
7. Merrit Kennedy, *Threatened by Rising Seas, Alaska Village Decides to Relocate*, NPR (Aug. 18, 2016, 7:49 PM), https://www.npr.org/sections/thetwo-way/2016/08/18/490519540/threatened-by-rising-seas-an-alaskan-village-decides-to-relocate.
8. Synthesis Report, *supra* note 4, at 18.
9. *Id.* at 19.
10. Exec. Order No. 14008, 86 Fed. Reg. 7619, 7622 (Jan. 27, 2021).
11. *Id.*
12. *See* Aaron Levitt, *Climate Change & Muni Bond Insurance*, Municipal Bonds (Apr. 27, 2022), https://www.municipalbonds.com/bond-insurance/climate-change-and-muni-bond-insurance/.

is including criteria that incentivize climate adaptation in the various financial mechanisms being used to distribute the IIJA funds. It is improving access to the funds for middle-to-smaller sized underserved communities and tribes. EPA is also providing tools, training, and technical support to recipients of the funds to help them make climate-smart investments.

Ruhl and Craig emphasize the need for investment in research to better inform adaptation decisions and to provide the tools necessary. In fact, the U.S. Global Change Research Program (USGCRP) has been investing in research and assessments to inform decisionmaking.[13] Since 2000, the USGCRP has been producing National Climate Assessments required under the Global Change Research Act of 1990 to provide timely and useful information to support decisionmaking.[14] The USGCRP is now in the process of producing the Fifth National Climate Assessment.[15] In addition, many federal agencies like EPA, NOAA, the U.S. Department of Energy (DOE), and the U.S. Department of Transportation (DOT), are making significant investments to produce the tools and technical support and information needed by decisionmakers in the public and private sectors across the nation.

Ruhl and Craig discuss the need to create a "National Foresight System for Adaptation Planning." In March 2023, the White House Office of Science and Technology Policy (OSTP) released a report entitled "A Federal Framework and Action Plan for Climate Services."[16] The report outlines the development of a data-driven Climate Services System by the federal government that will provide the types of services a national foresight system needs to provide.

Finally, Ruhl and Craig talk about the need to develop programs that create paying jobs and provide training in adaptation skills. That is already underway across the federal government. In 2009, the USGCRP published a guide entitled "Climate Literacy: The Essential Principles of Climate Science."[17] The guide provides a framework and essential principles for formal and informal education about climate change. The USGCRP is now updating the Guide to include current climate and social science, and a focus on justice and capacity to implement solutions.[18] Also, agencies like EPA are already developing and providing training for people and communities across the nation to increase their awareness of why climate change matters for the things they care about and to train them on the implementation of adaptation strategies.[19]

In conclusion, I share Ruhl's and Craig's concerns about the risks posed by climate change and for the importance of having concurrent governance efforts to both mitigate greenhouse gas emissions and adapt to climate change. However, whether or not we feel a need to prepare the nation for a path to a 4°C world, we can—and are already—taking significant steps to develop a robust national foresight system for climate adaptation. And we need to continue doing so.

13. *See About USGCRP*, U.S. Global Change Research Program, https://www.globalchange.gov/about.
14. *See Legal Mandate*, U.S. Global Change Research Program, https://www.globalchange.gov/about/legal-mandate.
15. *See Fifth National Climate Assessment*, U.S. Global Change Research Program, https://www.globalchange.gov/nca5.
16. Fast Track Action Committee on Climate Services of the National Science and Technology Council, A Federal Framework and Action Plan for Climate Services (2023), https://www.whitehouse.gov/wp-content/uploads/2023/03/FTAC_Report_03222023_508.pdf.
17. U.S. Global Change Research Program, Climate Literacy: The Essential Principles of Climate Science (2009), https://www.globalchange.gov/browse/reports/climate-literacy-essential-principles-climate-science-high-resolution-booklet.
18. Notice of Request for Information, 88 Fed. Reg. 15981 (Mar. 15, 2023), https://www.federalregister.gov/documents/2023/03/15/2023-05322/notice-of-request-for-information-us-global-change-research-program-usgcrp.
19. *Climate Change Adaptation Training*, U.S. Env't Prot. Agency, https://www.epa.gov/arc-x/climate-change-adaptation-training.

COMMENT

THE DANGERS OF UNDERSCOPING RISK

by Rod Schoonover

Rod Schoonover is CEO and Founder of Ecological Futures Group.

Institutions that don't evolve in step with changing conditions create new problems. At best, such institutions increasingly fail to meet the needs of their intended beneficiaries, representing wasted resources and missed opportunities. At worst, such outdated institutions themselves exacerbate or become part of the problems they were constructed to address.

Arguably, one such institution is the national security apparatus of the United States. While serving for a decade in the U.S. intelligence community—including leading their efforts on climate change and related topics—I grew concerned that the doctrine and architecture of the security community were increasingly mismatched to the threat landscape shaped by a changing planet. While many threats persist from the Cold War era, such as weapons of mass destruction, great power clashes, and sovereignty skirmishes, people and nations are facing an additional set of threats.[1] Many of these arise from stressors from ecological disruption, such as climate change, infectious diseases, nutrient overabundance, resource depletion, pollution, plastics, and destabilization of the biosphere.

Since leaving government service in 2019, I have continued to engage in efforts to analyze, articulate, and annunciate the security dimensions of ecological disruption, which I believe are dangerously underappreciated by the security community.[2] In the case of governmental institutions, those that routinely underscope ongoing and future risks are likely to deliver ineffective and shortsighted policy responses which, in turn, could contribute to conditions that undermine institutional legitimacy.

In their provocatively titled and forward-leaning article *4°C*, J.B. Ruhl and Robin Kundis Craig arrive at similar conclusions with respect to systems of governance in the face of nonlinear and cascading planetary change. The authors effectively argue that governance measures, particularly adaptation planning, will fall short if institutions fail to embrace the real possibility that the planet will blow well past 2° Celsius (°C) above pre-industrial temperatures. Further, they argue that 4°C is a better target for adaptation planning because this metric better captures the future risk the nation faces. Ruhl and Craig are keenly aware that serious talk of a possible 4°C future will almost certainly trigger accusations of "doomism" from various critics. While I believe that such critiques are fair in many situations, such as communicating climate science to the public, the circumstances are different when assessing and planning for risk.

I concur with the authors that the 2°C target is too conservative for adaptation planning and governance, for two reasons. The first is that 2°C is indeed likely to be surpassed, given our physical and societal trajectories. In its sobering March 2023 AR6 Synthesis Report, the Intergovernmental Panel on Climate Change (IPCC) writes "All global modeled pathways . . . that limit warming to 2°C . . . involve rapid and deep and, in most cases, immediate greenhouse gas emissions reductions in all sectors this decade."[3] Emissions reductions are happening, due in large part to multilateral agreements and market forces, but nowhere close to the scale or speed necessary. Unfortunately, at this juncture, the findings of the Sixth Assessment Report seem unlikely[4] to spur transformative change any more than did the Fifth, Fourth, Third, etc.

The second reason is that planning only for the comparatively[5] safer scenario of 2°C is, simply put, bad policy. Ruhl and Craig argue "the 2°C assumption of maximum warming no longer works in the adaptation modality," but from its inception, this temperature target was too probable to be employed in such a fashion. Indeed, any type of planning that is predicated on assessing risk is fraught when it lowballs the risk. As alluded to in the old adage "hope for the best, prepare for the worst," planning assumptions involving risk should be tethered to reasonably likely high-impact futures (rather than unlikely and less impactful ones).

1. Such "actorless" threats are difficult for the traditional security community to act upon, much less conceptualize, since there are no proximate actors to engage with militarily or diplomatically.
2. For example, in response to President Joseph Biden's 2021 tasking of the intelligence community to produce a National Intelligence Estimate on climate change's national security implications, the intelligence community produced instead a report that largely examined climate change's geopolitical ramifications rather than addressing it as a threat in and of itself. The community also tends to regard biodiversity loss, pollution, plastics, invasive species, and other stressors as environmental policy issues with little-to-no impact on security.
3. Intergovernmental Panel on Climate Change, *Climate Change 2023 Synthesis Report: Summary for Policymakers* 21 (2023), https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf.
4. This assessment is partly predicated on arguments made later in this paper.
5. However, in no way can 2°C be considered safe in absolute terms.

A highlight of the article is the authors' invocation and extension of the concept of *anticipatory governance*. Even in times of relative stability, the precepts of anticipatory governance aim to proactively identify risks in advance and act on them before they become severe. Such an approach steers away from the well-trodden, default path of addressing problems as they arise, an approach that greatly reduces policy choices and leads to suboptimal and, often, maladaptive outcomes.

Critically, the authors inject *redesign* into the discussion. This is a welcome—if brutal—recognition that seawalls, heat-tolerant crops, community relocation, and other incrementalist engineer-y solutions aren't going to cut it on their own in a highly disruptive high-warming scenario. Without embracing anticipatory redesign in the face of increasingly unfamiliar, unanticipated, and sometimes hostile stresses, we are essentially gambling that social infrastructure will evolve rapidly enough to meet the needs of people and institutions. This approach is woefully out of step with the reality that essentially every sector, institution, and geography of the United States will be disrupted directly by climate change[6] or indirectly by those who are.[7] Moreover, I'm concerned that adaptation policies that don't seriously consider elements of redesign, especially to our social fabric, will substantially increase the risk of domestic instability at several scales.

However, I have three critiques of the thought-provoking and otherwise excellent article: one minor, one medium, and one that endeavors to contextualize the article's recommendations.

First, the authors call for the development of enhanced foresight capabilities to navigate difficulties ahead. While this is greatly needed, we should temper our foresight expectations since socio-ecological networks and the climate are complex systems highly likely to possess nonlinear critical transitions (tipping points) that are difficult if not impossible to predict.[8] They also rightly call for scenario planning, a critical tool when forecasting is difficult or impossible.

From my perspective, an emphasis on foresight without commensurate attention to decisionmaking falls flat. For example, the argument that a national foresight system for pandemics would've helped avoid acute disruption is true only to the extent that decisionmakers act on early warnings.[9] To their credit, the authors mention the importance of integrated planning and implementation—but if these elements are not supported or enabled to the same degree as foresight, wasted resources and a false sense of security follow.

More problematic is the article's employment of the 4°C metric in the first place. This is not because 4°C is overly "doomy," but rather that it implies if not identifies climate change as the sole/primary driver of ecological disruption. The authors point out that ecosystems are increasingly likely to be pushed past their tipping thresholds as temperatures increase. While true, the argument overlooks the fact that other ecological stressors—such as biodiversity loss, deforestation, soil toxification, nitrogen and phosphorus overabundance, overfishing, overhunting, pollution and plastics—are often more important drivers of ecosystem instability than climate change. Hence, the probability of crossing these tipping points is likely greater than when looking solely at temperatures, even far below 4°C. Moreover, by excluding the immense dangers[10] to humanity from ecological disruption writ large, the authors have themselves underscoped risk of planetary change. This shortcoming doesn't at all negate the excellent analysis and recommendations of the paper, particularly if adaptive governance and foresight activities were to uptake the larger problem of ecological disruption.

Lastly, the recommendations of the paper need to be contextualized in light of our country's current and probable near-term governance predicament. Writing this Comment in Spring 2023, we commonly watch information, both factual and fabricated, routinely and tribally weaponized.[11] The nation's populace seems especially vulnerable to influence campaigns of all stripes, heightening our collective vulnerability to conspiracy theories and their political ramifications and increasingly displacing evidence-based action. Our inability to significantly improve long-standing societal problems, such as gun violence, healthcare affordability, economic inequality, and racism, suggests that governance is already strained if not altogether broken. Trust in government, authority, expertise, and evidence have all suffered immensely. In this context, it is difficult to envision a pathway, irrespective of its merits, from where we currently sit as a nation to establishing the necessary configurations, mechanisms, trust, and legitimacy for effective anticipatory governance. To their credit, the authors acknowledge the difficult governance hurdles now and ahead; I worry, however, that these too are understated.

6. This includes climate policies as well as the phenomenological effects of climate change.
7. This assessment is probably true for a 2°C scenario as well.
8. This is a mere quibble since the authors clearly understand tipping points and other aspects of nonlinear change.
9. One might argue that SARS-CoV-1, MERS-CoV, and pre-Covid intelligence community threat assessments on coronavirus pandemics were themselves early warnings.
10. Will Steffen et al., *Planetary Boundaries: Guiding Human Development on a Changing Planet*, Science 347.6223 (2015): 1259855.
11. Social media continues to essentially act as an unregulated vector of information, misinformation, and disinformation.

ARTICLE

HOW ALGORITHM-ASSISTED DECISIONMAKING IS INFLUENCING ENVIRONMENTAL LAW AND CLIMATE ADAPTATION

by Sonya Ziaja, J.D., MSc, Ph.D.

Sonya Ziaja is an Assistant Professor at University of Baltimore School of Law.

I. Introduction

Agencies responsible for water and energy systems increasingly rely on algorithm-assisted decisionmaking to regulate these systems and shepherd them through climate adaptation.[1] Legal scholars, attorneys, and environmental equity advocates should care about this fundamental change in governance for three reasons. First, climate adaptation depends on these tools. Second, algorithmic tools are not policy-neutral; rather they embed value-laden assumptions and biases. And third, the "rules" of this new forum impede equity and democratic participation, without deliberate countermeasures.

This Article proposes an initial step in the development of such countermeasures: a framework for evaluating how algorithm-assisted decisionmaking, in environmental and energy regulation, influences law and what the consequences are for equity and participation.

II. The Challenge of Adapting Water and Energy Systems to a New Climate and the Role of Algorithms and Modeling

Freshwater systems in the United States are regulated, negotiated, and managed to meet multiple, and at times conflicting, purposes.[2] Climate change exacerbates many existing challenges to water governance by altering the quantity, flow, and quality of available freshwater.[3] Negotiation and agency regulation can prevent, or minimize, future conflicts among uses, which in turn, rely heavily on software assistance to create an array of scenarios to guide decisionmaking.[4]

Energy systems face a different set of challenges.[5] To reduce greenhouse gas (GHG) emissions, energy generation systems are swapping out old fossil fuels for new renewable energy and storage.[6] Regulators and balancing authorities are responsible for managing the transition from fossil fuels to renewables in a way that maintains grid reliability.[7] Popular writing and scholarship characterizes the energy system's relation to climate change as a source of

Editors' Note: This Article is adapted from Sonya Ziaja, *How Algorithmic-Assisted Decisionmaking Is Influencing Environmental Law and Climate Adaptation,* 48 ECOLOGY L.Q. 899 (2021)*, and used with permission.*

1. *See generally* Deniz Ozkundakci et al., *Building a Reliable Evidence Base Legal Challenges in Environmental Decision-Making Call for a More Rigorous Adoption of Best Practices in Environmental Modelling*, 88 ENV'T SCI. & POL'Y 52, 52-62 (2018).
2. *See* EDELLA SCHLAGER & WILLIAM BLOMQUIST, EMBRACING WATERSHED POLITICS 149-50 (2011); *see also* Sonya F. Ziaja, *Role of Knowledge Networks and Boundary Organizataions in Coproduction: A Short History of a Decision Support Tool and Model for Adapting Multiuse Reservoir and Water Energy Governance to Climate Change in California,* 11 WEATHER, CLIMATE, & SOC'Y 826 (2019); SANDRA POSTEL & BRIAN RICHTER, RIVERS FOR LIFE: MANAGING WATER FOR PEOPLE AND NATURE (2003); Helen Ingram*, Water as a Multi-Dimensional Value Implications for Participation and Transparency*, 6 INT'L ENV'T AGREEMENTS: POL'Y, L., & ECON. 429, 429-33 (2006).
3. *See, e.g.*, Thomas Johnson et al., *Water*, *in* 2 FOURTH NATIONAL CLIMATE ASSESSMENT: IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES 147 (David Reidmiller et al. eds., 2018), https://nca2018.globalchange.gov/downloads/NCA4_2018_FullReport.pdf.
4. *See, e.g.*, COMM. ON MODELS IN THE REGUL. DECISION PROCESS, NAT'L RSCH. COUNCIL, MODELS IN ENVIRONMENTAL REGULATORY DECISION MAKING, at ix (2007), http://nap.edu/11972. ("The use of computational models is an essential element of the environmental regulatory process."); Ziaja, *supra* note 2, at 833 tbl.2; Ozkundakci et al., *supra* note 1, at 52-62; Sonya F.P. Ziaja, *Rules and Values in Virtual Optimization of California Hydropower*, 57 NAT. RES. J. 329 (2017); Wendy Wagner et al., *Misunderstanding Models in Environmental and Public Health Regulation*, 18 N.Y.U. ENV'T L.J. 293 (2010); Marcela Brugnach et al., *Uncertainty Matters Computer Models at the Science-Policy Interface*, 21 WATER RES. MGMT. 1075 (2007).
5. *See generally* CALIFORNIA'S FOURTH CLIMATE CHANGE ASSESSMENT: STATEWIDE SUMMARY REPORT 84 (2019), https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf; *see also* 2 FOURTH NATIONAL CLIMATE ASSESSMENT: IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES, *supra* note 3, at 76.
6. *See* 100 Percent Clean Energy Act of 2018, S.B. 100, 2017-2018 Leg., Reg. Sess. (Cal. 2018); *see also* THE REG'L GREENHOUSE GAS INITIATIVE: AN INITIATIVE OF E. STATES OF THE U.S., https://www.rggi.org/ (last visited Feb. 20, 2021).
7. *See* Shelley Welton, *Rethinking Grid Governance for the Climate Change Era*, 109 CALIF. L. REV. 209, 250 (2021).

GHGs or a solution to curbing emissions.[8] But, the energy system itself is also vulnerable to climate impacts.[9]

Algorithms and "algorithmic decisionmaking"[10] (ADM) are discussed and debated far more now than even a decade ago.[11] An algorithm is a sequential process of calculations—or more simply, what the programmer instructs a computer to do with data.[12] Computer models of climate systems, social-economic-environmental systems, and energy grid expansion require algorithms to function. These software products and models may represent existing conditions,[13] or solve for least-cost policy options,[14] among others.

This Article uses the term algorithm-*assisted* decisionmaking, which includes, but is not exclusive to, ADM. Unlike ADM, algorithm-assisted decisionmaking recognizes the place of technology within human systems.[15] Both rely on quantification to represent the reality of complex environmental systems.[16] Climate change has increased the complexity of making decisions for water and energy planning, leading regulators to rely more heavily on algorithmic tools.

III. The Development and Use of Algorithm-Assisted Decisionmaking in Governance

Environmental scholarship was among the first to point out the disconnect between policymaking and modeling, and to posit solutions for bridging that gap.[17] In a 1997 paper, Stephen Schneider argued that Integrated Assessment Modeling (IAM) was intended to be a useful tool for policymakers to govern the environment.[18] But, because environmental models are necessarily complex and contain "value-laden assumptions," they can "obscure values or make implicit cultural assumptions about how nature or society works" and "diminish the openness of the decisionmaking process," making it "less rational."[19] Schneider proposed a means to express uncertainty in modeling results, arguing that modelers had a "special obligation to make . . . tools transparent as possible,"[20] and "[m]ost critical . . . to engage in a vigorous outreach program to entrain decisionmakers and citizens at all levels into the process of helping to design, test, and use IAMs for real policy questions."[21]

From Schneider's work, we can derive three diagnostic categories to address concerns: uncertainty, transparency, and stakeholder collaboration.

A. *Uncertainty*

Many environmental systems are complex adaptive systems[22]—where underlying cause-and-effect relationships may not be known or knowable. This is called system uncertainty or "model uncertainty."[23] Using a "reductionist approach" simplifies the system structure, which conceals the underlying system uncertainty.[24] Solutions for resolving uncertainty rely on increased stakeholder involvement in the modeling process,[25] or greater forthrightness about uncertainty from modelers.[26] Marcela Brugnach and others argue that by doing both, projects are able to help decisionmakers understand the model and build trust between modelers and stakeholders.[27]

8. Craig D. Zamuda et al., *Energy Supply, Delivery, and Demand*, *in* 2 Fourth National Climate Assessment: Impacts, Risks, and Adaptation in the United States, *supra* note 3, at 196.
9. *See id.* at 175-76.
10. *See*, *e.g.*, Mike Ananny & Kate Crawford, *Seeing Without Knowing Limitations of the Transparency Ideal and Its Application to Algorithmic Accountability*, 20 New Media & Soc'y 973 (2016).
11. *See*, *e.g.*, Bruno Lepri et al., *Fair, Transparent, and Accountable Algorithmic Decision-Making Processes*, 31 Phil. & Tech. 611 (2018).
12. *See generally* Harry Surden, *Machine Learning and Law*, 89 Wash. L. Rev. 87 (2014); Harry Surden, *Artificial Intelligence and Law: An Overview*, 35 Ga. State U. L. Rev. 1319 (2019).
13. *See* Dave Owen, *Mapping, Modeling, and the Fragmentation of Environmental Law*, 45 Utah L. Rev. 219, 245 (2013).
14. Ziaja, *Rules and Values*, *supra* note 4, at 331.
15. *See*, *e.g.*, Surden, *Artificial Intelligence and Law: An Overview*, *supra* note 12.
16. *See generally* Linda Pilkey-Jarvis & Orrin H. Pilkey, *Useless Arithmetic Ten Points to Ponder When Using Mathematical Models in Environmental Decision Making*, 68 Pub. Admin. Rev. 470 (2008).
17. *See generally* Edward A. Parson, *Integrated Assessment and Environmental Policy Making in Pursuit of Usefulness*, 23 Energy Pol'y 463 (1995); *see also* Edward A. Parson, *Three Dilemmas in the Integrated Assessment of Climatic Change: An Editorial Comment*, 34 Climatic Change 315, 321-24 (1996); Diana M. Liverman, *Forecasting the Impact of Climate on Food Systems Model Testing and Model Linkage*, 11 Climatic Change 267 (1987); Brian Wynne & Simon Shackley, *Environmental Models Truth Machines of Social Heuristics?*, 21 Globe: Revue Internationale d'Etudes Quebecoises 6, 6-8 (1994); Marjolein B.A. van Asselt & Jan Rotmans, *Uncertainty in Integrated Assessment Modelling From Positivism to Pluralism*, 54 Climatic Change 75 (2002).
18. *See generally* Stephen H. Schneider, *Integrated Assessment Modeling of Global Climate Change Transparent Rational Tool for Policy Making or Opaque Screen Hiding Value-Laden Assumptions?*, 2 Env't Modeling & Assessment 229, 229 (1997). Notably, Dave Owen and James Fine trace the tension between modeling and participation even further in case law. *See* James D. Fine & Dave Owen, *Technocracy and Democracy Conflicts Between Models and Participation in Environmental Law and Planning*, 56 Hastings L.J. 914-15 (2005) (citing to Sierra Club v. Costle, 657 F.2d 298 (D.C. Cir. 1981)).
19. Schneider, *supra* note 18 at 230.
20. *Id.*
21. *Id.*
22. *See* Bobbi Low et al., *Redundancy and Diversity Do They Influence Optimal Management?*, *in* Navigating Social-Ecological Systems: Building Resilience for Complexity and Change 83, 103 (Fikret Berkes et al. eds., 2002) (describing complex adaptive systems as being "composed of a large number of active elements whose rich patterns of interactions produce emergent properties—which are not easy to predict by analyzing the separate system components").
23. James Wilson, *Scientific Uncertainty, Complex Systems, and the Design of Common-Pool Institutions*, *in* The Drama of the commons 327, 333 (Elinor Ostrom et al. eds., 2002); *see also* Fine & Owen, *supra* note 18, at 922-26 (discussing sources of uncertainty in simulation models).
24. Wilson, *supra* note 23, at 328.
25. *See*, *e.g.*, Brugnach et al., *supra* note 4.
26. Wagner et al., *supra* note 4, at 7 (both participation and transparency); *see also* Ozkundakci et al., *supra* note 1, at 61 ("[I]f models are to be of substantial help in environmental and resource management decision-making, then modellers and decision-makers will need to ensure that there is a clear understanding of the purpose of a model, the modelling process is transparent, and that best practice guidelines are followed."). *See generally* John Bistline et al., *Deepening Transparency About Value-Laden Assumptions in Energy and Environmental Modelling Improving Best Practices for Both Modellers and Non-Modellers*, 21 Climate Pol'y 1 (2020) (arguing that interdisciplinary collaboration is needed to unearth and openly discuss hidden "value-laden" assumptions in environmental and energy models).
27. *See* Brugnach et al., *supra* note 4, at 1082.

B. Transparency

Legal approaches to algorithm-assisted decisionmaking problems have focused on transparency as a solution.[28] However, transparency alone may not be sufficient to overcome algorithm-assisted decisionmaking's obfuscation of uncertainty and associated "value-laden" assumptions. Many environmental models and software include a descriptive model process manual, which describes the model's structure, calibration, and data, and generally how the model works. But, this does not necessarily make the model accessible to non-engineering audiences.[29]

C. Stakeholder Collaboration

Schneider proposed stakeholder collaboration as important to the future of environmental modeling, calling for the "increased involvement of diverse policy actors in the development and use of assessments and assessment tools."[30] While existing literature does not agree on the appropriate timing and extent of stakeholder collaboration for model development, much of the literature maintains that stakeholder collaboration should occur throughout the modeling process.[31]

D. Implications for Equity Across Uncertainty, Transparency, and Stakeholder Collaboration

Value-laden assumptions in decisionmaking are tied to substantive and procedural equity. In a democracy, choices among competing visions of equity are political dilemmas,[32] subject to deliberation.[33] Deliberation depends on participation[34] and accessibility.[35] The nature of algorithmic tools and the typical design process of such tools frustrates participation in and accessibility of deliberation.

IV. Framework for Evaluating Value-Laden Assumptions in Algorithm-Assisted Decisionmaking

I suggest a six-part framework for evaluating value-laden assumptions in algorithm-assisted decisionmaking (see Table 1 next page). This framework provides a structure to answer some of the concerns posed by Schneider, and serves as a guide for attorneys and policymakers for approaching algorithm-assisted decisionmaking tools, and focuses on attributes that may influence equity.

V. Cross Case Comparison and Application of Framework

How would this framework function in practice? Below, I present and compare two models: one for water regulation and the other for energy planning. While both models influence law and regulation of resources, they raise different issues of equity due to divergences in design processes and logics.

A. Water Governance and Algorithm-Assisted Decisionmaking on the Sacramento River

The main mechanism for managing the Sacramento River for flood control, distributing water to cities and farms, and protecting stream flow for aquatic habitat, is deciding when to release water from reservoirs. For the large dams along the Sacramento, that decision is predetermined by the U.S. Army Corps of Engineers' "rule curve," the maximum fill line for that reservoir for each month of the year.[36] Most curves were set in the mid-20th century.[37] Those assumptions about seasonal precipitation, temperature, and evaporation rates no longer hold true because of climate change.[38] Additionally, few agency rules for regulating stream flow from hydropower projects were designed with the other rules in mind.[39]

Algorithm-assisted decisionmaking has been a useful workaround to limitations of existing law. The California Department of Water Resources installed a software

28. *See* Sandra Wachter, *The GDPR and the Internet of Things A Three-Step Transparency Model*, 10 L., Innovation & Tech. 266, 280 (2018).
29. For example, see U.S. EPA's model documentation for the SAGE model of the U.S. economy for environmental planning. Alex Marten et al., *SAGE Model Documentation (2.0.1)*, U.S. EPA, https://www.epa.gov/environmental-economics/cge-modeling-regulatory-analysis (last visited Jan. 4, 2022).
30. Schneider, *supra* note 18, at 235.
31. *See*, *e.g.*, Katharine J. Mach et al., *Actionable Knowledge and the Art of Engagement*, 42 Current Op. Env't Sustainability 30, 32-33 (2020); Jens Christian Refsgaard et al., *Uncertainty in the Environmental Modelling Process—A Framework and Guidance*, 22 Env't Modelling & Software 1543, 1544-45 (2007); Susanne C. Moser, *Can Science on Transformation Transform Science? Lessons From Co-Design*, 20 Current Op. Env't Sustainability 106, 111-12 (2016).
32. *See* Deborah Stone, Policy Paradox: The Art of Political Decisionmaking 39 (1997); Daniel Bromley, Sufficient Reason: Volitional Pragmatism and the Meaning of Economic Institutions 16 (2010):
> In democratic states, these declarations of what must (or ought to) be done emanate from the judicial and parliamentary branches of government. That is, after all, the reason why these branches of government exist. It is in the discourses of parliaments—and the considerations of the courts—that debates about the relative merits of Y and ~Y take place. Although Paretian economists may feel uncomfortable at the prospect of making choices without prices (and thus without monetary estimates of $\Sigma\$V_Y$), this is a misplaced concern. Democratic structures and processes exist for precisely those purposes.

(internal citations omitted)).
33. *See* Bromley, *supra* note 32, at 31-42.
34. *See* Sherry R. Arnstein, *A Ladder of Citizen Participation*, 35 J. Am. Inst. Plan. 216, 220 (1969).
35. Jonathan Skinner-Thompson, *Procedural Environmental Justice*, 97 Wash. L. Rev. 399 (2022).
36. *See* Ann D. Willis et al., *Climate Change and Flood Operations in the Sacramento Basin, California*, 9 S.F. Estuary & Watershed Sci. 1, 1 (2011).
37. *See* Ziaja, *Rules and Values*, *supra* note 4, at 343-44.
38. *Id.*
39. *See* Joshua H. Viers, *Hydropower Relicensing and Climate Change*, 47 J. Am. Water Res. Ass'n 655, 657-58 (2011); Willis et al., *supra* note 36, at 8 (A notable exception to this is the New Bullards Bar dam, whose operating manual mandates coordination with the St. Mary's dam, which was never built).

Table 1		
	Model Itself	**Design Process**
Uncertainty	How is governance and conflict represented?	How is uncertainty communicated and to whom?
	To what extent do the model's mechanisms for assigning weighted values and choosing optimal solutions reflect existing governance?	Who is involved in determining sources of uncertainty?
	What are the kinds of uncertainty in the system being modeled that simplification may obscure?	
Transparency	Is the logic of the model explicable?	Are participants in the design and implementation known?
	What aspects, if any, of the model are "black box" and unknowable?	
	Are the inputs and parameters open to verification from outside sources?	
Stakeholder Collaboration	Is stakeholder collaboration advisory or determinative?	Who determines which stakeholders are relevant? With what parameters? Can stakeholders themselves expand who participates?
	Is stakeholder knowledge incorporated into the model?	
		To what extent do stakeholders determine processes for collaboration?
		How are disagreements among stakeholders and designers resolved?

program called INFORM, that works alongside human water managers to regulate the flow of the Sacramento.[40] INFORM coordinates reservoir operations across multiple spatial and temporal scales, while including short- and long-term weather and climate forecasts.[41]

Existing law and regulation are represented in INFORM through operational rules. After a human water manager chooses the specific time horizon, INFORM creates "runs" from the model sets and evaluates trade offs for water uses, before presenting the water manager with analyzed results for "optimal" operations management.[42] Multi-year studies confirm that INFORM outperforms normal reservoir decisionmaking.[43]

INFORM's representation of law and policy depends not just on law on the books, but also informal law as practiced and interpreted by water managers.[44] The design team incorporated these perceptions and practices into INFORM's algorithms.[45]

40. *See* Ziaja, *Role of Knowledge Networks*, *supra* note 2, at 827.
41. *See id.*
42. *See id.* at 827-28.
43. *See* Huaming Yao & Aris Georgakakos, *Assessment of Folsom Lake Response to Historical and Potential Future Climate Scenarios 2. Reservoir Management*, 249 J. Hydrology 176, 187-88 (2001).
44. *See generally* Ziaja, *Role of Knowledge Networks*, *supra* note 2.
45. *See id.* at 356-57; *see also* Telephone Interview with Konstantine Georgakakos, Hydrologic Rsch. Ctr., Scripps Inst. of Oceanography, San Diego, CA (Dec. 6, 2016); *see also* Interview with Guido Franco, Cal. Energy Comm'n, Sacramento, CA (Apr. 6, 2016).

B. *Integrated Resource Planning for Renewable Energy Build Out and Algorithm-Assisted Decisionmaking*

California's Legislature has set increasingly ambitious targets to reduce GHG emissions.[46] By 2015, the legislature, in SB 350 set GHG emissions and renewable energy development targets for regulated electric utilities[47] and requires each regulated utility to submit an Integrated Resource Plan (IRP) to be evaluated by the California Public Utilities Commission (the Commission).[48] In response to SB 350, the Commission established the IRP and Long Term Procurement Plan (IRPLTPP), an "umbrella" administrative proceeding to evaluate electricity procurement policies and capacity requirements.[49]

The Commission opened a quasi-legislative rulemaking to comply with the IRP directive in SB 350[50] and contracted with an energy and environmental consulting firm to develop a decision support tool to assess energy procurement scenarios called "RESOLVE."[51]It solves for optimal capital allocation,[52] grid reliability, and GHG targets.[53]

RESOLVE depends on some simplification of the physical, legal, and political world it is representing. RESOLVE's core simplification (geography in buckets, and time as nonsequential samples) makes quickly running different scenarios feasible.

C. *Comparison of Value-Laden Assumptions in INFORM and RESOLVE Across Uncertainty, Transparency, and Stakeholder Collaboration*

The framework divides algorithm-assisted decisionmaking tools into two components: the model itself and the design process behind the model. Under each, questions target how uncertainty, transparency, and stakeholder collaboration lead to or resolve value-laden assumptions.

1. Uncertainty

The framework's investigation into uncertainty first considers how governance and conflict are represented. In both INFORM and RESOLVE, the mechanism of governance is literally mechanical, a quantified optimization problem. The course of action is determined by assigning values and solving for least-cost solutions.

The framework then asks how the model's mechanisms reflect existing governance. INFORM and RESOLVE diverge significantly from existing real-world governance because in the real world, the "value" of choices and their consequences are not determined by numerical value or exchange value, but through deliberation.[54] There are numerical values associated with energy build out and resource adequacy that drive RESOLVE. However, modelers choose what those values are, rather than arriving at those values as the result of a true market.

The framework also asks whether there are sources of inherent uncertainty in the social-ecological-technical system being represented, and whether simplification preserves or obscures those sources. INFORM, for example, can only model and represent a few of aspects of the Sacramento River.[55] The simplified governance mechanism in RESOLVE may obscure uncertainty surrounding a key input for energy modeling. For example, the existence of procurement contracts can shift the market price for other energy procurement,[56] but the influence of these contracts is not modeled in RESOLVE.[57]

In the design process, the framework asks about the processes for communicating uncertainty. The INFORM research team communicated uncertainty in the model to the working group at semiannual meetings.[58] The working group discussed system uncertainty with the researchers at the same meetings.[59] For RESOLVE, model uncertainty is discussed openly by the modelers to the working group.[60]

2. Transparency

The framework begins by asking whether the logic of a model is explicable. There are models that are relatively simple, like RESOLVE. And then there are models whose logic is nominally explicable, but difficult for even experts

46. *See* California Global Warming Solutions Act of 2006, A.B. 32, 2005-2006 Leg., Reg. Sess. (Cal. 2006).
47. Cal. S.B. 350.
48. Cal. Pub. Util. Code §454.51-52; *see also* Cal. Pub. Util. Comm'n, 16-02-007, Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements (2016) [hereinafter 2016 Order Instituting Rulemaking].
49. *See* 2016 Order Instituting Rulemaking, *supra* note 48, at 3, 25; *see also Integrated Resource Plan and Long Term Procurement Plan (IRP-LTPP)*, Cal. Pub. Util. Comm'n, https://www.cpuc.ca.gov/irp/ (last visited Dec. 27, 2021).
50. *See generally* 2016 Order Instituting Rulemaking, *supra* note 48.
51. *See generally RESOLVE Renewable Energy Solutions Model*, Energy & Env't Econ., Inc. (E3), https://www.ethree.com/tools/resolve-renewable-energy-solutions-model/ (last visited Dec. 27, 2021).
52. The capital cost allocation mechanism is important here because unlike thermal generation, wind and solar energy generation does not require fuel; so, the more renewable generation is integrated into the grid, the higher the percentage of capital costs. Interview with Mohit Chhabra (November 2020) (on file with author).
53. Energy & Env't Econ., Inc., RESOLVE Capacity Expansion Model: User Manual 3-4 (2019), https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2019-2020-irp-events-and-materials/resolve-user-guide—-public-release-20191106.pdf.
54. Inputs & Assumptions: 2019-2020 Integrated Resource Planning, Cal. Pub. Util. Comm'n 4-5 (November 2019), https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2019-2020-irp-events-and-materials/inputs--assumptions-2019-2020-cpuc-irp_20191106.pdf.
55. *See* Ziaja, *Role of Knowledge Networks*, *supra* note 2, at 837.
56. *See generally* Severin Borenstein & James Bushnell, *The U.S. Electricity Industry After 20 Years of Restructuring* (Nat'l Bureau of Econ. Rsch., Working Paper No. 21113, 2015), https://www.nber.org/system/files/working_papers/w21113/w21113.pdf; Severin Borenstein et al., *Expecting the Unexpected Emissions Uncertainty and Environmental Market Design* 24 (Nat'l Bureau of Econ. Rsch., Working Paper No. 20999, 2018), https://www.nber.org/system/files/working_papers/w20999/w20999.pdf.
57. *See* Energy & Env't Econ., Inc., *supra* note 53, at 3-4.
58. Ziaja, *Role of Knowledge Networks*, *supra* note 2.
59. *See id.*
60. Interview with E3 staff (Feb. 4, 2021) (on file with author); Interview with CPUC Staffer (2020); Interview with Mohit Chhabra, *supra* note 52.

to understand. INFORM falls into this latter category. Answers to this question, therefore, vary based on who is trying to understand the model.

The framework also asks whether the inputs and parameters are open to verification from outside sources. The Commission requires that RESOLVE be transparent.[61] It operates under a public license and the data sources are open to the public.[62] Because INFORM is operated by the Department of Water Resources, its inputs are subject to the state's public records act.[63] However, prior interviews show that when developing the model, the researchers consulted reservoir operators and included parameters to represent circumstances under which operators felt they could deviate from law on the books.[64] But none of the researchers interviewed could recall what those parameters were.[65] The result is that there are elements of the model that are obscured and may no longer be knowable.

Regarding the design process, the framework asks whether the participants in the design and implementation are known. Both RESOLVE and INFORM are state-funded and the development and implementation process are matters of public record. In both cases, the participants are known or discoverable.

3. Stakeholder Collaboration

The framework begins by asking two questions. First, is stakeholder collaboration advisory or determinative? Both INFORM and RESOLVE have had technical advisory groups. For INFORM's process, stakeholder collaboration was determinative. It also depended on consensus decisionmaking. For RESOLVE, the working group is purely advisory. Second, is stakeholder knowledge incorporated into the model? For both RESOLVE and INFORM, knowledge from the working groups changed inputs to the model.[66]

The framework then asks three sets of questions regarding the design process. First, who determines which stakeholders are relevant in the process? Those who determined the stakeholders relevant to the development of INFORM changed over time.[67] At the beginning, the researchers developed connections with agencies that could end up using their product.[68] Once the product development was funded by government agencies, those agencies chose additional stakeholders for the technical advisory committee.[69] However, once the advisory committee began meeting, the participants could suggest additional stakeholders who would be interested in the outcome or who could provide specific input.[70] The process was different for RESOLVE. On paper, it was the administrative law judge, with advice from a staffer within the analysis division of the Commission, who weighed the input and advice of stakeholders before determining which comments influence the development of RESOLVE.[71] In practice, the opinions of the regulated utilities, the expertise of the modelers, and the political pressures of the moment can add a thumb to the scale.

Second, to what extent do stakeholders determine collaboration processes? For RESOLVE, stakeholders do not formally drive the collaboration, but rather the Commission determines the process.[72] However, since several of the participants are from organizations with few staff, some will informally work together, strategize, and jointly submit comments to divide up the work.[73] For INFORM, the funding agencies set the minimum standards for collaboration.[74] Once initial advisory group meetings took place, stakeholders and researchers jointly determined the process for collaboration.[75]

And third, how are disagreements among stakeholders and designers resolved? The answers determine whose vision is embedded in the algorithmic tools. For INFORM, disagreement was resolved through discussion of working group members and researchers.[76] For RESOLVE, disagreements are synthesized by the assigned administrative law judge, who then makes a recommendation to the Commission.[77]

VI. Equity Considerations

It seems from these two cases that for stakeholders to understand the models and therefore meaningfully contribute to their development, those stakeholders need an extraordinarily high level of technical expertise, and the available time (or economic interest) to commit to providing input. For both INFORM and RESOLVE, the network of active and expert stakeholders influences the inputs and param-

61. Cal. Pub. Util. Comm'n, Fact Sheet: Decision on 2019-20 Electric Resource Portfolios to Inform Integrated Resource Plans and Transmission Planning (2020), https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/i/6442464699-irp-2019-rsp-fact-sheet-v3.pdf.
62. *See RESOLVE Model Inputs and Results Used for 2019 IRP Reference System Plan Decision*, Cal. Pub. Utils. Comm'n (Mar. 23, 2020), https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/long-term-procurement-planning/2019-20-irp-events-and-materials/resolve-model-inputs-and-results-used-for-2019-irp-reference-system-plan-decision.
63. *See* California Public Records Act, Cal. Gov't Code §§6250-6270.7.
64. Ziaja, *Role of Knowledge Networks*, *supra* note 2 at 827-28.
65. *Id.*
66. For detailed INFORM results from the working group, see Ziaja, *Role of Knowledge Networks*, *supra* note 2, at 824-31 Fig.1.
67. *Id.* at 836-39.
68. *Id.* at 836-38.
69. *Id.*
70. *Id.* at 839.
71. *See*, *e.g.*, Administrative Law Judge's Ruling Seeking Comments on Proposed Preferred System Plan, Order Instituting rulemaking to Continue Electric Integrated Resource Planning and Related Procurement Processes (Aug. 17, 2021) https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M399/K450/399450008.PDF.
72. Interview with working group participants (on file with author).
73. Interview with Mohit Chhabra, *supra* note 52.
74. *See* Ziaja, *Role of Knowledge Networks*, *supra* note 2, at 843.
75. *Id.* at 839.
76. Interviews with working group participants, *supra* note 72.
77. *Id.* For an example of comments, see Comments of the Natural Resources Defense Council (NRDC) on 2019-2020 Electric Resource Portfolios to Inform Integrated Resource Plans and Transmission Planning, in Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long Term Procurement Planning Requirements (Mar. 12, 2020), https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M329/K437/329437858.PDF.

eters for the two tools—driving the development and implementation of water and energy regulation, and those systems' adaptation to climate change. Ultimately, these networks are embodied in the decision support systems they create.

Here, we run straight into the main tension between the need for these tools and the need for participation. If (1) the focus on equity is who is being left out and whether the political arena is open and accessible; (2) the ability to influence algorithm-assisted decisionmaking tools depends on high technical capacity along with an economic or mission interest; and (3) the network of people and organizations who do participate in the development of the model influence inputs and parameters which embed value-laden assumptions and biases; then are algorithmic tools destined to be inequitable in environmental governance? And because of our dependence on these tools, are environmental, natural resource, and energy planning doomed to be increasingly inaccessible and inequitable with greater complexity? Possibly.

But the two cases and the framework provide some hope. Even though not all stakeholders in the RESOLVE process completely understood the model, they nonetheless are able to comment and raise their concerns to decisionmakers and modelers alike. This means that decisionmakers are at least aware of the concerns and can act accordingly. The open process of development still serves a governance function. The history of INFORM, meanwhile, demonstrates that close collaboration between modelers and stakeholders is possible.

In the end, the framework presented in this Article can be boiled down to a single question: is equity (substantive and procedural) included in the network for producing algorithmic tools? By assessing how uncertainty is created and communicated, the extent to which a model and its process of development are transparent, and the role of stakeholders in the production of the model, the framework provides a way for legal practitioners and advocates to approach the question of equity in algorithm-assisted decisionmaking. It also allows them to become involved in making these tools more equitable.

VII. Conclusion

Algorithmic tools are new fora for decisionmaking and the development of law with different rules and different players than a legislative body, court, or city council. It is still governance, though, and concerns about existing power imbalances in decisionmaking are relevant to how decisions are made within mathematical models. This Article offers a practical means for attorneys, watchdog organizations, and responsible decisionmakers to examine and assess algorithmic tools in a holistic manner. By considering sources of value-laden assumptions across uncertainty, transparency, and stakeholder collaboration, this framework indicates inflection points for substantive equity. By also considering the process of development, this framework incorporates lessons from the past two decades of social science on the importance of networks for the legitimacy and acceptability of scientific products.

COMMENT

LEARNING TO SEE THROUGH THE BLACK BOX: DEVELOP X-RAY VISION THROUGH ALGORITHMIC INTUITION

by Mohit Chhabra

Mohit Chhabra is Technical Lead and Advisor, Natural Resources Defense Council.

Environmental, natural resource, and energy planning will continue to rely on increasingly complex algorithms. Are these processes then also doomed to be inaccessible to key stakeholders? Hopefully not.

There are multiple steps to ensuring process and participatory equity. There is ease of access to the process, access to necessary information, and then there is the matter of having the right information to be able to meaningfully impact outcomes of algorithm-assisted decisionmaking processes.

In *How Algorithm-Assisted Decisionmaking Is Influencing Environmental Law and Climate Adaptation*, Prof. Sonya Ziaja proposes a useful framework for increasing participation and integrating process equity in algorithm-assisted decisionmaking. Guiding questions around uncertainty, transparency, and stakeholder collaboration provide a starting point to investigate and create accountability for climate models.

The next step to facilitating meaningful participation in analytically complex processes requires stakeholders to develop algorithmic intuition. Model developers and process facilitators have the ability and the necessary information to bring stakeholders along. Stakeholders and decisionmakers can do their part by asking the right questions.

In this Comment, I propose an additional set of questions for prospective participants, both technical and non-technical, to build familiarity, or intuition, of a given algorithm. *Algorithmic intuition* requires understanding the scope of the analysis, key parameters, and causal relationships between parameters and outcomes of the model at hand. Model developers and process facilitators can do their part by proactively providing this information to stakeholders.

With this knowledge, attorneys, advocates, and policy analysts should be better positioned to determine whether intervening in an algorithm-assisted decisionmaking process is worth their time. And if they decide to participate, they can focus their limited resources on the most influential aspects of the model. Decisionmakers can apply the principles of algorithmic intuition to translate seemingly precise model results to binding policy decisions.

I. Algorithms Are Inherent to Most Parts of Climate Policy

Algorithms are inherent to climate change policy-related debate, development, and regulatory decisionmaking. For instance, reports such as those by the Intergovernmental Panel on Climate Change (IPCC), that apply climate models to forecast tomorrow's devastation due to today's and yesterday's greenhouse gas (GHG) emissions, are responsible for the increasing prevalence of climate change in policy debate.[1] Moreover, the very question at the heart of most, if not all, climate policy debate is analytic and economic: whether and to what extent avoiding (algorithmically estimated) future climate damages justifies near-term spending to curb emissions.

Further, even though legislative debate to set climate change policy is often normative value-driven, policy implementation usually requires reliance on algorithms. Consider the case of California's electricity sector. The California Legislature, through Senate Bill 100, set a goal of getting to a zero-carbon electric sector by 2045.[2] Although there isn't much evidence that legislators considered climate models or economic analysis to determine the exact amount of, and timeline for, future carbon reduction, the California Energy Commission must apply an electric-sector capacity expansion model to determine how much, and what type of, new clean energy resources are required

Author's Note: The author would like to thank Sylvie Ashford and Julia de Lamare of the Natural Resources Defense Council for their review and feedback.

1. Timothy Cama, *"Answer to the Code Red": Dems Cite IPCC for Climate Agenda*, E&E Daily (Aug. 10, 2021, 6:50 AM), https://www.eenews.net/articles/answer-to-the-code-red-dems-cite-ipcc-for-climate-agenda/.
2. S. B. 100, 2017-2018 Leg. Sess. (Cal. 2018) (enacted), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100.

to comply with Senate Bill 100 while keeping electricity reliable and affordable.[3]

The Social Cost of Greenhouse Gas (SC-GHG) is another such example. The SC-GHG is the present value of future damages due to an additional ton of anthropogenic GHG emissions. The basic concept of the SC-GHG is straightforward: regulatory agencies should account for environmental externalities when evaluating the benefits and costs of any proposed regulation. A higher SC-GHG value means that regulators, like the U.S. Environmental Protection Agency (EPA), will find higher monetary benefits from reducing carbon emissions. Higher monetary benefits justify stricter and costlier GHG emission reduction standards. Stakeholder incentives are apparent: organizations with a vested interest in carbon-emitting technologies mostly argue for a lower SC-GHG value and vice versa.

Estimating the value of the SC-GHG is anything but straightforward. It requires a combination of legal, climate, and economic analyses. This calculation applies multiple complex models, which in turn are informed by long lists of inputs and assumptions. The SC-GHG is opaque to most stakeholders. Its theoretical and algorithmic complexity inhibits useful participation by stakeholders and is susceptible to both inadvertent and malicious distortions.

II. A Black Box: The Social Cost of Greenhouse Gases

The SC-GHG is calculated via four modules: a global economic and GHG projection module; a climate module; an economic module; and a discounting module. With much simplification, the process can be summarized as follows. Economists and experts develop multiple baseline scenarios of future global economic growth and associated GHG emissions that span hundreds of years. Modelers apply global climate models to these baseline scenarios to determine the future climate impacts of an incremental ton of GHG emissions. The economic damage from these climate impacts, such as loss in productivity and increased mortality due to extreme heat, is then inferred. These future economic damages are then discounted to the present using the full Ramsey function, which adjusts the discount rate for each future year based on forecasted economic conditions. The outcome is a stream of dollar values that regulators apply in benefit cost analysis.

The Interagency Working Group (IWG) under President Barack Obama recommended a mean SC-GHG of around $51 per ton of GHG emissions; the Donald Trump Administration changed some key inputs and assumptions and recommended an SC-GHG of under $7[4]; and EPA recently updated the methodology, inputs, and assumptions to recommend a mean value of $190.[5] Public comments to EPA were predictable and guided by political leanings and economic priorities.[6]

Following the framework proposed by Professor Ziaja starts to demystify this process. To EPA's credit, they provide detailed documentation on how they calculate the SC-GHG. The documentation contains links to all relevant studies and models that inform the SC-GHG. The documentation also explains how it accounted for uncertainty in various steps.[7] EPA's updates are based on extensive publicly accessible recommendations by the National Academy of Sciences.[8] EPA also released its report on the SC-GHG update three months before soliciting public comment.

This is a vast amount of information. Although the logic of each component of the analysis is explicable, and a list of inputs that informed the final output are available, this information doesn't help advocates or subject matter experts assess the extent to which they can influence or contribute to the final estimate.

III. Algorithmic Intuition Gives X-Ray Vision

Algorithmic intuition is built by understanding an algorithm-assisted decisionmaking process' scope, key parameters, and causal relationships.

- Scope: what is the scope of the model? Would expanding or contracting the model scope significantly influence the outcome?

3. *See* Liz G. et al., Cal. Energy Comm'n, 2021 SB 100 Joint Agency Report, Achieving 100 Percent Clean Electricity in California: An Initial Assessment (Sept. 2021), https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity.
4. *See* U. S. Gov't Accountability Off., Social Cost of Carbon: Identifying a Federal Entity to Address the National Academies' Recommendations Could Strengthen Regulatory Analysis 1 (June 2002), https://www.gao.gov/assets/gao-20-254.pdf.
5. *See* Supplementary Material for the Regulatory Impact Analysis for the Supplemental Proposed Rulemaking, "Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review" EPA External Review Draft of Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances, EPA 3 (September 2022) [hereinafter EPA's SC-GHG Report]. Note that each of these SC-GHG estimates are approximate in that they reflect different discount rates and should be expressed in terms of the same nominal dollars for an accurate comparison. These estimates suffice for an order of magnitude comparison.
6. The Heritage Foundation, commenting on a related ruling that an older and lower SC-GHG estimate states that the SC-GHG process is easily influenced by political leanings and that the Obama-era IWG values are vast over-estimates. *See* Marlo Lewis, Competitive Enterprise Institute (CEI), and Kevin D. Dayaratna, Heritage Foundation, Comment on EPA, Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Gas Sector Climate Review; Supplemental Notice of Proposed Rulemaking, 87 FR 74702, Dec. 6, 2022, https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0317-2413; *see also* https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0317-2237. On the other hand, groups like Our Children's Trust argued that the EPA's SC-GHG estimate should be even higher. Environmental organizations also supported EPA's update and argue that some appropriate changes would cause the SC-GHG to increase further. See, for example: https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0317-2253 and https://www.nrdc.org/sites/default/files/nrdc_comments_epa_sc-ghg_update-20230213.pdf.
7. See, for example, EPA's SC-GHG Report at 23 and 25.
8. Nat'l Acad. of Sci., Eng'g, & Med., Valuing Climate Damages, Estimating the Social Cost of Carbon Dioxide (2017), https://nap.nationalacademies.org/read/24651/chapter/1.

Figure 1. Sensitivities of the SC-GHG to Key Parameters by Rennert et al.

Table 1 | Evolution of mean SC-CO_2 from DICE-2016R to this study

Row	Scenario	Mean SC-CO_2 ($ per tCO2)	Incremental change ($ per tCO2)	Share of total change (%)
a	DICE-2016R	44		
b	GIVE with DICE damage function, 3% near-term discount rate	59	15	11
c	GIVE with sectoral damages, 3% near-term discount rate	80	21	15
d	This study: GIVE with sectoral damages, 2% near-term discount rate	185	105	74

All SC-CO_2 values are expressed in 2020 US dollars per metric tonne of CO_2. Row a represents the SC-CO_2 using base DICE-2016R deterministic. The mean SC-CO_2 of $44 per tCO_2 is similar to the value previously estimated from IWG DICE-2010 of $46 per tCO_2 at a 3% discount rate, after converting to 2020 dollars[65]. Row b then retains the DICE-2016R damage function but otherwise deploys GIVE under discounting parameters of ρ=0.8%, η=1.57, which are consistent with a 3% near-term discount rate (see Methods section 'Discounting' for descriptions of ρ and η). Row c replaces the DICE-2016R damage function with our sectoral damage functions, and row d then uses our preferred discounting parameters from this study of ρ=0.2%, η=1.24, which are consistent with a 2% near-term discount rate. The final row represents the preferred mean value from this study.

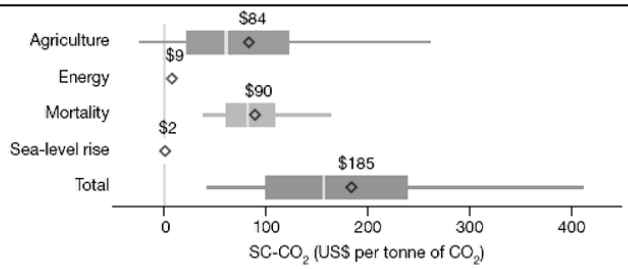

Fig. 3 | Partial SC-CO_2 estimates and uncertainty levels strongly differ across the four climate damage sectors. Box and whisker plots for the climate damage sectors included in the GIVE model, based on partial SC-CO_2 estimates for each sector. The figure depicts the median (centre white line), 25%–75% quantile range (box width), and 5%–95% quantile range (coloured horizontal lines) partial SC-CO_2 values. Black diamonds highlight each sector's mean partial SC-CO_2, with the numeric value written directly above. All SC-CO_2 values are expressed in 2020 US dollars per metric tonne of CO_2.

- Key parameters: which inputs and assumptions have an outsized impact on a model's outputs?
- Causal relationships: what is the direction and the order of magnitude of change in output due to a change in key parameters?

Once a stakeholder has intuition for an algorithmic tool, they can determine the extent to which they can influence the outcome of the model. By better understanding what most drives the outcome, they can better focus their advocacy and resources. Decisionmakers can apply this algorithmic intuition to better interpret model outputs with the nuance and skepticism necessary to make binding policy decisions.

Model developers should provide this information to stakeholders, and stakeholders should demand this information when participating in algorithm-assisted decisionmaking processes. Requesting a clear explanation of analysis scope seems straightforward, however drawing the boundaries between what a model can and can't consider has real implications on the outcomes. Key questions for the SC-GHG include how far in time it should estimate damages to, and whether an agency of the United States should limit its accounting of climate damages to whatever occurs within the country's geographic boundaries. There are policy and legal arguments for both questions. The Trump Administration limited the scope of the SC-GHG analysis to only those damages from GHG emissions that occur domestically. This limitation is a big reason why the Trump Administration's SC-GHG estimate was so low. This key part of the analysis, establishing an appropriate scope, is something non-technical stakeholders can influence.

Identifying key parameters and their causal relationships to the output requires both transparency and analysis. Model developers should provide stakeholders with a list of parameters that the model is most sensitive to. Stakeholders should request a sensitivity analysis on each of these key parameters to understand how and to what extent these parameters influence the output. One way to conduct the sensitivity analysis is to first hold all parameters but one constant, then vary the parameter of interest by an order of magnitude, then rerun the model. Repeating this for all key parameters would tell a clear story of how different key parameters impact the outcome of the model.

Fortunately, recent research published in *Nature* conducts such an analysis on the SC-GHG.[9] The study, an update to the SC-GHG using up-to-date scientific and economic data, also analyzes the sensitivity of the SC-GHG estimate to key model parameters. Their findings, reproduced below, illustrate that future climate damages to agricultural output and mortality impact the SC-GHG more than impacts on other sectors. The other noteworthy fact is that these are the only four sectors investigated, which further speaks to better understanding and refining the scope of the analysis.[10] Finally, as the left side of the figure illustrates, the discount rate matters much more than most modeling details. Reducing the discount rate from 3% to 2% increases the study's estimate of the SC-GHG from $80 per ton to $185.

9. Kevin Rennert et al., *Comprehensive Evidence Implies A Higher Social Cost of CO_2*, 610 Nature J. 687, 687-92 (2022), https://doi.org/10.1038/s41586-022-05224-9.
10. See, for example, EPA's SC-GHG Report at 73.

IV. An Example of How to Use X-Ray Vision to Effectively Participate in Black Box Processes

Using this framework for algorithmic intuition, interested participants now know what kind of expertise to leverage and what sub-components of the analysis warrant their limited resources. Attorneys and non-technical staff at environmental organizations can apply this framework of algorithmic intuition to influence the outcome of a seemingly black box process. Consider the example of the SC-GHG.

Should the SC-GHG scope be limited to one country's geographic boundary given the spillover effects of climate change, the interconnectedness of the global economy, and the fact that GHGs are a global pollutant whose impact is independent of where they were emitted? Non-technical participants can provide evidence and normative value-based arguments to answer this key question. Attorneys can provide the legal basis for whether and how the global impact of domestic pollutants needs to be accounted for. Environmental organizations can also comment on the fact that the SC-GHG analyses do not account for the irreversible harm that climate change will inflict on ecosystems and biodiversity therein. Without the inclusion of these impacts, SC-GHG estimates are bound to be conservative. Finally, advocates can reach out to economists to better understand the arguments for including lower discount rates and then request an analysis that more accurately values future damages from present-day GHG emissions.

COMMENT

MAKING PARTICIPATION IN ALGORITHM-ASSISTED DECISIONMAKING IN CLIMATE INVESTMENTS MORE ACCESSIBLE AND EQUITABLE

by Debra Gore-Mann, Vinhcent Le, and Sneha Ayyagari

Debra Gore-Mann is President and CEO of the Greenlining Institute. Vinhcent Le is Senior Legal Counsel of Tech Equity at the Greenlining Institute. Sneha Ayyagari is Clean Energy Initiative Program Manager at the Greenlining Institute.

In *How Algorithm-Assisted Decisionmaking Is Influencing Environmental Law and Climate Adaptation,* Prof. Sonya Ziaja provides a useful framework to analyze whether an algorithm-assisted decisionmaking (AADM) tool and its design process is procedurally equitable. Professor Ziaja's framework contains several different questions advocacy groups can use to analyze the AADM tools that are increasingly used for environmental resource governance, such as the INFORM and RESOLVE algorithms discussed in the article, which guide the allocation and distribution of water and energy resources. The questions within the framework can help stakeholders assess the legal and policy assumptions ("value-laden assumptions") embedded in algorithmic decision tools and are a starting point for identifying potential biases and substantive equity issues within those systems and encouraging greater deliberation and coproduction of AADM tools between governmental agencies and advocacy groups. In this Comment, we discuss some of the barriers advocacy organizations face when engaging in the development of algorithmic systems, how the framework can ease those barriers, and finally the need for the developers of algorithmic decision systems to complete impact or risk assessments to further enable informed discussion and coproduction of these tools.

I. Barriers to Participation in AADM Development

The framework in the article is described as a tool to help advocacy organizations engage in the development of increasingly inaccessible and technically complex algorithms and to guide a critical analysis of these tools in an effort to make them more equitable.[1] The Greenlining Institute (Greenlining) is an organization focused on undoing the impact of historical discrimination and redlining on communities of color through advocacy focused on economic and climate equity. As it relates to this article, Greenlining works with state and federal agencies developing algorithmic decision tools, making Greenlining a prime target for Professor Ziaja's framework. For example, Greenlining and over 2,600 other commenters provided input to the White House Council on Environmental Quality (CEQ) on its development of the federal Climate and Economic Justice Screening Tool (CEJST). CEJST is used by federal agencies to identify disadvantaged communities and determine their eligibility and priority for billions of dollars of federal benefits and investment. CEJST is an AADM tool that is a critical part of the Justice40 initiative which aims to direct 40% of federal investments in clean energy and transit, pollution reduction, sustainable housing and climate infrastructure to disadvantaged communities.[2] Greenlining's comments advocated for substantive and procedural equity in CEJST through the inclusion of datasets that ensured redlined and disadvantaged communities of color were properly identified by the tool and for community participation and transparency in

1. Sonya Ziaja, *How Algorithm-Assisted Decision Making Is Influencing Environmental Law and Climate Adaptation*, 48 Ecology L.Q. 899, 934 (2022).
2. *See* Justice40, A Whole of Government Initiative, The White House (2022), https://www.whitehouse.gov/environmentaljustice/justice40/ (last visited Mar 17, 2023).

selecting the metrics or thresholds used for identifying disadvantaged communities.[3]

In our experience, the level of engagement and participation we saw in the development of CEJST is the exception not the rule when it comes to stakeholder participation in the development of algorithmic systems. As Professor Ziaja notes, meaningful participation takes time, is costly and requires technical capacity-building and translation,[4] all culminating in significant barriers to participation, even for intermediate advocacy groups like Greenlining that have attorneys, scientists, and other experts on staff. The CEJST tool was open-source, but the ability to understand and provide feedback around the algorithms used to identify disadvantaged communities required an understanding of Python programming and familiarity with GitHub—making it inaccessible to many advocacy groups, community-based organizations and individuals who may not have the time or technical knowledge to apply. This is especially the case for algorithms that are more complex, inscrutable, and lack a specific focus on equity, such as the INFORM and RESOLVE algorithms described in the article. The highly technical nature of many public algorithmic decision tools, the unclear or seemingly attenuated impacts of any particular algorithm on an organization's particular community of interest, or limited opportunities for stakeholder collaboration with developers can make investing time and staff resources into the development process a difficult decision. Public participation in the development of algorithmic decision tools is often limited to a 30- to 60-day notice-and-comment process that occurs with unpredictable timing that can interfere with ongoing projects and other rulemaking efforts. Given these constraints, advocacy organizations like Greenlining are less likely to comment and get involved if there is a concern that participation will be superficial and will not add value to the development process. This concern is further magnified by the lack of transparency on how advocate and community feedback gets translated into substantive changes to the methodology or development of an AADM tool. Within the CEJST development process, CEQ provided an opportunity for users to provide feedback on specific census tracts, but there was not a clear process for how this feedback would be implemented in the designation of those census communities as disadvantaged (and therefore eligible for future funding). In addition, there was not much transparency around the process for how advocates could influence future iterations or the implementation of the tool. These constraints and structural barriers to stakeholder participation ultimately limit the oversight and analysis of inequity and value-laden assumptions embedded in algorithmic systems.

II. Applying the Framework

This article serves as a reminder that it may not be feasible for advocates to pivot to procedural equity issues when engaging on the technical or substantive elements (datasets, inputs, optimization criteria, etc.) of an algorithmic tool due to the constraints mentioned above or simply because those issues would be properly addressed in another organization's comments. Pushing developers to include proper notice and transparency about the logic and methodologies of their AADM tools, information on the diversity of the decisionmakers, the sources of uncertainty in a model, how an AADM tool will be used and implemented and ensuring sufficient opportunities for effective stakeholder collaboration is especially justified when it comes to the development of public-purpose algorithms used by government agencies and funded by taxpayers. The benefits of procedural equity do not just flow to the public, they also benefit the regulators and developers behind these algorithms by catalyzing a feedback loop that can help save time and prevent missteps and public outcry if these algorithms fall short of public expectations.

The California Public Utilities Commission (Commission) recently partnered with a developer to create an AADM tool that would identify "priority" areas for broadband infrastructure funding.[5] Public comments on the tool centered around the need to prioritize disadvantaged communities with socioeconomic barriers to broadband adoption for this funding.[6] In practice, the Commission and the developer built a model focused on identifying areas that were profitable to invest in, and in doing so, prioritized wealthier and more advantaged communities in terms of socioeconomic vulnerability and exposure to environmental health hazards—reflecting a value-laden assumption that embedded the primacy of profit over equity in prioritizing communities for broadband investment.[7] In terms of Professor Ziaja's framework, the model was quite transparent about its logic and focus on prioritizing profitable investments, but this also created a significant disconnect with the public as it disregarded stakeholder knowledge that was advisory rather than determinative. This disconnect, along with strong disagreement around how the model reflected existing governance and expectations in selecting priority areas led to public outcry, multiple legislative oversight

3. *See* The Greenlining Institute, Comment Letter on the White House Council of Environmental Quality's Climate and Economic Justice Screening Tool (CEJST) (May 23, 2022), https://www.regulations.gov/comment/CEQ-2022-0002-2483.
4. *See* Ziaja, *supra* note 1, at 919, 933.
5. CostQuest Associates, *California Broadband Analysis Federal Funding Account Priority Areas Process Overview and Methods*, California Public Utilities Commission 4 (Dec. 2022), https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/communications-division/documents/broadband-implementation-for-california/priority-areas-webpage/ca-broadband-analysis-priority-areas.pdf.
6. *See generally* California Public Utilities Commission, Decision Adopting Federal Funding Account Rules, Rulemaking 20-09-001, D. 22-04-055 22-25 (Apr. 22, 2022), https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M470/K543/470543650.PDF.
7. The priority areas had an average CalEnviroScreen score (where a higher score indicates greater exposure to pollution and poverty) between 19.2 and 27.6, while the average CalEnviroScreen score for Black and Latino communities is above 65. *See* CostQuest Associates, *supra* note 5, at 17; California Environmental Protection Agency (CalEPA), *Analysis of Race/Ethnicity and CalEnviroScreen 4.0 Scores* (2021) 2 https://oehha.ca.gov/media/downloads/calenviroscreen/document/calenviroscreen40raceanalysisf2021.pdf.

hearings, and pressure to scrap the use of the tool entirely. Approximately one month later, the Commission scrapped the use of investment criteria in the model and the development of priority areas, and it indicated that it is developing an updated model that focuses on selecting areas without access to broadband and providing higher scores to projects that serve disadvantaged communities.[8]

III. Integrating the Framework Into Risk and Impact Assessment Requirements

As the above example shows, Professor Ziaja's framework provides a lens that advocates can use to guide their analysis of algorithmic systems and their asks for the incorporation of substantive equity as well as transparency obligations and plain-language explanations within algorithmic decision tools. However, given the resource constraints for advocacy organizations, it raises the question, why should advocates have to apply the framework and ask these questions in the first place? As developers have greater control over the development of algorithmic systems, it should be their responsibility to affirmatively answer the questions contained in the framework as they develop the tool. Providing this type of information before, during, and after the development of algorithmic systems can lower the barriers to entry for organizations interested in participating in the development and governance of algorithmic systems and can act as an internal quality control process for the developers as they think through the implications and potential public response to the assumptions embedded within an algorithmic-decision tool.

A key part of Greenlining's algorithmic equity work is to develop legislation and regulations that require developers and government agencies to systematically publish impact or risk assessments of algorithmic-decision systems that make critical decisions. Environmental risk assessments are already required by laws like the California Environmental Quality Act (CEQA), which generally requires state and local government agencies to inform decisionmakers and the public about the potential environmental impacts of proposed projects, and to reduce those environmental impacts to the extent feasible. In Canada, government agencies are required to complete an algorithmic impact assessment with varying peer review, transparency, and documentation requirements depending on the purpose, risk, and uses of the algorithm. Impact assessments are crucial as they enable the identification and evaluation of potential risks and harms that could result from the deployment of algorithmic systems. These assessments consider various factors, including the accuracy and fairness of the algorithm, potential for bias or discrimination, and the possibility of negative impacts on individuals or groups. These assessments often incorporate the elements of the framework described in this article. For example, the National Institute of Standards and Technology (NIST) risk management framework asks developers to have processes in place for stakeholder engagement as well as documenting the limitations of the system that correspond with the framework's focus on transparency, uncertainty, and stakeholder engagement.[9] By conducting and publishing risk assessments that address equity concerns, developers and decisionmakers can do a self-assessment for potentially harmful value-laden assumptions. Public risk assessments can lower the barriers for effective stakeholder involvement and engagement by helping advocates understand the purpose of the algorithm and if there are any measures in place to minimize risks and ensure equity. This can increase the likelihood that advocacy organizations can engage in the policy processes underpinning the development of algorithmic systems and generate more constructive comments and feedback in the use of these tools and the development of assumptions that guide their algorithmic decisions. Moreover, a risk assessment can address topics that cannot be included for some reason in the tool itself. For example, CalEnviroScreen, an AADM tool similar to CEJST could not include race as a factor in the tool, but it did publish an analysis on how the factors were correlated to race.[10]

The article concludes its analysis by asking if algorithmic tools are destined to be increasingly inequitable in environmental governance due to the increasing complexity of these systems. In Professor Ziaja's view, inequity could rise from the need for high technical capacity that excludes the necessary people and organizations that could drive equity in development of AADM tools. The article's framework, complemented with legislation imposing an affirmative obligation for developers to complete public risk assessments of algorithmic decision tools would lower the barriers to entry into the AADM development processes, improve procedural and substantive equity, and encourage informed engagement and coproduction of these systems. In this way, advocates, developers, and other stakeholders have a greater chance at avoiding a destiny where algorithmic decision systems become increasingly complex, opaque, and inequitable.

8. *See* Federal Funding Account Priority Areas, California Public Utilities Commission (2023), https://www.cpuc.ca.gov/industries-and-topics/internet-and-phone/broadband-implementation-for-california/last-mile-federal-funding-account/priority-areas (last visited Mar. 17, 2023).

9. *See* NIST, *AI Risk Management Framework: Second Draft* 19-25 (2022), https://www.nist.gov/system/files/documents/2022/08/18/AI_RMF_2nd_draft.pdf.

10. *See* CalEPA, *supra* note 7.

ARTICLE

ARBITRARINESS REVIEW AND CLIMATE CHANGE

by Cass R. Sunstein

Cass R. Sunstein is the Robert Walmsley University Professor at Harvard University.

In its ideal form, arbitrariness review is an instrument for promoting "deliberative democracy"—a system that combines reason-giving with political accountability. Under arbitrariness review in its current form, courts tend to embrace the "hard look doctrine," which has a procedural component, requiring agencies to offer detailed justifications, and also a substantive component, in which courts assess the reasonableness of agencies' choices on the merits. These are serious constraints on the executive branch, and they also reduce the risk of large-scale instability in government, in which scientific and economic judgments are overridden by political considerations.

With respect to regulatory policy, it is not enough to say that "elections have consequences." For climate change in particular, the "social cost of carbon," or more broadly the "social cost of greenhouse gases," is sometimes described as "the most important number you've never heard of." A key reason is that within the executive branch, the stringency of regulation of greenhouse gases emissions sometimes depends on that number. In the United States, the relevant numbers were challenged in court under the administrations of Barack Obama (where they were upheld), Donald Trump (where they were struck down), and Joseph Biden (where they were struck down, though the ultimate fate of the relevant ruling is unclear).

Legal challenges to the social cost of carbon raise fundamental questions about the role of science, economics, and politics in judicial review of agency action, and about the relationship between courts and the administrative state.

With respect to the social cost of carbon, I aim to defend the following propositions: (1) A decision to use the global number, as opposed to the domestic number, would be straightforward to defend against an arbitrariness challenge; a decision to use the domestic number, as opposed to the global number, would be more challenging to defend against an arbitrariness challenge. (2) A decision to use a low discount rate, such as 2%, would be straightforward to defend against an arbitrariness challenge; a decision to use a very low discount rate, such as 1%, or a high discount rate, such as 7%, would be exceedingly difficult to defend against an arbitrariness challenge. (3) A wide range of decisions—involving, for example, climate sensitivity and the damage function—raise difficult questions in science and economics; they should be straightforward to defend against an arbitrariness challenge, but only if they follow from a reasoned justification. (4) Approaches that take account of equity—including "prioritarianism"—should be defensible against an arbitrariness challenge, as should be a refusal to adopt such approaches, but here again, a reasoned justification is required. (5) A decision to "back out" a social cost of carbon, from some specific target, would be challenging to defend against an arbitrariness challenge.

A general lesson, with relevance to lawyers and judges, involves the range of arbitrary and nonarbitrary choices for the social cost of carbon. Another lesson, with even broader implications, is that judicial review of the social cost of carbon should (and likely will) involve a procedural hard look, not a substantive hard look. A procedural hard look is important to defend against failures of both deliberation and democracy; but in this context, a substantive hard look would strain judicial capacities.

Editors' Note: This abstract is adapted from Cass R. Sunstein, *Arbitrariness Review and Climate Change*, 170 U. PA. L. REV. 991 (2022), *and used with permission.*

ARTICLE

BUILDING A NEW GRID WITHOUT NEW LEGISLATION: A PATH TO REVITALIZING FEDERAL TRANSMISSION AUTHORITIES

by Avi Zevin, Sam Walsh, Justin Gundlach, and Isabel Carey

Avi Zevin is Deputy General Counsel for Energy Policy at the U.S. Department of Energy. Sam Walsh is General Counsel of the U.S. Department of Energy. Justin Gundlach is Senior Advisor for Policy Implementation at New York State's Department of Public Service. Isabel Carey is an Associate at Marten Law.

New long-distance, high-voltage transmission will be vital if the United States is to integrate the renewable energy generation needed to decarbonize the electric system at sufficient scale and at reasonable cost. The U.S. Congress would ideally take action to address the regulatory and economic barriers that currently prevent long-distance, high-voltage transmission from being developed at the necessary speed and scale. But until Congress acts, the U.S. Department of Energy (DOE) and the Federal Energy Regulatory Commission (FERC) should use their existing authority to advance transmission development. However, it has become conventional wisdom that development of new long-distance, high-voltage transmission projects is hopeless without new legislation because opponents can exploit veto points created by state laws and state-level institutions involved in transmission siting decisions.

As this Article explains, that conventional wisdom is wrong. Congress has already enacted authorities that the federal government can use to counteract siting-related obstacles. To date, those authorities have either not been used or have been used unsuccessfully. In part, this is the result of unfavorable judicial interpretations of those authorities, but those interpretations are not fatal. Given the urgent need for energy system transformation, now is the time for DOE and FERC to revisit the authorities that they have been given.

This Article recommends steps for those agencies to take now that would allow them to side-step the obstacles and revitalize the provisions Congress has already adopted in order to facilitate transmission system development: (1) reducing obstacles to transmission; (2) designating Transmission Corridors under the Federal Power Act (FPA) §216(a); (3) federal permitting of transmission under FPA §216(b); (4) entering DOE-private developer partnership projects under the Energy Policy Act of 2005 §1222; and (5) exploring Power Marketing Administration transmission projects. Within the five categories, there are 20 interrelated recommendations:

Editors' Note: This abstract is adapted from Avi Zevin et al., *Building a New Grid Without New Legislation: A Path to Revitalizing Federal Transmission Authorities,* 48 Ecology L.Q. 169 (2021)*, and used with permission, and was discussed on a public webinar hosted by the Environmental Law Institute. A recording of the webinar may be viewed at this link: https://youtu.be/q5qV2CN9FDM.*

Authors' Note: This Article was written prior to the employment of Mr. Zevin and Mr. Walsh at the U.S. Department of Energy. It does not necessarily reflect the views of the Department. Similarly, it was written prior to Mr. Gundlach's employment at the New York State Department of Public Service, and does not necessarily reflect the views of the Department or the New York State Public Service Commission.

Table 1. Twenty Recommendations for Policymakers

Reducing Obstacles to Transmission
1. Technologies and policies that increase use of the existing transmission system, minimize the extent of new transmission needs, reduce public opposition, or eliminate the need for state permitting should be implemented to the greatest extent feasible.
Transmission Corridor Designation (FPA §216(a))
2. DOE should supplement or redo its 2020 congestion study.
3. DOE should expeditiously designate new Transmission Corridors that are a prerequisite to FERC issuing federal siting permits.
4. DOE should consider how new transmission will benefit customers by connecting areas with high renewable potential.
5. DOE should take care to consult with states when studying transmission congestion as required.
6. DOE should meaningfully incorporate state feedback into Transmission Corridors designation.
7. DOE should designate narrow Transmission Corridors with specific projects in mind.
8. DOE and FERC should issue coordinated project-specific Transmission Corridor designations and federal siting permits for the project, which would require FERC to update its regulations.
9. DOE should consider delegating Transmission Corridor designation responsibilities/authority to FERC.
Federal Permitting of Transmission (FPA §216(b))
10. FERC should issue a new order refining the procedure for issuing federal permits and clarifying its interpretation of the criteria FERC will use to evaluate applications.
11. FERC's new order should clarify that transmission projects connecting renewable energy to population centers meet the statutory criteria for federal permits.
12. FERC's order should reiterate FERC's interpretation that it may grant a federal permit when a state affirmatively denies siting to a project and apply that interpretation to projects in states outside the Fourth Circuit.
13. FERC's order should permit applicants to begin the pre-filing process in parallel with state review of project applications.
14. FERC's order should encourage developers to apply for federal siting permits when states lack authority to approve their projects, when states fail to consider a project's interstate benefits, when states only permit projects that serve in-state customers, or when states impose unreasonable conditions.
DOE-Private Developer Partnership Projects (EP Act 2005 §1222)
15. DOE should issue a new request for proposals that declares the agency's willingness to evaluate new partnership.
16. DOE should make the beginning of the section 1222 review process automatic.
17. DOE should structure deals under section 1222 to provide material inducements that might aid in building public support for projects.
18. If it moves forward with future projects, DOE should consider whether existing appropriated funds might be available.
Power Marketing Administration Transmission Projects
19. DOE should consider providing appropriated taxpayer funds to study PMA transmission systems and existing rights-of-way.
20. DOE should continue to support the Western Area Power Administration's management of its program to borrow funds for transmission development.

HONORABLE MENTION

MAKING NET ZERO MATTER

by Albert C. Lin

Albert C. Lin is a Martin Luther King Jr. Professor of Law at University of California, Davis School of Law.

In recent months, dozens of countries and thousands of businesses have pledged to achieve net-zero greenhouse gas emissions. However, net zero often means different things to different entities, and it is often uncertain how net-zero pledges—which set targets years or decades from the present—will be met. This Article considers the motivations behind net-zero pledges, highlights the underappreciated role of carbon removal in net-zero efforts, and identifies mechanisms for encouraging the accomplishment of net-zero goals. Two key strategies are essential to making net-zero targets matter. First, society should develop and implement accountability and enforcement mechanisms to promote follow-through on net-zero commitments. These mechanisms include disclosure standards, benchmarks, contractual arrangements, and legal claims under securities and consumer protection laws. Second, net-zero pledges should incorporate distinct targets for emissions reduction and carbon removal. Carbon mitigation and carbon removal differ in significant ways with respect to verifiability, permanence, readiness, and risks. Distinguishing carbon mitigation and carbon removal in net-zero goals is essential to avoid undermining efforts to achieve climate goals, shifting the burdens of climate action to vulnerable populations or future generations, and increasing societal, health, and environmental risks.

Editors' Note: This abstract is adapted from Albert C. Lin, *Making Net Zero Matter,* 79 WASH. & LEE L. REV. 679 (2022)*, and used with permission.*

HONORABLE MENTION

CONSERVATION RIGHTS-OF-WAY ON PUBLIC LANDS

by Justin R. Pidot and Ezekiel A. Peterson

Justin R. Pidot is Professor of Law, Ashby Lohse Chair in Water & Natural Resources, and Co-Director of the Environmental Program at the University of Arizona James E. Rogers College of Law. Ezekiel A. Peterson received his J.D. in May 2021 from the University of Arizona James E. Rogers College of Law.

The Joseph Biden-Kamala Harris Administration's ambitious America the Beautiful Campaign to protect 30% of the United States' lands and waters by 2030 will require a comprehensive inventory of conservation tools. This Article contributes to that inventory by identifying and evaluating a novel use of the authority of the Bureau of Land Management (BLM) to issue rights-of-way under Title V of the Federal Land Management & Policy Act (FLPMA) over the vast public lands managed by the agency, which account for roughly 10% of the surface area of the United States. It contends that BLM could issue a "conservation right-of-way" to a state, tribe, local government, or private party seeking to restore and protect ecological systems. Creating private rights to conservation in appropriate circumstances could address persistent asymmetries between active use of public lands—which tends to occur through private rights—and conservation use of public lands—which tends to occur through public policy. BLM could plausibly deploy conservation rights-of-way in an array of circumstances, for example, to authorize the construction and maintenance of mitigation banks for wetlands or wildlife habitat or to monitor and maintain wildlife corridors. Conservation rights-of-way could be small in scale, nuanced, and context-dependent, and they could be issued in a distributed fashion at BLM field offices throughout the United States. These features suggest that conservation rights-of-way could serve as an important supplement to other conservation tools.

Editors' Note: This abstract is adapted from Justin R. Pidot & Ezekiel A. Peterson, *Conservation Rights-of-Way on Public Lands*, 55 U.C. Davis L. Rev. 89 (2022), *and used with permission.*

HONORABLE MENTION

RENEWABLE ENERGY FEDERALISM

by Danielle Stokes

Danielle Stokes is Assistant Professor of Law at the University of Richmond School of Law.

No one seriously questions that an improved and decarbonized energy supply system is a key component of climate change mitigation, but the United States' system of federalism complicates the siting of utility-scale renewable energy facilities. The Joseph Biden Administration presents the United States with an opportunity to reimagine how this country regulates renewable energy siting, allowing for substantial national progress in reducing greenhouse gas emissions. Currently, primary siting authority for renewable energy projects rests with state and local governments, which generally exercise that authority through zoning and land use planning, while the federal government approves certain interstate energy delivery systems. This fragmented system of governance can delay and even deter project development, simultaneously thwarting the optimal logic in developing a national renewable energy generation system. Proactive renewable energy project planning offers one potentially effective—and constitutional—solution to this renewable energy federalism dilemma, particularly in conjunction with negotiated siting guidelines and a centralized siting agency. Drawing upon the substantial body of scholarly work that advocates for federal or regional collaboration in renewable energy policymaking and for more balanced and dynamic federalism in the energy sector, this Article further advances those goals while also shifting the focal axis and underscoring renewable energy as the locus for expanding energy federalism and mitigating climate change.

Editors' Note: This abstract is adapted from Danielle Stokes, *Renewable Energy Federalism,* 106 MINN. L. REV. 1757 (2022), *and used with permission.*

IN CASE YOU MISSED IT . . .

In the Courts

"In the Courts" contains full summaries of court cases reported in *ELR Update* during the month of June 2023. They are listed under the following categories: Climate Change, Energy, Governance, Natural Resources, Toxic Substances, Water, and Wildlife. The summaries are then arranged alphabetically by case name within each category. To access *ELR*'s entire collection of court cases and summaries, visit https://www.elr.info/judicial.

CLIMATE CHANGE

Concerned Household Electricity Consumers Council v. Environmental Protection Agency, No. 22-1139, 53 ELR 20082 (D.C. Cir. May 25, 2023). The D.C. Circuit dismissed industry groups' petitions to review EPA's decision not to reconsider its 2009 finding that greenhouse gas (GHG) emissions from motor vehicles contribute to climate change and thus endanger public health and welfare. The groups initially petitioned EPA to reconsider its finding in light of new research allegedly invalidating its earlier conclusions regarding the link between GHG emissions and climate change. The Agency determined the arguments and evidence the groups presented were "inadequate, erroneous, and deficient," and denied the petitions. The groups then petitioned the court to review EPA's decision. The court found the groups failed to provide any evidence that they or their members had been injured by the endangerment finding, and dismissed both petitions for lack of standing.

Heating, Air Conditioning & Refrigeration Distributors International v. Environmental Protection Agency, No. 21-1251, 53 ELR 20094 (D.C. Cir. June 20, 2023). The D.C. Circuit, in a split ruling, vacated certain provisions of EPA's rule phasing out the use of hydrofluorocarbons (HFCs). Two companies and three trade groups argued EPA exceeded its authority in issuing the rule and that the American Innovation and Manufacturing (AIM) Act, which directed the Agency to promulgate the rule, violated the nondelegation doctrine. The court found the nondelegation challenge failed and that the AIM Act gave EPA authority to regulate HFCs within blends, but that the Agency lacked authority to pass two measures in the rule regulating the distribution of HFCs—a mandate for refillable cylinders to transport HFCs, which banned disposable cylinders used by the industry, and a certification and tracking system for HFC distribution. It vacated those provisions of the rule and remanded to EPA.

Juliana v. United States, No. 6:15-cv-01517-AA, 53 ELR 20087 (D. Or. June 1, 2023). A district court granted a group of youths' motion for leave to file a second amended complaint in a lawsuit alleging the U.S. government failed to act on climate change and violated their right to a safe climate. The youths had argued that the government violated their constitutional rights under the Fifth and Ninth Amendments by continuing to permit, authorize, and subsidize the use of fossil fuels despite knowing the risks, and sought to compel the government to develop a plan to phase out fossil fuel emissions and reduce atmospheric carbon dioxide. The district court concluded the youths had standing, but the Ninth Circuit held their injuries could not be redressed because development of an effective remedial plan necessarily required complex policy decisions entrusted to the executive and legislative branches, not the judiciary; it remanded to the district court with instructions to dismiss for lack of standing. On remand, the youths moved to amend their complaint to address the defects the appellate court identified. The district court found that the proposed amendments—alleging that a declaration under the Declaratory Judgment Act was substantially likely to remediate their ongoing injuries, and that such relief was within the court's power to award—satisfied redressability, and granted the youths' motion.

GOVERNANCE

WildEarth Guardians v. United States Forest Service, No. 21-35936, 53 ELR 20090 (9th Cir. June 14, 2023). The Ninth Circuit dismissed for lack of standing a challenge to the Forest Service's livestock grazing decisions in Colville National Forest. Environmental groups argued the decisions would lead to an increase in wolf attacks on livestock, which in turn would cause the Washington Department of Fish and Wildlife to kill more wolves. The court found the Service had no authority to require the Department to do anything before killing wolves because they were not federally protected. Because the lethal removal of wolves could not be fairly traced to the Service's grazing decisions, a remedy that required it to make different decisions would not redress the harm. The court dismissed for lack of standing.

LAND USE

Friends of Alaska National Wildlife Refuges v. Haaland, Nos. 20-35721, 20-35727, and 20-35728, 53 ELR 20091 (9th Cir. June 15, 2023). The Ninth Circuit granted DOI's motion to dismiss a long-running land exchange dispute over construc-

tion of a road through the Izembek National Wildlife Refuge. The court found the Secretary of the Interior's recent withdrawal of the exchange, which was approved by a previous Secretary, mooted the case.

NATURAL RESOURCES

Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation v. Enbridge Energy Co., No. 19-cv-602-wmc, 53 ELR 20092 (W.D. Wis. June 16, 2023). A district court ordered the Line 5 oil and gas pipeline to be removed within three years from tribal land in northern Wisconsin. The Bad River Band of Lake Superior Chippewa Indians sought to enjoin the owner from operating the pipeline through reservation land based on the risk of its failure constituting a public nuisance, and sought damages for the owner's continued operation of the pipeline in trespass on portions of the reservation for which long-standing rights-of-way had expired. The court concluded that a rupture at the Bad River meander would unquestionably be a public nuisance, and that current conditions created a real and unreasonable risk of that occurring such that equitable relief was warranted; but that the threat of rupture was not so imminent as to warrant immediate shutdown of the pipeline. It ordered the owner to adopt a more conservative shutdown and purge plan and to pay the Band more than $5 million for operating with expired rights-of-way; and enjoined the owner to remove the pipeline within three years from any parcel within the Band's tribal territory on which it lacked a valid right-of-way and to provide reasonable remediation at those sites.

Center for Biological Diversity v. United States Bureau of Land Management, No. 4:21-cv-00182-BLW, 53 ELR 20088 (D. Idaho June 2, 2023). A district court vacated BLM's final EIS and 2019 record of decision (ROD) that approved an open-pit phosphate mine in southeast Idaho. Environmental groups had argued the ROD and final EIS upon which it was based violated NEPA, FLPMA, and the CWA. The court granted summary judgment in part for the groups, but deferred ruling on the appropriate remedy. On that issue, the groups argued the ROD and final EIS should be vacated. BLM sought remand without vacatur, claiming a more tailored remedy was warranted. The court found vacatur was warranted because of the seriousness of BLM's errors—failing to properly analyze direct, indirect, and cumulative impacts to the greater sage-grouse population and habitat, and failing to consider the indirect effect of processing ore from the mine at a nearby plant. It vacated the final EIS and ROD, and all decisions made in reliance on them.

Sierra Club v. Federal Energy Regulatory Commission, No. 20-1512, 53 ELR 20086 (D.C. Cir. May 26, 2023). The D.C. Circuit granted in part environmental groups' petitions to review FERC orders allowing the Mountain Valley Pipeline project to proceed. The groups argued FERC erred by allowing construction to resume before the pipeline owner reacquired all its other permits, that constructing segments of the pipeline up to the border of Jefferson National Forest would pressure BLM and the Forest Service to allow construction within the forest, and that the Commission should have prepared a supplemental EIS before permitting construction to resume. The court denied most of the groups' claims, but agreed that FERC inadequately explained its decision not to prepare a supplemental EIS addressing unexpected erosion and sedimentation along the pipeline's right-of-way. It granted the petitions for review on that ground, but did not vacate the Commission's orders allowing work on the project to resume, and remanded to FERC to either prepare a supplemental EIS or provide a better explanation for why it is unnecessary.

WATER

Arizona v. Navajo Nation, No. 21-1484, 53 ELR 20095 (U.S. June 22, 2023). The U.S. Supreme Court held, 5-4, that an 1868 peace treaty between the Navajo Nation and the United States establishing the Navajo Reservation reserved necessary water to accomplish the purpose of the reservation, but did not require the U.S. government to take affirmative steps to secure water for the tribe. The tribe brought a breach-of-trust claim, seeking to compel the government to take affirmative steps to secure water for the tribe—for example, by assessing the tribe's water needs, developing a plan to secure needed water, and potentially building pipelines, pumps, wells, or other water infrastructure. A district court dismissed the suit, and the Ninth Circuit reversed, holding the U.S. government had a duty under the treaty to take affirmative steps to secure water for the tribe. The Supreme Court found the treaty did not establish a conventional trust relationship with respect to water, and concluded its text and history did not require the government to take such affirmative steps. It further explained that it is Congress' and the president's "responsibility to update federal law as they see fit" to address modern water needs. It reversed the Ninth Circuit ruling. Kavanaugh, J., delivered the opinion of the Court, in which Roberts, C.J., and Thomas, Alito, and Barrett, JJ., joined. Thomas, J., filed a concurring opinion. Gorsuch, J., filed a dissenting opinion, in which Sotomayor, Kagan, and Jackson, JJ., joined.

Forest Service Employees for Environmental Ethics v. United States Forest Service, No. 22-168-M-DLC, 53 ELR 20085 (D. Mont. May 26, 2023). A district court granted in part and denied in part an environmental group's motion for summary judgment in a CWA citizen suit concerning the Forest Service's discharge of aerially deployed fire retardant into navigable waters of the United States without an NPDES permit. The group argued the Service's application of the retardant without an NPDES permit violated the CWA, and sought to enjoin it from doing so until it obtained a permit. The court found the Service itself conceded that an aircraft can be a point source and that fire retardant is a pollutant. Further, the Service has already begun the process for obtaining an NPDES permit to discharge its retardant into "waters of the United States." The court held that the Service's unpermitted

aerial discharges of fire retardant into navigable waters in 10 states violated the CWA, but declined to enjoin the Service from continuing the practice because doing so could conceivably result in greater harm from wildfires.

In re Klamath Irrigation District, No. 22-70143, 53 ELR 20089 (9th Cir. June 5, 2023). The Ninth Circuit, 2-1, denied a municipal irrigation district's request to compel a district court to remand to state court its motion for preliminary injunction in a suit concerning water allocation in the Klamath Basin. The district initially sought to stop the Bureau of Reclamation from releasing water from the Upper Klamath Lake in accordance with its ESA responsibilities and tribes' rights. The Bureau removed the suit to federal court on federal officer removal grounds, and the district moved to remand. The district court found the district's preliminary injunction motion sought to re-litigate federal issues—namely, the Bureau's authority to release water in compliance with the ESA and tribal rights—and thus declined to remand. The appellate court concluded the state court did not have prior exclusive jurisdiction over the rights the district sought to relitigate, and thus that the district court did not err in declining to remand.

Sackett v. Environmental Protection Agency, No. 21-454, 53 ELR 20083 (U.S. May 25, 2023). The U.S. Supreme Court held that the CWA extends to only those "wetlands with a continuous surface connection to bodies that are 'waters of the United States' in their own right," such that they are indistinguishable from those waters, in a challenge to an EPA compliance order stating that landowners' Idaho property contained jurisdictional wetlands and directing them to remove fill and restore the property to its natural state. The landowners had argued EPA lacked jurisdiction because any wetlands on their property were not "waters of the United States." The district court granted summary judgment for EPA and the Ninth Circuit affirmed, holding that the CWA covers adjacent wetlands with a significant nexus to traditional navigable waters and that the property satisfied that standard. The Supreme Court held, 5-4, that the CWA extends only to wetlands that are "as a practical matter indistinguishable from waters of the United States," which requires establishing that the adjacent water body constitutes "water(s) of the United States" and that the wetland has a continuous surface connection with that water body such that it is "difficult to determine where the 'water' ends and the 'wetland' begins." It found the wetlands on the landowners' property were "distinguishable from any possibly covered waters," reversed the appellate ruling, and remanded for further proceedings. Alito, J., delivered the opinion of the Court, in which Roberts, C.J., and Thomas, Gorsuch, and Barrett, JJ., joined. Thomas, J., filed a concurring opinion, in which Gorsuch, J., joined. Kagan, J., filed an opinion concurring in the judgment, in which Sotomayor and Jackson, JJ., joined. Kavanaugh, J., filed an opinion concurring in the judgment, in which Sotomayor, Kagan, and Jackson, JJ., joined.

WILDLIFE

Maine Lobstermen's Ass'n v. National Marine Fisheries Service, No. 22-5238, 53 ELR 20093 (D.C. Cir. June 16, 2023). The D.C. Circuit reversed summary judgment for NMFS in a Maine lobstermen group's challenge to the Service's 2021 biological opinion (BiOp) that authorized a series of federal fisheries, including the lobster fishery, and implemented a conservation framework designed to reduce the fisheries' impact on North Atlantic right whales. The group had argued that the BiOp and associated framework made scientific errors that led them to overestimate the fishery's effects on the right whale population, and that NMFS' final rule restricting the use of fishing lines arbitrarily relied on the flawed BiOp. A district court granted summary judgment for NMFS. The appellate court reversed, finding that the Service's reliance on "worst-case scenarios and pessimistic assumptions to benefit a favored side," rather than the best available scientific data, undermined its role as an expert. It directed the district court to vacate the BiOp as applied to the fisheries at issue and remanded without vacatur the final rule to NMFS.

Western Watersheds Project v. Haaland, No. 22-8031, 53 ELR 20084 (10th Cir. May 25, 2023). The Tenth Circuit affirmed in part and reversed in part dismissal of a challenge to the Forest Service's approval of grazing permits in Bridger-Teton National Forest that authorized the "lethal take" of grizzly bears. Environmental groups challenged the approval, arguing FWS violated the ESA because its biological opinion (BiOp) was deficient regarding grizzly bears, that the Forest Service violated the ESA by relying on the BiOp in its record of decision (ROD), and that the Forest Service violated the National Forest Management Act because the ROD failed to adequately consider the grazing's impact on sensitive amphibians and migratory birds. The court found FWS' failure in the BiOp to consider a limit on lethal take of female grizzly bears and the grazing's likely contribution to the already-existing mortality sink for female grizzlies in the area were arbitrary and capricious, and that the Forest Service's reliance on the BiOp was arbitrary and capricious. It also found that the ROD's failure to consider the adequacy of forage and cover for migratory birds in the area was arbitrary and capricious, but that its analysis with respect to sensitive amphibians was not. It remanded to the agencies without vacatur to address the deficiencies in the BiOp and ROD.

In the Federal Agencies

"In the Federal Agencies" contains summaries of notable agency activity during the month of June 2023. Citations are to the *Federal Register* (FR). Entries below are organized by Final Rules, Proposed Rules, and Notices. Within each section, entries are further subdivided by the subject matter area, with entries listed chronologically. To see *ELR*'s entire collection, visit http://elr.info/daily-update/archives.

FINAL RULES

AIR

EPA finalized federal implementation plan requirements to address 23 states' obligations to eliminate significant contribution to nonattainment, or interference with maintenance, of the 2015 ozone NAAQS in other states. 88 FR 36654 (6/5/23).

TOXIC SUBSTANCES

EPA amended the requirements in the National Oil and Hazardous Substances Pollution Contingency Plan that govern the use of dispersants and other chemicals and spill-mitigating substances when responding to oil discharges into jurisdictional waters of the United States. 88 FR 38280 (6/12/23).

EPA updated the list of chemicals subject to toxic chemical release reporting under EPCRA and the Pollution Prevention Act, identifying nine per- and polyfluoroalkyl substances that must be reported. 88 FR 41035 (6/23/23).

PROPOSED RULES

GOVERNANCE

The Pipeline and Hazardous Materials Safety Administration proposed amendments to its hazardous materials regulations to require all railroads to generate in electronic form, maintain, and provide to first responders, emergency response officials, and law enforcement personnel, certain information regarding hazardous materials in rail transportation to enhance emergency response and investigative efforts. 88 FR 41541 (6/27/23).

LAND USE

BLM proposed to amend its existing right-of-way regulations to facilitate responsible solar and wind energy development on public lands managed by BLM. 88 FR 39726 (6/16/23).

WILDLIFE

FWS proposed to list the swale paintbrush as endangered under the ESA. 88 FR 37490 (6/8/23).

FWS and NMFS proposed to amend portions of their regulations that implement ESA §7 to further clarify and improve the interagency consultation processes, while continuing to provide for the conservation of listed species. 88 FR 40753 (6/22/23).

FWS and NMFS proposed to revise portions of their regulations implementing ESA §4 to clarify, interpret, and implement the procedures and criteria used for listing, reclassifying, and delisting species on the Lists of Endangered and Threatened Wildlife and Plants and designating critical habitat. 88 FR 40764 (6/22/23).

NOTICES

NATURAL RESOURCES

BLM withdrew approximately 336,404.42 acres of public lands surrounding Chaco Culture National Historical Park from location and entry under U.S. mining laws and from leasing under mineral leasing laws, but not mineral materials laws, subject to valid existing rights, to protect these public lands and the greater connected landscape with a rich Puebloan, Tribal Nation, and cultural legacy in San Juan, Sandoval, and McKinley counties, New Mexico, for a period of 20 years. 88 FR 37266 (6/7/23).

In the Congress

"In the Congress" covers notable environment-related activities reported in the *Congressional Record* during the month of June 2023. Entries are arranged by bill number, with Senate bills listed first. To see all environment-related bills that are introduced, reported out of committee, passed by either house, or signed by the president, including environmental treaties ratified by the Senate, visit *ELR*'s website at https://elr.info/legislative/congressional-update.

CHAMBER ACTION

ENERGY

H.R. 1640 (Save Our Gas Stoves Act), introduced by Rep. Debbie Lesko (R-Ariz.) on March 17, 2023, was passed by the House. The bill would prohibit the Secretary of Energy from finalizing, implementing, or enforcing the proposed rule titled "Energy Conservation Program: Energy Conservation Standards for Consumer Conventional Cooking Products." 169 Cong. Rec. H2922 (daily ed. June 14, 2023).

GOVERNANCE

H.R. 662 (Block Grant Assistance Act of 2023), introduced by Rep. Scott Franklin (R-Fla.) on January 31, 2023, was passed by the House. The bill would amend the Disaster Relief Supplemental Appropriations Act of 2023 to improve disaster relief funding for agricultural producers. 169 Cong. Rec. H2803 (daily ed. June 13, 2023).

BILLS INTRODUCED

AIR

S. 2125 was introduced by Shelley Capito (R-W. Va.) on June 22, 2023. The bill would amend the CAA to facilitate efficient state implementation of certain NAAQS. It was referred to the Committee on Environment and Public Works. 169 Cong. Rec. S2222 (daily ed. June 22, 2023).

CLIMATE CHANGE

S. 2148 was introduced by Sen. Edward Markey (D-Mass.) on June 22, 2023. The bill would promote long-term economic recovery and job creation in environmental justice communities by providing for investment in catalytic local predevelopment projects for resilient climate infrastructure innovation, and provide assistance to support state and local project development. It was referred to the Committee on Environment and Public Works. 169 Cong. Rec. S2223 (daily ed. June 22, 2023).

GOVERNANCE

S. 2142 was introduced by Sen. Robert Menendez (D-N.J.) on June 22, 2023. The bill would reauthorize the National Flood Insurance Program. It was referred to the Committee on Banking, Housing, and Urban Affairs. 169 Cong. Rec. S2223 (daily ed. June 22, 2023).

NATURAL RESOURCES

S. 1831 (Roadless Area Conservation Act of 2023) was introduced by Sen. Maria Cantwell (D-Wash.) on June 6, 2023. The bill would provide lasting protection for inventoried roadless areas within the National Forest System. It was referred to the Committee on Energy and Natural Resources. 169 Cong. Rec. S1982 (daily ed. June 6, 2023).

H.R. 4301 was introduced by Rep. Katie Porter (D-Cal.) on June 22, 2023. The bill would amend the Mineral Leasing Act to make certain adjustments to the regulation of surface-disturbing activities and to protect taxpayers from unduly bearing the reclamation costs of oil and gas development. It was referred to the Committee on Natural Resources. 169 Cong. Rec. H3109 (daily ed. June 22, 2023).

WASTE

H.R. 4040 was introduced by Rep. Joe Neguse (D-Colo.) on June 12, 2023. The bill would require the EPA Administrator to carry out certain activities to improve recycling and composting programs in the United States. It was referred to the Committee on Energy and Commerce. 169 Cong. Rec. H2808 (daily ed. June 12, 2023).

WATER

S. 1808 (Coastal Communities Ocean Acidification Act of 2023) was introduced by Sen. Lisa Murkowski (R-Alaska) on June 6, 2023. The bill would amend the Federal Ocean Acidification Research and Monitoring Act of 2009 to require the Secretary of Commerce, acting through the NOAA Administrator, to collaborate with state and local governments and Indian tribes on vulnerability assessments related to ocean acidification, research planning, and similar activi-

ties. It was referred to the Committee on Commerce, Science, and Transportation. 169 Cong. Rec. S1982 (daily ed. June 6, 2023).

H.R. 4031 was introduced by Rep. Jared Huffman (D-Cal.) on June 12, 2023. The bill would prohibit drilling in the Arctic Ocean. It was referred to the Committee on Natural Resources. 169 Cong. Rec. H2808 (daily ed. June 12, 2023).

WILDLIFE

S. 1788 was introduced by Sen. Tammy Baldwin (D-Wis.) on June 1, 2023. The bill would require the FWS Director to update the post-delisting monitoring plan for the Western Great Lakes distinct population segment of the gray wolf. It was referred to the Committee on Environment and Public Works. 169 Cong. Rec. S1899 (daily ed. June 1, 2023).

H.R. 4350 was introduced by Rep. Jimmy Panetta (D-Cal.) on June 23, 2023. The bill would encourage and facilitate efforts by states and other stakeholders to conserve and sustain the western population of monarch butterflies. It was referred to the Committees on Natural Resources and Agriculture. 169 Cong. Rec. H3142 (daily ed. June 23, 2023).

In the State Agencies

"In the State Agencies" contains summaries of notable state regulatory developments reported during the month of June 2023. The entries are arranged by state, and within each section, entries are further subdivided by subject matter. To access *ELR*'s entire collection of state regulatory developments, visit https://elr.info/administrative/state-updates.

ALASKA

WATER

The Department of Environmental Conservation proposed to issue an Alaska Pollutant Discharge Elimination System general permit for statewide lagoon facilities to discharge to waters of the United States. *See* https://aws.state.ak.us/OnlinePublicNotices/Notices/View.aspx?id=211451 (June 14, 2023).

ARIZONA

TOXIC SUBSTANCES

The Department of Agriculture proposed amendments to regulations governing pesticides. The amendments would, among other things, make technical corrections and incorporate federal requirements for the suspension or revocation of a pesticide license, permit, or certification. *See* 29 Ariz. Admin. Reg. 1221 (June 2, 2023).

CALIFORNIA

WATER

The State Water Resources Control Board proposed to establish a primary drinking water standard for hexavalent chromium in the form of a maximum contaminant level of 10 micrograms per liter (µg/L) or 0.010 milligrams per liter, an associated initial detection limit for purposes of reporting of 0.1 µg/L. A hearing will be held August 2, 2023. Comments are due August 4, 2023. *See* 24-Z Cal. Regulatory Notice Reg. 793 (June 16, 2023).

COLORADO

CLIMATE CHANGE

The Air Quality Control Commission proposed amendments to its regulations governing greenhouse gas emissions. The revisions would reduce greenhouse gas emissions from the industrial and manufacturing sector and make any necessary revisions to reduction strategies for the Energy Intensive, Trade-Exposed Manufacturing Source Audit Program. A hearing will be held September 20, 2023. Comments are due September 5, 2023. *See* https://www.sos.state.co.us/CCR/Upload/NoticeOfRulemaking/AddInfoAttach2023-00273.doc (May 17, 2023).

DELAWARE

TOXIC SUBSTANCES

The Department of Agriculture amended its pesticide regulations. The revisions, among other things, update certification requirements to ensure that the state is in compliance with EPA's Certification of Pesticide Applicators regulations. *See* 26 Del. Reg. Regs. 1050 (June 1, 2023).

DISTRICT OF COLUMBIA

WATER

The Department of Energy and Environment proposed amendments to its water and sanitation regulations. The amendments would establish a local approval process to authorize the discharge of uncontaminated groundwater to the municipal separate storm sewer system (MS4) while maintaining compliance with the District's MS4 NPDES permit, the CWA, and the District's Water Pollution Control Act. *See* https://dcregs.dc.gov/Common/DCR/Issues/IssueCategoryList.aspx?DownloadFile={818E4A0B-965B-45C6-A339-EC08FB2176D9} (May 26, 2023).

FLORIDA

AIR

The Department of Environmental Protection proposed amendments to its air pollution control regulations. The revisions would adopt EPA's amendments to new source performance standards and NESHAPs. *See* 49 Fla. Admin. Reg. 2246 (June 15, 2023).

GEORGIA

WASTE

The Environmental Protection Division proposed amendments to its hazardous waste management regulations. The revisions would adopt federal rules relating to modernizing ignitable liquids determinations and Canadian import-export recovery and disposal code changes. *See* https://epd.georgia.gov/public-announcements-0/proposed-rules/chapter-391-3-11-rules-hazardous-waste-management (June 7, 2023).

WATER

The Department of Natural Resources proposed amendments to its safe drinking water regulations. The revisions would reduce the minimum requirements for the construction of steel casing thickness in drinking water wells for four- and five-inch diameter wells. *See* https://epd.georgia.gov/chapter-391-3-5-rules-safe-drinking-water (June 6, 2023).

ILLINOIS

ENERGY

The Environmental Protection Agency adopted regulations that establish the basic framework and general requirements of the Charging Infrastructure Grant Program, which was enacted to offset the installation costs of electric vehicle charging infrastructure through grant awards to public and private organizations and companies to install and maintain Level 2 or Level 3 charging stations. *See* 48 Ill. Reg. 8334 (June 16, 2023).

KANSAS

WATER

The Department of Health and Environment proposed to adopt draft 2024 Intended Use Plans for the Kansas Public Water Supply Loan Fund and the Kansas Water Pollution Control Revolving Fund. The plans would make additions to the Project Priority List of each program, include estimates and uses of anticipated capitalization grants from EPA, establish criteria for loan forgiveness, and establish the procedures for ranking projects. *See* https://sos.ks.gov/publications/Register/Volume-42/Issues/Issue-21/05-25-23-51164.html (May 25, 2023).

LOUISIANA

ENERGY

The Department of Natural Resources proposed amendments to regulations governing the leasing of state lands and water bottoms for exploration, development, and production of wind energy. *See* 49 La. Reg. 982 (May 20, 2023).

GOVERNANCE

The Department of Natural Resources amended its pipeline safety regulations. Changes include revisions to the damage

prevention rules and pipeline operations rules for natural gas and coal operations. *See* 49 La. Reg. 902 (May 20, 2023).

The Department of Environmental Quality proposed to adopt regulations establishing a program for voluntary environmental self-audits. The regulations would provide procedures for establishing the program, identifying violations not eligible for relief under the program, a fee for review of the self-audits and corrective actions submitted to the Department, and suspending prescription upon participation in the program. Comments are due August 3, 2023. *See* 49 La. Reg. 1148 (June 20, 2023).

WASTE

The Department on Environmental Quality proposed to amend its solid waste regulations. The amendments would revise rules governing leachate collection and removal systems for industrial and municipal landfills by establishing and clarifying procedures, standards, requirements, and records for the measurement, collection, and control of leachate. *See* 49 La. Reg. 929 (May 20, 2023).

MAINE

TOXIC SUBSTANCES

The Department of Environmental Protection amended its oil discharge prevention and pollution control regulations for marine oil terminals, transportation pipelines, and vessels. Changes include updates to the existing rules to reflect more current standards, incorporation of statutory changes, and the inclusion of climate change in the design, operation, and planning of marine oil terminals. *See* https://www.maine.gov/sos/cec/rules/notices/2023/060723.html (June 7, 2023).

MARYLAND

AIR

The Department of the Environment proposed to adopt California's Advanced Clean Cars II (ACC II) Program. *See* https://dsd.maryland.gov/MDRIssues/5010/Assembled.aspx#_Toc135128988 (May 19, 2023).

MINNESOTA

WASTE

The Pollution Control Agency proposed amendments to its solid waste regulations. The amendments would revise the current Metropolitan Policy Plan (MPP) for solid waste management to emphasize environmental outcomes, hold stakeholders accountable for achieving the goals and objectives in the MPP, provide objectives to measure progress, and provide a set of strategies to achieve the objectives. Comments are due August 31, 2023. *See* 47 Minn. Reg. 1157 (June 5, 2023).

WATER

The Department of Health proposed amendments to regulations governing drinking water protection. The revisions would, among other things, clarify nitrate or nitrite maximum contaminant level acute violations. *See* 47 Minn. Reg. 1117 (May 22, 2023).

NEW HAMPSHIRE

WASTE

The Department of Environmental Services proposed amendments to regulations governing fines relating to hazardous waste management. The revisions would establish a schedule of fines for violations of administrative rules and statutory requirements related to hazardous waste management. *See* https://gencourt.state.nh.us/rules/register/2023/0608/2023-137%20IP%20Notice%20Env-Hw%20904.pdf (June 8, 2023).

WATER

The Department of Environmental Services proposed amendments to regulations governing its list of public waters. The revisions would, among other things, update and/or remove titles of state agencies that have changed during the past 10 years and revise the time frame for the Department to issue its final determination. *See* https://gencourt.state.nh.us/rules/register/2023/0525/2023-122%20IP%20Notice%20Env-Wr%20900.pdf (May 25, 2023).

The Department of Environmental Services proposed amendments to regulations governing wetlands project-specific requirements, coastal lands and tidal waters and wetlands, wetlands compensatory mitigation, and wetlands permits. *See* https://gencourt.state.nh.us/rules/register/viewer.aspx?fileName=F:\Websites\GCNHWeb\Rules\register\2023\No%2022%20June%201%202023.PDF (June 1, 2023).

The Department of Environmental Services proposed amendments to regulations governing alteration of terrain. The revisions would, among other things, adopt project-specific design requirements for the construction of solar arrays and design standards for the stormwater treatment practice of bioretention system with internal storage reservoir. *See* https://gencourt.state.nh.us/rules/register/2023/0608/2023-136%20IP%20Notice%20Env-Wq%201500%20various.pdf (June 8, 2023).

NEW YORK

AIR

The Department of Environmental Conservation adopted California's Advanced Clean Cars II (ACC II) Program and Medium- and Heavy-Duty Diesel Vehicle Emission Standards. *See* XLV N.Y. Reg. 1 (May 24, 2023).

WASTE

The Department of Environmental Conservation amended its solid waste regulations. The revisions add aerosol cans and paint to the list of wastes that may be managed as universal wastes in the state. *See* XLV N.Y. Reg. 11 (May 24, 2023).

The Department of Environmental Conservation amended its solid waste management regulations. Changes include revisions to rules governing waste transportation, local solid waste management planning, and state assistance grants to municipalities related to solid waste management. *See* XLV N.Y. Reg. 2 (June 7, 2023).

NORTH CAROLINA

WATER

The Department of Environmental Quality proposed to readopt, with amendments, its water sanitation regulations. The amendments would clarify existing language and align the regulation with current practices regarding the sanitation of water supplies in local confinement facilities. *See* 37 N.C. Reg. 2172 (June 1, 2023).

OHIO

AIR

The Environmental Protection Agency proposed amendments to its alternative fuel grant regulations as part of a five-year review. *See* https://www.registerofohio.state.oh.us/hearings/hearingsSearch/results/824689/343756 (May 25, 2023).

OREGON

GOVERNANCE

The Department of Environmental Quality proposed to adopt a new regulation governing fuel tank seismic stability. The regulation would require facilities to perform seismic vulnerability assessments and propose and execute risk mitigation implementation plans that would reduce the risk of oil spills due to a high-magnitude earthquake. *See* http://records.sos.state.or.us/ORSOSWebDrawer/Recordhtml/9483473 (May 26, 2023).

WASTE

The Department of Environmental Quality proposed to adopt new regulations governing the Plastic Pollution and Recycling Modernization Act. The regulations would clarify when and how producer responsibility organizations would provide funding or reimbursements to local governments or their collection service providers for related transportation costs, new or expanded on-route collection start-up costs, new or expanded depot collection start-up and operational costs, and contamination reduction programming. *See* http://records.sos.state.or.us/ORSOSWebDrawer/Recordhtml/9483465 (May 25, 2023).

PENNSYLVANIA

WATER

The Department of Environmental Protection proposed to issue an NPDES general permit for discharges from petroleum product-contaminated groundwater remediation systems and an NPDES general permit for point source discharges from the application of pesticides. *See* 53 Pa. Bull. 2809 (May 20, 2023).

The Department of Environmental Protection proposed its Federal Fiscal Year 2023 Intended Use Plans for the Clean Water and Drinking Water State Revolving Fund Programs. *See* 53 Pa. Bull. 3057 (June 3, 2023).

SOUTH CAROLINA

ENERGY

The Department of Health and Environmental Control proposed amendments to its regulations governing radioactive materials. The amendments would add new references for accuracy and update event conditions to reduce specific requirements. A hearing will be held October 12, 2023. *See* 47 S.C. Reg. 24 (May 26, 2023).

SOUTH DAKOTA

WASTE

The Department of Agriculture proposed to amend its hazardous waste regulations by incorporating updated codified federal regulations. *See* 49 S.D. Reg. 109 (May 30, 2023).

TENNESSEE

TOXIC SUBSTANCES

The Department of Agriculture adopted amendments to regulations governing agricultural pesticides. The revisions establish requirements for the pesticide dicamba. *See* https://publications.tnsosfiles.com/rules_filings/06-21-23.pdf (June 13, 2023).

UTAH

WATER

The Department of Natural Resources proposed amendments to regulations governing water conservation requirements and incentives. The amendments would revise definitions, refine directives governing the Division of Water Resources' administration of the existing lawn conversion incentive program, and establish directives for a new program authorizing the Division to award grants to eligible water conservancy districts to augment financial incentives provided through their respective lawn conversion incentive programs. *See* 11 Utah Bull. 157 (June 1, 2023).

VERMONT

WASTE

The Agency of Natural Resources proposed amendments to its wastewater system and potable water supply regulations. The revisions would, among other things, update and clarify technical standards for wastewater systems. *See* https://secure.vermont.gov/SOS/rules/ (May 24, 2023).

VIRGINIA

WATER

The State Water Control Board proposed to amend and reissue the Virginia Pollutant Discharge Elimination System (VPDES) general permit regulation for discharges of stormwater associated with industrial activity as well as the VPDES general permit regulation for nonmetallic mineral mining. *See* 39 Va. Reg. Regs. 2388 (May 22, 2023).

The Department of Environmental Quality proposed amendments to regulations governing local and regional water supply planning. The amendments would, among other things, establish regional planning areas, identify the particular regional planning area in which each locality will participate, identify a procedure for localities to request a change to the locality's planning area, and require localities to invite stakeholder groups to participate in coordinated resource planning. *See* 39 Va. Reg. Regs. 2466 (May 22, 2023).

The State Water Control Board reissued, with amendments, the Virginia Pollutant Discharge Elimination System general permit regulation for discharges resulting from the application of pesticides to surface waters. The amendments clarify permit conditions and increase consistency with other general permits. *See* 39 Va. Reg. Regs. 2484 (May 22, 2023).

WASHINGTON

TOXIC SUBSTANCES

The Department of Ecology adopted regulations to reduce toxic chemicals in consumer products and increase product ingredient transparency. The regulations establish cross-reporting requirements and restrictions for manufacturers, distributors, and retailers of priority consumer products that contain priority chemicals; and address existing stock, repair and replacement parts, refurbished products, and previously owned products. *See* https://lawfilesext.leg.wa.gov/law/wsr/2023/12/23-12-044.htm (May 31, 2023).

The Department of Ecology adopted amendments to regulations governing facility oil handling standards and vessel oil transfer advance notice and containment requirements. The amendments, among other things, update and clarify enforcement provisions for expired plans, manuals, reports, and programs requiring reapproval for Class 1 and 2 facilities and delivering vessels; update submittal requirements, recordkeeping requirements, and compliance schedules; and update advance notice reporting time frame requirements for delivering vessels. *See* lawfilesext.leg.wa.gov/law/wsr/2023/12/23-12-077.htm (June 6, 2023).

WILDLIFE

The Department of Fish and Wildlife reclassified the American white pelican from threatened to sensitive. *See* lawfilesext.leg.wa.gov/law/wsr/2023/12/23-12-051.htm (June 1, 2023)

WEST VIRGINIA

WASTE

The Waste Management Division of Water and Waste Management proposed amendments to regulations governing hazardous waste management systems. *See* XL W. Va. Reg. 25 (June 16, 2023).

WATER

The Health Agency proposed amendments to regulations governing operators of public water systems and wastewater systems. *See* XL W. Va. Reg. 16 (May 19, 2023).

The Water Resources Division of Water and Waste Management proposed amendments to its regulations governing underground injection control. *See* XL W. Va. Reg. 25 (June 16, 2023).

In the World

"In the World" features notable developments reported in the international section of *ELR Update* during the month of June 2023. Current and archived materials, and links to primary news sources, can be found on *ELR*'s website at https://elr.info/international/international-update.

CLIMATE CHANGE

ZIMBABWE GOVERNMENT TO REGULATE DOMESTIC CARBON OFFSET MARKET

On May 23, Zimbabwe's government announced that it will begin regulating voluntary carbon offset trading. Zimbabwe is the 12th largest creator of carbon offsets in the global carbon offset market, an industry valued at around $2 billion. Under the new regulation, all carbon offset projects must register with and be approved by the state in the next two months. The government will then take half of the revenue from all carbon offset projects; of the remaining revenue, 20% will be earmarked for local communities, and foreign investors will be allowed a maximum of 30% (Bloomberg, Reuters).

The new policy is intended to reduce greenwashing and benefit local communities. "We need to see the money going to the respective communities so they don't continue decimating forests if they understand that they will be deriving benefits from them," Mangaliso Ndlovu, Zimbabwe's environment and climate minister, commented (Reuters). The policy follows on the heels of the government's declaration that all carbon credit agreements previously entered by international agencies with local authorities are now "null and void," raising some concerns about the safety of investing in carbon offsets (Bloomberg).

ENERGY

LONDON HIGH COURT RULES BRITAIN'S APPROVAL OF NUCLEAR PLANT LAWFUL

On June 22, London's High Court ruled that the British government's approval of the planned Sizewell C nuclear plant in southeast England was lawful. Britain approved the plant last summer, and announced plans in the fall to allocate $895 million to the plant and take a 50% stake during its development (Reuters). A campaign group, Together Against Sizewell C, challenged the plant's approval, arguing the government failed to consider the environmental impact of the project.

At a hearing in March, the campaign group contended the government failed to consider alternatives to nuclear power to reach its emissions goals (Reuters). Judge David Holgate dismissed their challenge, ruling that "[t]he claimant's argument depends upon an illegitimate attempt to rewrite the government's policy aims by pretending that the central policy objective is at a higher level of abstraction, namely to produce clean energy, without any regard to diversity of energy sources and security of supply" (BBC).

According to the project's developers, the French energy giant EDF, the reactors in the Sizewell C plant are expected to generate 3.2 gigawatts of electricity—enough to power six million homes—and will be operational by mid-2034 (Reuters).

NATURAL RESOURCES

BRAZIL UNVEILS PLAN TO ELIMINATE DEFORESTATION BY 2030

On June 5, Brazil's government released a plan to eliminate deforestation in the Amazon, the largest rain forest on the planet, by 2030 (Reuters, BBC). The plan is a critical step in decreasing Brazil's carbon emissions, which account for about 3% of the world's emissions, half of which are understood to be caused by deforestation (AP News). It outlines strategies for decreasing local economies' reliance on cattle ranching, a driving force of deforestation, through developing a bioeconomy in the Amazon region with increased ecotourism and acai production (Reuters). The plan also seeks to cut down on criminal activity through the use of remote monitoring and accountability systems in the Amazon that employ satellite imagery and financial intelligence (AP News). As part of this effort, the government intends to develop mechanisms to trace wood, livestock, and other agricultural products derived from the Amazon to ensure they have been acquired through legal means (Reuters).

"Brazil will once again become a global reference in sustainability, tackling climate change, and achieving targets for carbon emission reduction and zero deforestation," President Luiz Inácio Lula da Silva, or "Lula," commented (AP

News). President Lula has made reducing deforestation a central part of his presidential platform, which served as a driving force behind these efforts and spearheaded an additional pledge to achieve net-zero deforestation by replanting as much vegetation as is removed. While the strategy is set to be implemented over the remaining four years in President Lula's term, full implementation will depend on his successor, who will take office in 2027 (AP News).

RECENT JOURNAL LITERATURE

"Recent Journal Literature" lists recently published law review and other legal periodical articles. Within subject-matter categories, entries are listed alphabetically by author or title. Articles are listed first, followed by comments, notes, symposia, surveys, and bibliographies.

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VOLUME 53 CUMULATIVE INDEX

Below are all Articles, Comments, and Dialogues published in *ELR—The Environmental Law Reporter* in 2023. To access the entire *ELR* archive online, visit https://elr.info/articles.

NATURAL RESOURCES

WASTE

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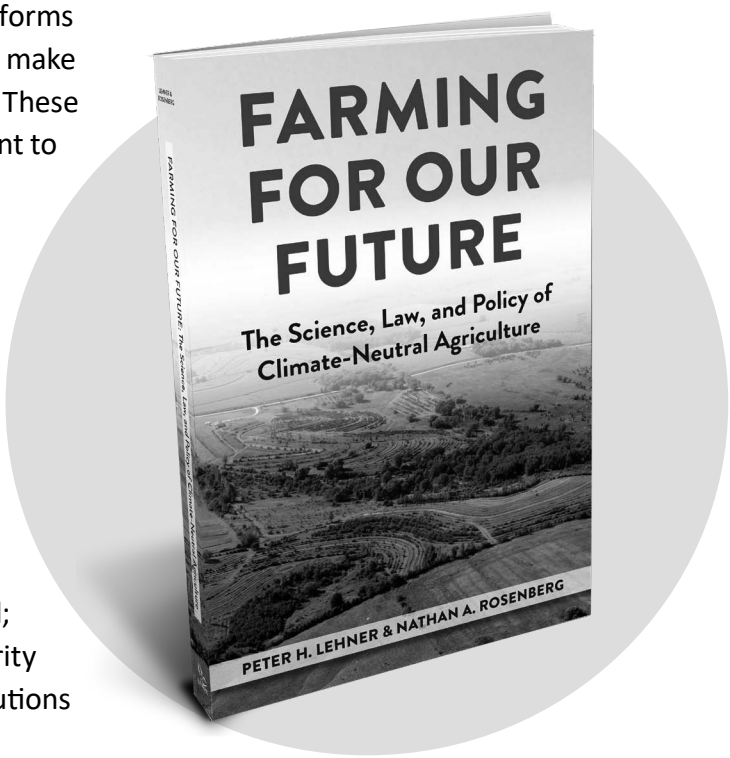
FARMING FOR OUR FUTURE

The Science, Law, and Policy of Climate-Neutral Agriculture

by Peter H. Lehner & Nathan A. Rosenberg

Farming for Our Future examines the policies and legal reforms necessary to accelerate the adoption of practices that can make agriculture in the United States climate-neutral or better. These proven practices will also make our food system more resilient to the impacts of climate change.



Agriculture's contribution to climate change is substantial—much more so than official figures suggest. We will not be able to achieve our overall mitigation goals unless agricultural emissions sharply decline. Fortunately, farms and ranches can be a major part of the climate solution, while protecting biodiversity, strengthening rural communities, and improving the lives of the workers who cultivate our crops and rear our animals. The importance of agricultural climate solutions should not be underestimated; they are critical elements both in ensuring our food security and limiting climate change. This book provides essential solutions to address the greatest crisis of our time.

"Every eater should read this to better understand why we must demand that policymakers reform a dated and ineffective agricultural system to one that meets the needs of all of society, today and in the future."

—Ricardo J. Salvador, Director and Senior Scientist,
Food & Environment Program, Union of Concerned Scientists

"Lehner and Rosenberg lay out the details in a highly readable and succinct manner . . . . Their prescriptions form a well-drawn blueprint for the White House and USDA to follow and for Congress to adopt in the 2023 federal farm bill. Adoption of the book's recommendations would put U.S. agriculture on a rapid path to decarbonization and resilience. Policymakers should pay heed!"

—Ferd Hoefner, Policy Consultant and Fomer Policy Director
of the National Sustainable Agriculture Coalition

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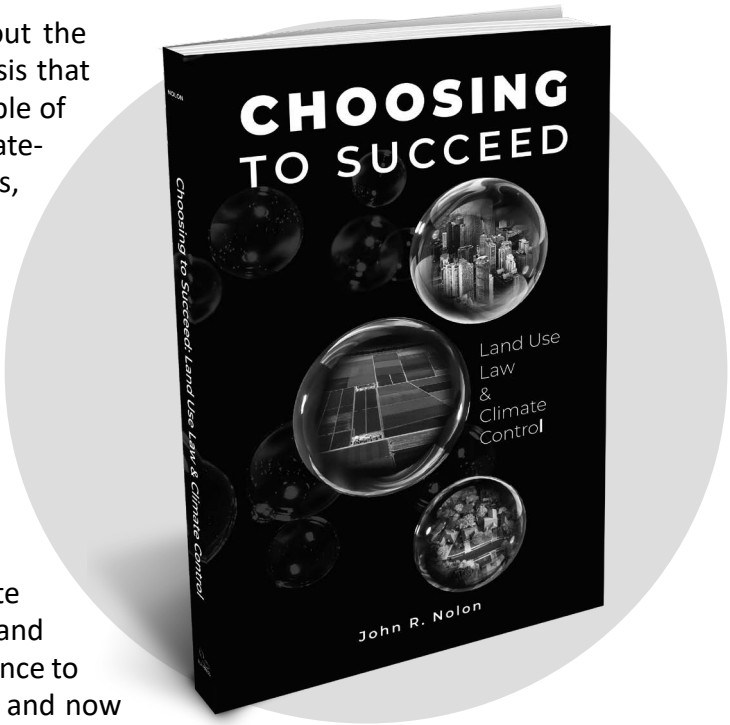
Choosing to Succeed:
Land Use Law & Climate Control

by John R. Nolon



Land use climate bubbles are popping up throughout the nation at an alarming rate, creating an economic crisis that will be more damaging than that of the housing bubble of 2008. The costs to ecosystems and low- and moderate-income households are equally severe. These bubbles, where land and building values are declining, provide extensive, objective evidence that climate change is real and must be dealt with on the ground. And it sidelines the ideological battles over the political response and instead requires us to focus on the practical question: what can we do to respond?

Climate action seeks to avoid the harm we can't manage and to manage the harm we can't avoid. Local leaders understand the urgency of the crisis and are highly motivated to learn how to prevent and mitigate its consequences. This book describes how the local land use legal system can leverage state and federal assistance to reduce per capita carbon emissions as an important and now recognized component of global efforts to manage climate change. The tools and techniques presented in the book are available to the nation's 40,000 local governments, if led by courageous leaders choosing to succeed in this epic battle.

"Professor Nolon has pioneered many advances in local environmental law and practically invented the field. Since the 1990s, he has identified the ways local governments influence environmental protection, how they have obtained the power to do it, and followed that with theories of how local players can coordinate with one another and collaborate with large scales of power. Integrating those ideas into a book focused on the climate crisis is a crowning achievement."

—Robert Verchick, Gauthier-St. Martin Eminent Scholar and
Chair in Environmental Law, Loyola University New Orleans College of Law

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Governing for Sustainability

John C. Dernbach and **Scott E. Schang**
Editors

Sustainable development may be one of the most important and potentially transformational ideas to come out of the last century. The ultimate objectives of sustainable development are freedom, opportunity, justice, and quality of life for everyone in this and future generations. While the United States has a substantial body of environmental and social protection laws, we are far from being a sustainable society. The question is what to do.

Governing for Sustainability provides a detailed set of recommendations for federal, state, tribal, territorial, and local governments, as well as the private sector and civil society. The various contributions that personal behavior can make toward both public and private governance are included as well. These recommendations would help make America a better place for all. Every American has a role to play.

Dernbach and Schang have brought together a rich, diverse set of voices to outline how the United States can build a more sustainable economy and society. Small-gauge sustainability targets are not enough. As with recent administrative and legislative breakthroughs in climate, leaders can and must craft solutions that simultaneously advance multiple sustainability goals such as job creation and economic growth, public health, and social justice.

—David Hayes, Lecturer, Stanford Law School; former Special Assistant to the President for Climate Policy; and former Deputy Secretary of the Interior

Governing for Sustainability *offers an inspired, timely, and important roadmap for meeting the wide ranging political, economic, and social justice challenges our nation faces in achieving sustainability. Each chapter, authored by one or more of the nation's leading experts, is a treasure to be mined.*

—Richard Lazarus, Howard J. and Katherine W. Aibel Professor of Law, Harvard Law School

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