

LEGAL PATHWAYS TO DEEP DECARBONIZATION IN THE UNITED STATES

Edited by

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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 Wiseman), 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.

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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.

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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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Melissa Powers is a Jeffrey Bain Faculty Scholar and Professor of Law at Lewis & Clark Law School, and she was a Fulbright-Schuman Scholar in 2014-2015 researching Denmark's and Spain's renewable energy laws. She is also the Founder and Director of the Green Energy Institute at Lewis & Clark Law School, an organization that designs strategies to a transition to a zero-carbon energy system. Powers is a member-scholar of the Center for Progressive Reform and a board member of the Environmental Law Collaborative. She is the book review editor of *Transnational Environmental Law*, a peer-reviewed journal published by Cambridge University Press. She is a coauthor of the books *Climate Change and the Law* and *Principles of Environmental Law*. Recent book chapters and articles include: Lessons from U.S. Biofuels Policy: The Renewable Fuels Standard's Rocky Ride, in *The Law and Policy of Biofuels* (eds. Yves Le Boutillier, Annie Cowie, Paul Martin, & Heather McLeod-Kilmurray) (2016); Is that All There Is? The Surprising Value of Unenforceable Local Climate Action Plans, in *Rethinking Sustainable Development to Meet the Climate Change Challenge* (eds. Owley & Hirokawa) (2015); Quick Fixes or Real Remedies? The Benefits and Limitations of Climate and Energy Fast Policy, *San Diego Journal of Climate and Energy Law* (2017) (with Edward Jewell and Joni Slinger); and An Inclusive Energy Transition: Expanding Low-Income Access to Clean Energy Programs, *North Carolina Journal of Law and Technology* (2017).

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Michael B. Gerrard

John C. Dernbach

List of Acronyms

AEA	Atomic Energy Act
AFV	alternative fuel vehicle
AIA	American Institute of Architects
BAT	best available technology
BACT	best achievable control technology
BLM	Bureau of Land Management
BOEM	Bureau of Ocean Energy Management
CAA	Clean Air Act
CCS	carbon capture and sequestration
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CES	clean energy standard
CFC	chlorofluorocarbon
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRP	Conservation Reserve Program
CSP	Conservation Stewardship Program
DAC	direct air capture
DDPP	Deep Decarbonization Pathways Project
DG	distributed generation
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOJ	U.S. Department of Justice
DOT	U.S. Department of Transportation
DPF	diesel particulate filter
EERS	energy-efficiency resource standard
EIS	environmental impact statement
EISA	Energy Independence and Security Act
EPA	U.S. Environmental Protection Agency
EPAct 2005	Energy Policy Act of 2005
EPCA	Energy Policy and Conservation Act
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act
ETS	emissions trading scheme
EU	European Union
EVs	electric vehicles
FAA	Federal Aviation Administration
FAST	Fixing America's Surface Transportation Act
FCIC	Federal Crop Insurance Corporation
FERC	Federal Energy Regulatory Commission
FHA	Federal Housing Administration
FHwA	Federal Highway Administration
FITs	feed-in tariffs
FONSI	finding of no significant impact
FPA	Federal Power Act

FSA	Farm Service Agency
FWS	U.S. Fish and Wildlife Service
GATT	General Agreement on Tariffs and Trade
GHG	greenhouse gas
Gt	gigaton
GWP	global warming potential
HCFC	hydrochlorofluorocarbon
HDVs	heavy-duty vehicles
HFC	hydrofluorocarbon
HFCV	hydrogen fuel cell vehicle
HUD	U.S. Department of Housing and Urban Development
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
ISO	independent system operator
KWh	kilowatt hours
LAER	lowest achievable emissions rate
LCCP	life-cycle climate performance
LCRs	local content requirements
LDVs	light-duty vehicles
LEED	Leadership in Energy and Environmental Design
LFG	landfill gas
LWR	light water reactor
M&V	measurement and verification
MEPS	minimum efficiency performance standards
MMT	million metric tons
MPOs	metropolitan planning organizations
MWh	megawatt hours
NAFTA	North American Free Trade Agreement
NEPA	National Environmental Policy Act
NETs	negative emissions technologies
NGCC	natural gas combined cycle
NHTSA	National Highway Traffic Safety Administration
NPDES	national pollutant discharge elimination system
NRC	Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NSPS	new source performance standards
PAB	private activity bond
PACE	property assessed clean energy
PHMSA	Pipeline and Hazardous Materials Safety Administration
PM	particulate matter
PPA	power purchase agreement
PTC	production tax credit
PUC	public utilities commission
PURPA	Public Utility Regulatory Policies Act
PV	photovoltaic
R&D	research and development
RCRA	Resource Conservation and Recovery Act

RD&D	research, development, and demonstration
RFS	Renewable Fuel Standard
RMA	Risk Management Agency (USDA)
RPS	renewable portfolio standard
RTO	regional transmission organization
SFO	sustainable finance organization
SIP	state implementation plan
SMR	small modular reactor
SWPA	Southwestern Power Administration
TNCs	transportation network companies
TOD	transit-oriented development
TPO	third-party ownership
TVA	Tennessee Valley Authority
UNFCCC	United Nations Framework Convention on Climate Change
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
VMT	vehicle miles traveled
WAPA	Western Area Power Administration
ZEB	zero-energy building
ZEV	zero-emission vehicle
ZNE	zero net energy