LEGAL PATHWAYS TO DEEP DECARBONIZATION IN THE UNITED STATES

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Michael Burger is the Executive Director of the Sabin Center for Climate Change Law and a Research Scholar and Lecturer-in-Law at Columbia Law School. He is a widely published scholar, a frequent speaker at conferences and symposiums, and a regular source for media outlets. From 2010-2015, he was an Associate Professor at Roger Williams School of Law, where he taught courses in environmental law, administrative law, and law & literature, and founded and directed...
the Environmental and Land Use Law Clinical Externship. Prior to that, he was an acting assistant professor of lawyering at New York University School of Law, and an attorney with the Office of the Corporation Counsel for the city of New York. He is also a co-founder and member of the Environmental Law Collaborative. Michael is a graduate of Columbia Law School and Brown University, and holds a Master of Fine Arts degree from the Creative Writing program at NYU.

**Andrea Hudson Campbell** is a Partner at Van Ness Feldman LLP in Washington, D.C. She advises major international passenger car, light-duty truck, and heavy-duty vehicle and engine manufacturers on a wide range of federal and state environmental and energy policy, regulatory, legislative, and compliance matters. A significant portion of her practice involves greenhouse gas/fuel economy standards applicable to light-duty vehicles and heavy-duty trucks and engines. She also provides strategic advice on California zero-emission and low-emission vehicle programs, including matters related to advanced-technology vehicle charging and refueling infrastructure. Campbell represents vehicle and engine manufacturers in EPA recalls, enforcement actions, and investigations, and advises on vehicle labeling, distribution, and importation matters. Her experience includes working with HFC and fluorinated compound users and manufacturers on matters related to EPA’s Significant New Alternatives Policy. She holds a J.D., with honors, from the George Washington University Law School, and a B.A. from Douglass College at Rutgers University.

**Frederico Cheever** (deceased) was a Professor of Law at the University of Denver Sturm College of Law. He began teaching at the law school in 1993 specializing in environmental law, wildlife law, public land law, land conservation transactions, and property. Cheever briefly left Denver in 2000 to be a Visiting Fellow at Queen Mary and Westfield College, University of London, and in 2002, he served as the DU Law Hughes/Rudd Research Professor. During the summer of 2005, he was a Visiting Professor at Northwestern Law School, Lewis & Clark College. He was also an adjunct professor at the Colorado School of Mines, teaching environmental law. Until his passing, Cheever wrote extensively about the Endangered Species Act, federal public land law, and land conservation transactions. He received his law degree from UCLA and his undergraduate and masters degrees from Stanford University.

**Michael T. Craig** received his Ph.D. from the Engineering and Public Policy Department at Carnegie Mellon University. He works on mitigating climate change through reducing emissions from the electric power sector. Craig has published peer-reviewed papers on rooftop solar, grid-scale storage, and carbon capture and sequestration. Previously, he obtained an M.S. in Technology and Policy from Massachusetts Institute of Technology and a B.A. in Environmental Studies from Washington University in St. Louis.

**K.K. DuVivier** is a tenured Full Professor of Law at the University of Denver Sturm College of Law. She has taught full-time at the law school level since 1990, including 10 years at the University of Colorado School of Law before joining the Denver Law faculty in 2000. She received the Robert B. Yegge Excellence in Teaching Award in 2018, the Hughes-Ruud Research Professorship from 2015 to 2018, the AALS Teacher of the Year for University of Denver Sturm College of Law in 2015, the Student Bar Association Mentorship Achievement Award in 2013-2014, and the Sturm College of Law Faculty Excellence Award for Best Professor in 2012-2013. Professor DuVivier’s current research and teaching focuses are energy and renewable energy law, with a special emphasis on wind, solar, and energy efficiency. In addition to scores of articles, she has authored two books: *Energy Law Basics* (2017) and *The Renewable Energy Reader* (2011). Professor DuVivier worked as a field geologist before law school, and after earning her J.D., she practiced for eight years, first in natural resources law at the law firms of Sherman & Howard and Arnold & Porter, then as an Assistant City Attorney in the land use and revenue section for the City and County of Denver. Her net-zero-energy house, built using Passiv Haus standards, won the Colorado Renewable Energy Society’s award for Renewable Energy and Sustainable Design in Buildings—Single Family in 2012.

**Steven Ferrey** is a Professor of Law at Suffolk University Law School in Boston. He previously served as a Visiting Professor of Law at Harvard Law School and Boston University Law School, and taught law in Europe and Asia. Since 1993, he served as a primary international legal advisor to the World Bank and the United Nations on renewable energy and climate change projects in numerous developing countries in Asia, Africa, and Latin America. In the last year, this has included Vietnam, Sri Lanka, Mozambique, the Solomon Islands, Fiji, and Papua New Guinea. Professor Ferrey served as Vice-Chair of two different American Bar Association Energy and Climate Change Committees. He has testified as an expert before seven different committees of the U.S. Congress on energy and environmental matters, and was appointed by prior U.S. presidents to serve on three different national presidential energy boards. He is the author of seven books
and 100 articles on environmental and energy law. His books include the three-volume *Law of Independent Power*, now in its 46th edition, 2018; *Environmental Law: Examples & Explanations*, 7th ed. 2016 & 8th ed. 2019; *Renewable Power in Developing Countries* (2006); and *Unlocking the Global Warming Toolbox* (2010). In addition to holding a J.D. degree from University of California, Berkeley, Professor Ferrey holds a bachelor’s degree in Economics from Pomona College in California and a master’s degree in Urban and Regional Environmental/Energy Planning from Berkeley, and was a Fulbright Fellow in Energy Law at the University of London between his U.S. graduate degrees.

Joshua P. Fershée is a Professor of Law at West Virginia University College of Law and is a globally recognized expert in the areas of energy law and policy, and business law and entity governance. He works with the College of Law’s Center for Energy and Sustainable Development and serves as Research Faculty and the Head of the Economic and Community Development Group in the Center for Innovation in Gas Research and Utilization, which is located in the Benjamin M. Statler College of Engineering and Mineral Resources. He is also a co-investigator on a $1.26M Research Challenge Grant from the West Virginia Higher Education Policy Commission. He served as Associate Dean for Faculty Research and Development from June 2015 to June 2018. Professor Fershee has presented his research in Spain, Poland, and the United Kingdom. He has taught about energy and cyber security in Geneva, Switzerland, and has presented his work discussing the economic, environmental, and social opportunities and challenges related to shale oil and gas development to U.S. audiences and delegations from multiple countries, including Lithuania, Brazil, South Africa, Mongolia, Ukraine, Colombia, and Indonesia. Professor Fershee received his J.D., magna cum laude, from Tulane Law School, where he was elected Order of the Coif and editor in chief of the *Tulane Law Review*, and is a graduate of Michigan State University. Before joining West Virginia University, Professor Fershee served as an Associate Professor of Law and Associate Dean for Academic Affairs & Research at the University of North Dakota School of Law and as a Visiting Assistant Professor of Law at Penn State University School of Law.

Robert L. Fischman is the George P. Smith, II Distinguished Professor of Law and Adjunct Professor of Public and Environmental Affairs, at the Indiana University Maurer School of Law. At the Indiana University Maurer School of Law, Fischman teaches Environmental Law, Administrative Law, Public Natural Resources Law, Water Law, Wildlife Law, and an Advanced Environmental Seminar. At IU’s School of Public and Environmental Affairs, he teaches a capstone seminar and a course on biodiversity conservation policy. Professor Fischman is a founding board member of the Conservation Law Center, Inc., which operates the law school’s conservation law clinic. His research explores the relationship between law and conservation implementation, and he is a co-author of the leading casebook on public land and resources law.

Robert Freedman is one of Shearman & Sterling LLP’s Energy Industry Leaders and a Partner in the Project Development & Finance practice. He focuses on finance and development, asset acquisitions and dispositions, and complex workouts and restructurings of infrastructure assets across the breadth of infrastructure sectors, including power, renewables, and sustainable development. Freedman’s clients include major corporations, private equity and other institutional investors and banks, and others financial institutions. He has been widely quoted in industry, national, and international publications, including *The New York Times* and the *Financial Times*, on matters relating to renewables and other infrastructure sectors. Prior to joining Shearman & Sterling, Freedman was a Managing Director and Counsel with GE Energy Financial Services, the energy investment business of the General Electric Company. He has been ranked Band 2 for Projects by *Chambers USA* (2017) and named a Leading Lawyer for Project Finance by *The Legal 500 US* (2017).

Ben Haley, Co-Founder of Evolved Energy Research, has unique experience developing energy system models to support energy transformation decisionmaking. His models have been utilized by parties from the California state government to support 2030 greenhouse gas target-setting and by the research team representing the United States in the Deep Decarbonization Pathways Project convened at the behest of the United Nations. Haley has a passion for problem solving and a deep technical knowledge of energy, specifically in the growing interaction between electricity and other sectors of the energy economy. His education includes a master’s degree in International Environmental Policy from Middlebury Institute of International Studies and a bachelor’s degree in Business Administration from Bucknell University.

Stephen Herzenberg holds a Ph.D. in Economics from Massachusetts Institute of Technology and has been Executive Director since December 1995 of the Keystone Research Center (KRC), the mission of which is to promote a more prosperous and equitable Pennsylvania. Before KRC, Herzenberg worked at the U.S. Congressional Office of Technology Assessment and the U.S. Department of Labor (DOL). At DOL, he served as Assistant to the chief negotiator of the labor
side agreement to the North American Free Trade Agreement. He also researched and wrote on the international labor rights and standards, and the integration of the U.S.-Canada and Mexican auto industries. One unifying theme in Herzenberg’s research has been the challenges workers face in the transition from a manufacturing dominated U.S. economy with limited imports to a global, postindustrial, service-dominated economy. At KRC, he has written extensively on the policies and institutions that might improve “non-mobile” service jobs as well as conducted an assessment of Pennsylvania’s training and adjustment programs for dislocated manufacturing workers on the 25th anniversary of the “Rapid Response” program’s creation. Herzenberg’s writings for national audiences include Losing Ground in Early Childhood Education, Economic Policy Institute, 2005; New Rules for a New Economy: Employment and Opportunity in Postindustrial America, Cornell/ILR Press, 1998; U.S.-Mexico Trade: Pulling Together or Pulling Apart? U.S. Congressional Office of Technology Assessment, September 1992; and Labor Standards in the Global Economy, U.S. Department of Labor Bureau of International Labor Affairs, 1990.

Tracy Hester is a Lecturer at the University of Houston Law Center, where he teaches courses on environmental law, climate change, emerging technologies, and statutory interpretation. His research focuses on the innovative application of environmental laws to emerging technologies and risks, such as climate engineering, genetic modification, nanotechnologies, wind and other renewable energy projects, and on novel compliance and liability issues. He also writes on the application of environmental criminal laws to disasters and accidental releases. Professor Hester was inducted into the American College of Environmental Lawyers in 2015, elected as a member of the American Law Institute in 2004, and named the Top Environmental Lawyer in Houston in 2011 by Best Lawyers of America. He was also elected to the Council of the American Bar Association’s Section on Environment, Energy and Resources (SEER) in 2011, and he currently co-chairs SEER’s Law Professors Committee.

Shi-Ling Hsu is the D’Alemberte Professor of Law at the Florida State University College of Law, and is currently serving as the Associate Dean for Environmental Programs. Prior to his current appointment, Professor Hsu was a Professor of Law and Associate Dean for Special Projects at the University of British Columbia Faculty of Law. He has also served as an Associate Professor at George Washington University Law School, a Senior Attorney and Economist for Environmental Law Institute, and a Deputy City Attorney for the City and County of San Francisco. Professor Hsu practiced law with the firm of Fenwick & West in Palo Alto, California. He holds a B.S. in Electrical Engineering from Columbia University, and a J.D. from Columbia Law School. He also has an M.S. in Ecology and a Ph.D. in Agricultural and Resource Economics, both from University of California, Davis. Professor Hsu has taught in the areas of environmental and natural resource law, law and economics, quantitative methods, and property. He serves on the Board of Advisors of Citizens Climate Lobby and as an adjunct scholar with the Niskanen Center.

Blake Hudson is the A.L. O’Quinn Chair in Environmental Law and Professor of Law at the University of Houston Law Center. Professor Hudson's research considers how property, land use, and natural resources law and policy intersect with environmental and constitutional law, with specific focus on the issue of federalism and property rights as they relate to land use and the environment. One branch of his research centers on “commons” scholarship and the complicated role of private property rights and government institutions as solutions to commons dilemmas. Professor Hudson’s research further assesses how the issues of federalism and constitutional structure have the potential to both complicate and resolve land use and natural resource management issues at the state, federal, and international levels, with particular emphasis on forests, natural capital impacted by direct land use planning, and the legal and political institutions established to govern those resources. He has also begun writing about the role of culture and political philosophy in influencing land use decisions and natural resources management, particularly in the U.S. South. Professor Hudson teaches courses in natural resources law and policy, water law, and property law. Professor Hudson obtained his bachelor's degree in both Biology and History, as well as minors in Pre-Law and Political Science, at University of Montevallo, where he was a scholar-athlete. He graduated with high honors from Duke University School of Law, and graduated with a master's degree in Environmental Science and Policy from Duke University’s Nicholas School of the Environment.

David Ismay is a Senior Attorney for the Conservation Law Foundation (CLF) in Boston, specializing in clean energy and climate change policy, law, and regulation. Ismay regularly represents CLF in proceedings before state environmental and energy agencies as well as in state and federal court, and is an adjunct lecturer in energy law and policy at Northeastern University School of Law. He is also a senior advisor to the U.S. Deep Decarbonization Pathways Project. Before joining CLF, Ismay was a Senior Associate at Farella Braun + Martel LLP in San Francisco, where he
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Wendy B. Jacobs is the Emmett Clinical Professor of Environmental Law and Director of the Harvard Law School (HLS) Emmett Environmental Law & Policy Clinic. She serves on the Faculty of the Harvard Center for Health and the Global Environment and as Special Adviser to the HLS Dean on Learning and Practice. She is a member of the American College of Environmental Lawyers and is the Board Chair of the Clean Air Task Force. In the Clinic, Jacobs and her students work on a variety of complex environmental and energy law and policy projects, with a focus on citizen science, climate change mitigation, resiliency and displacement, sustainable aquaculture and agriculture, renewable energy, microgrids and district energy, carbon capture and sequestration, improved oversight and management of offshore drilling, protection of the Arctic, energy justice, and protection of national monuments. In 2017, she launched the Climate Solutions Living Lab course, in which advanced students from multiple disciplines across Harvard University collaborate in designing projects to help universities and other enterprises reduce climate impacts via off-campus actions and investments. Prior to joining HLS, Jacobs practiced environmental and administrative law as a partner at Foley Hoag LLP in Boston for 20 years, and before that as an appellate attorney and special litigator for the Environment Division of the U.S. Department of Justice in Washington, D.C. She received her J.D., with honors, in 1981 from HLS, where she was an editor of the Harvard Law Review.

Ryan A. Jones, Co-Founder of Evolved Energy Research, has deep analytical expertise in electricity operations, reliability, and long term planning. His work has focused on jurisdictions with increasing levels of renewable energy, exploring implications from the perspective of system operators, as well as renewable developers and energy technology companies. Through this work, creating and using a broad set of analytical tools, Jones has developed a unique conceptual understanding of the long-term challenges and opportunities of deep decarbonization. He holds a master’s degree from Stanford University in Atmosphere/Energy and a bachelor’s degree, summa cum laude, from Emory University in Environmental Studies and Physics.

Réna Kakon is an Attorney at the California and Paris bars. She is in-house legal counsel for Fenix International, a technology company focusing on energy access and financial services for rural Africa, founded in San Francisco, headquartered in Uganda, and owned by the French public utility company Engie. She previously worked on energy and climate policies for the CPUC and Dentons. She trained at Baker McKenzie and Dentons following her studies in business and tax law at University Paris I-La Sorbonne Law School and Paris II-Assas Law School. She received a certificate in English law from the University of Birmingham and an LL.M. with a certificate in energy and cleantech law from Berkeley Law.

David R. Kanter is an Assistant Professor of Environmental Studies at NYU. His research focuses on the interconnected challenges of nitrogen pollution, sustainable agriculture, and climate change. He received his Ph.D. in Science, Technology and Environmental Policy from Princeton University and his B.Sc. in Chemistry and Law from the University of Bristol in the United Kingdom. Prior to NYU, Professor Kanter was a Postdoctoral Research Fellow at the Earth Institute at Columbia University.

Kit Kennedy is a Senior Director of the Climate and Clean Energy Program at the Natural Resources Defense Council (NRDC). She directs NRDC’s advocacy at the state and regional level to accelerate progress on scaling up clean energy, including energy efficiency, renewable energy, transportation electrification, and building decarbonization, as well as creating and strengthening state carbon policies and markets. Kit has 30 years of experience as an environmental and energy attorney and advocate. From 2007-2010, she served as Special Deputy Attorney for Environmental Protection at the New York Attorney General’s Office, where she directed the litigation and policy activities of the office’s Environmental
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Alexandra B. Klass is a Distinguished McKnight University Professor at the University of Minnesota Law School. She teaches and writes in the areas of energy law, natural resources law, environmental law, tort law, and property law. Her recent scholarly work, published in many of the nation's leading law journals, addresses regulatory challenges to integrating more renewable energy into the nation's electric transmission grid, siting and eminent domain issues surrounding interstate electric transmission lines and oil and gas pipelines, and applications of the public trust doctrine to modern environmental law challenges. Klass is a coauthor of *Energy Law and Policy* (West Academic Publishing, 2d ed. 2018) (with Davies, Osofsky, Tomain, and Wilson), *The Practice and Policy of Environmental Law* (Foundation Press, 4th ed. 2017) (with Ruhl, Salzman, and Nagle), *Energy Law: Concepts and Insights* (Foundation Press 2017) (with Hannah Wise-man), and *Natural Resources Law: A Place-Based Book of Problems and Cases* (Aspen, 4th ed. 2018) (with Klein, Cheever, Birdsong, and Biber). Prior to her teaching career, she was a Partner at Dorsey & Whitney LLP in Minneapolis, where she specialized in environmental law and land use litigation. She is a member scholar at the Center for Progressive Reform, and a Fellow and Faculty Leadership Council member at the University of Minnesota’s Institute on the Environment.

Gabe Kwok, a Principal with Evolved Energy Research, has expertise in energy planning, wholesale electricity markets, asset evaluation, and economic analysis. His work supports the policy, planning, and investment decisionmaking needs of clients across all sectors, including regulators, utilities, project developers, investors, and NGOs. He develops and employs quantitative tools to answer complex energy and environmental questions, and frequently provides reports and presentations communicating insights. Kwok brings together modeling expertise and an understanding of the technical and institutional aspects of the energy economy to help clients holistically understand and respond to deep decarbonization. He earned a master's degree in Environmental Management from Duke University and a bachelor's degree in Economics from Texas A&M University.

Monica Lamb is an Attorney representing renewable power plant developers, investors, and energy technology startups. She draws on years of experience as a solar power plant developer and in cleantech business development to help clients navigate the quickly shifting energy regulatory landscape to build sustainable, financeable projects and businesses. Lamb has contributed to the UNECE’s ongoing efforts to develop standards for public-private partnerships for renewable energy power plants, in pursuit of the UN’s Sustainable Development Goals. She has testified before the Energy Subcommittee of the U.S. House of Representatives on the role of new technologies serving energy consumers. Lamb holds a J.D. from Columbia Law School and a B.A. in Economics from Harvard College.

Peter H. Lehner is a Senior Strategic Advisor and Senior Attorney at Earthjustice, and directs the Sustainable Food & Farming Program, deploying strategies to reduce health, environmental, and climate harms from production of our food and to promote a more environmentally sound and climate-change resilient agricultural system. From 2007-2015, Lehner was the Executive Director of the Natural Resources Defense Council (NRDC) and the NRDC Action Fund. There, he grew the organization and particularly the climate change and clean energy programs, opened several new offices and programs, and expanded the food system work. From 1999-2006, he served as Chief of the Environmental Protection Bureau of the New York State Attorney General’s office, supervising all environmental litigation by and against the state. His cases there created important clean air, climate change, and watershed protection precedents. Lehner previously served at NRDC for five years directing the Clean Water Program. Before that, he created and led the Environmental Prosecution Unit for the New York City Law Department and served in the Affirmative Litigation Division. He clerked for Chief Judge James Browning of the U.S. Court of Appeals for the Ninth Circuit. Peter holds an A.B. in Philosophy and Mathematics from Harvard College and is an honors graduate of Columbia University Law School, where he taught for many years. Lehner also manages two large farms in Costa Rica. He is on several NGO boards, and has been honored with numerous awards by EPA and many environmental groups.
**Gregg P. Macey** is a Professor of Law, Brooklyn Law School, where he teaches courses on environmental law and property, a Visiting Professor at Massachusetts Institute of Technology (MIT), where he teaches a course in environmental justice law and policy, and a Visiting Research Fellow with the Program on Science, Technology & Society at Harvard University. His research interests include environmental and energy law, environmental health, and organizations. His articles appear in *Georgetown Law Journal, Environmental Health, Arizona State Law Journal, Cornell Law Review, Environmental Management,* and the *Journal of Policy Analysis and Management,* among other journals. Professor Macey has also published chapters in *Risk Analysis of Natural Hazards* (2016) and *Legal Pathways to Deep Decarbonization in the United States* (2018), as well as an edited volume on the future of the Superfund program, *Reclaiming the Land* (with Jon Cannon). He previously worked as a patent litigator, lecturer in urban planning, environmental consultant, and land use mediator. He has a Ph.D. in Urban Planning from MIT and a J.D. from the University of Virginia.

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**Caitlin McCoy** is the Climate, Clean Air & Energy Fellow for the Environmental & Energy Law Program at Harvard Law School. She was previously a Visiting Associate Professor of Law and the Environmental Program Fellow at George Washington University Law School (GW), where she taught classes on environmental law to undergraduate, graduate, and law students. Before GW, she served as the Legal Director of The Center for Coalfield Justice, where she worked on environmental justice, coal mining, and shale gas drilling issues in southwestern Pennsylvania. McCoy earned her LL.M. in International Environmental Law, with highest honors, from George Washington University Law, her J.D., *cum laude,* from Washington University School of Law, and her B.A., with highest honors, from University of California, Berkeley.

**Robert B. McKinstry, Jr.** Environmental and Climate Law Attorney and Consultant. He is a former partner of Ballard Spahr, LLP, where he led the firm’s Climate Change and Sustainability Initiative and founded the firm’s Environment and Natural Resources Group. Major cases in which he was involved include *Michigan v. EPA,* 135 S. Ct. 2699 (2015); *EPA v. EME Homer City Generation, L.P.,* 134 S. Ct. 1584 (2014); *Massachusetts v. EPA,* 549 U.S. 497 (2007); and *Raytheon Constructors Inc. v. ASARCO Inc.,* 368 F.3d 1214 (10th Cir. 2003). Between 2001-2007, he served a six-year term as the Maurice K. Goddard Chair in Forestry and Environmental Resources Conservation in the Pennsylvania State University School of Forest Resources. He has also taught climate change and other environmental law topics at Penn State as an adjunct professor of law. He received his undergraduate degree, with honors, from Swarthmore College, a masters degree from the Yale School of Forestry and Environmental Studies, and his J.D. from Yale Law School.

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**Aoife O’Leary** is a Senior Legal Manager at the Environmental Defense Fund with substantial environmental and economic experience. After qualifying as a lawyer in Ireland, she moved into the environmental sector. She worked with and advised various NGOs on the environmental impacts of international shipping and aviation, EU environmental governance, and UK community energy. After working in the legal and environmental sectors for a number of years, O’Leary decided to gain economics expertise to bring an additional element to her work and has since ensured economic incentives form part of the policy solutions she advocates. She is a board member of Rethinking Economics (a charity campaigning to reform the economics curriculum in the UK) and Economy (a charity working to make economics more understandable).
Uma Outka works at the intersection between energy law and environmental law, with a focus on renewable energy and the transition to a low-carbon electricity sector. She joined the University of Kansas School of Law (KU) faculty in 2011, teaching courses in energy law, environmental law, property, and climate change law and policy. Her scholarship has appeared in law journals, including Vanderbilt Law Review, Ecology Law Quarterly, Colorado Law Review and the Stanford Environmental Law Journal, and her chapter on Legal Regimes for Land Use, Land Use Change and Forestry is featured in the comparative law reference volume Research Handbook on Climate Change Mitigation Law (Edward Elgar Publ. 2015). Before coming to KU Law, Outka spent two years as a Visiting Scholar in Energy and Land Use Law at the Florida State University College of Law (FSU). As a faculty research partner with FSU’s Institute for Energy Systems, Economics and Sustainability, she directed a Sustainable Energy Research Project aimed at understanding and advancing legal frameworks to support sustainable energy development and organized a national symposium on energy and land use issues at FSU. Outka previously worked as General Counsel for 1000 Friends of Florida, a nonprofit advocacy organization focused on growth management, environmental conservation, and affordable housing, and in private practice with the firm Verrill Dana, LLP in Portland, Maine. She is a summa cum laude graduate of University of Maine School of Law, and holds a master’s degree in Public Policy and Administration from the Muskie School of Public Service.

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David A. Repka is a retired Partner at Winston & Strawn LLP in Washington, D.C. Mr. Repka has over 35 years of experience in nuclear energy regulation and policy, administrative and appellate litigation, the National Environmental Policy Act, and federal regulatory compliance and enforcement related to nuclear power, radiological materials, and nuclear

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Professor Gilligan, *Beyond Politics: The Private Governance Response to Climate Change*, was published by Cambridge University Press in 2017. Prior to joining the Vanderbilt faculty, Vandenbergh was a Partner at Latham & Watkins in Washington, D.C., and he served as Chief of Staff of EPA from 1993-95. He has been a Visiting Professor at Harvard and the University of Chicago, and his research has been discussed in major media outlets such as National Public Radio’s *All Things Considered*, *National Geographic*, *USA Today*, and the *Washington Post*.

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Michael B. Gerrard
John C. Dernbach
## List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AEA</td>
<td>Atomic Energy Act</td>
</tr>
<tr>
<td>AFV</td>
<td>alternative fuel vehicle</td>
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<tr>
<td>AIA</td>
<td>American Institute of Architects</td>
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<tr>
<td>BAT</td>
<td>best available technology</td>
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<tr>
<td>BACT</td>
<td>best achievable control technology</td>
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<tr>
<td>BLM</td>
<td>Bureau of Land Management</td>
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<td>BOEM</td>
<td>Bureau of Ocean Energy Management</td>
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<tr>
<td>CAA</td>
<td>Clean Air Act</td>
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<td>CCS</td>
<td>carbon capture and sequestration</td>
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<tr>
<td>CEQ</td>
<td>Council on Environmental Quality</td>
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<tr>
<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation, and Liability Act</td>
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<tr>
<td>CES</td>
<td>clean energy standard</td>
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<tr>
<td>CFC</td>
<td>chlorofluorocarbon</td>
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<tr>
<td>CO₂</td>
<td>carbon dioxide</td>
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<tr>
<td>CO₂eq</td>
<td>carbon dioxide equivalent</td>
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<td>CRP</td>
<td>Conservation Reserve Program</td>
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<td>CSP</td>
<td>Conservation Stewardship Program</td>
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<td>DAC</td>
<td>direct air capture</td>
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<td>DDPP</td>
<td>Deep Decarbonization Pathways Project</td>
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<td>DG</td>
<td>distributed generation</td>
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<td>DOE</td>
<td>U.S. Department of Energy</td>
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<td>DOI</td>
<td>U.S. Department of the Interior</td>
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<td>DOJ</td>
<td>U.S. Department of Justice</td>
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<td>DOT</td>
<td>U.S. Department of Transportation</td>
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<td>DPF</td>
<td>diesel particulate filter</td>
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<td>EERS</td>
<td>energy-efficiency resource standard</td>
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<td>EIS</td>
<td>environmental impact statement</td>
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<td>EISA</td>
<td>Energy Independence and Security Act</td>
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<td>EPA</td>
<td>U.S. Environmental Protection Agency</td>
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<td>EPCA</td>
<td>Energy Policy and Conservation Act</td>
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<td>Environmental Quality Incentives Program</td>
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<td>ESA</td>
<td>Endangered Species Act</td>
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<td>ETS</td>
<td>emissions trading scheme</td>
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<td>EU</td>
<td>European Union</td>
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<td>EVs</td>
<td>electric vehicles</td>
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<td>Federal Aviation Administration</td>
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<td>FAST</td>
<td>Fixing America’s Surface Transportation Act</td>
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<td>Federal Crop Insurance Corporation</td>
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<td>Federal Highway Administration</td>
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<td>FONSI</td>
<td>finding of no significant impact</td>
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<td>FPA</td>
<td>Federal Power Act</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<td>FSA</td>
<td>Farm Service Agency</td>
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<td>U.S. Fish and Wildlife Service</td>
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<td>GATT</td>
<td>General Agreement on Tariffs and Trade</td>
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<td>GHG</td>
<td>greenhouse gas</td>
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<tr>
<td>Gt</td>
<td>gigaton</td>
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<td>GWP</td>
<td>global warming potential</td>
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<td>HCFC</td>
<td>hydrochlorofluorocarbon</td>
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<td>HDVs</td>
<td>heavy-duty vehicles</td>
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<tr>
<td>HFC</td>
<td>hydrofluorocarbon</td>
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<td>HFCV</td>
<td>hydrogen fuel cell vehicle</td>
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<td>HUD</td>
<td>U.S. Department of Housing and Urban Development</td>
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<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<td>IMO</td>
<td>International Maritime Organization</td>
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<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>ISO</td>
<td>independent system operator</td>
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<td>KWh</td>
<td>kilowatt hours</td>
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<td>LAER</td>
<td>lowest achievable emissions rate</td>
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<td>LCCP</td>
<td>life-cycle climate performance</td>
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<td>LCRs</td>
<td>local content requirements</td>
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<td>LDVs</td>
<td>light-duty vehicles</td>
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<td>LEED</td>
<td>Leadership in Energy and Environmental Design</td>
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<td>LFG</td>
<td>landfill gas</td>
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<td>light water reactor</td>
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<td>M&amp;V</td>
<td>measurement and verification</td>
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<td>MEPS</td>
<td>minimum efficiency performance standards</td>
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<td>MMT</td>
<td>million metric tons</td>
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<td>MPOs</td>
<td>metropolitan planning organizations</td>
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<td>megawatt hours</td>
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<td>North American Free Trade Agreement</td>
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<td>National Environmental Policy Act</td>
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<td>negative emissions technologies</td>
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<td>natural gas combined cycle</td>
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<td>NHTSA</td>
<td>National Highway Traffic Safety Administration</td>
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<td>NPDES</td>
<td>national pollutant discharge elimination system</td>
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<td>NRC</td>
<td>Nuclear Regulatory Commission</td>
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<td>NRCS</td>
<td>Natural Resources Conservation Service</td>
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<td>NSPS</td>
<td>new source performance standards</td>
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<td>PAB</td>
<td>private activity bond</td>
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<td>property assessed clean energy</td>
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<td>PHMSA</td>
<td>Pipeline and Hazardous Materials Safety Administration</td>
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<td>particulate matter</td>
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<td>PPA</td>
<td>power purchase agreement</td>
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<td>production tax credit</td>
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<td>PUC</td>
<td>public utilities commission</td>
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<tr>
<td>PURPA</td>
<td>Public Utility Regulatory Policies Act</td>
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<tr>
<td>PV</td>
<td>photovoltaic</td>
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<tr>
<td>R&amp;D</td>
<td>research and development</td>
</tr>
<tr>
<td>RCRA</td>
<td>Resource Conservation and Recovery Act</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Definition</td>
</tr>
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<tr>
<td>RD&amp;D</td>
<td>research, development, and demonstration</td>
</tr>
<tr>
<td>RFS</td>
<td>Renewable Fuel Standard</td>
</tr>
<tr>
<td>RMA</td>
<td>Risk Management Agency (USDA)</td>
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<tr>
<td>RPS</td>
<td>renewable portfolio standard</td>
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<tr>
<td>RTO</td>
<td>regional transmission organization</td>
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<tr>
<td>SFO</td>
<td>sustainable finance organization</td>
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<tr>
<td>SIP</td>
<td>state implementation plan</td>
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<tr>
<td>SMR</td>
<td>small modular reactor</td>
</tr>
<tr>
<td>SWPA</td>
<td>Southwestern Power Administration</td>
</tr>
<tr>
<td>TNCs</td>
<td>transportation network companies</td>
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<tr>
<td>TOD</td>
<td>transit-oriented development</td>
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<tr>
<td>TPO</td>
<td>third-party ownership</td>
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<tr>
<td>TVA</td>
<td>Tennessee Valley Authority</td>
</tr>
<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<tr>
<td>USDA</td>
<td>U.S. Department of Agriculture</td>
</tr>
<tr>
<td>USFS</td>
<td>U.S. Forest Service</td>
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<tr>
<td>VMT</td>
<td>vehicle miles traveled</td>
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<tr>
<td>WAPA</td>
<td>Western Area Power Administration</td>
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<tr>
<td>ZEB</td>
<td>zero-energy building</td>
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<tr>
<td>ZEV</td>
<td>zero-emission vehicle</td>
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<tr>
<td>ZNE</td>
<td>zero net energy</td>
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