Renewable Energy Siting for the Critical Decade

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I. INTRODUCTION

Over a decade ago, more than half of U.S. states had fairly new renewable energy mandates or targets in place, calling for a percentage of electricity delivered to customers within the state to be generated with renewable resources, such as wind and solar energy.[1] Anticipating the significant physical footprint that could accompany widespread renewable energy development, scientists at The Nature Conservancy cautioned against "energy sprawl." Much like urban sprawl, characterized by poorly planned, inefficient urban development, scaling up renewable energy without informed, thoughtful planning could fragment wildlife habitats and harm natural landscapes unnecessarily.[2] For renewable energy, early science-based planning could avoid and minimize interference with habitat, while advancing the shift away from coal, a major source of energy sector greenhouse gas emissions. By contrast, they argued, increased energy efficiency could help reduce the need for new electric power facilities.[3]

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1. Other forms of renewable energy used for electricity include hydropower, geothermal energy, and bioenergy. There are currently thirty-five states (plus the District of Columbia) that have a renewable portfolio standard or clean energy standard, though some have effectively expired. *See Renewable & Clean Energy Standards (Sept. 2020)*, NC CLEAN ENERGY TECH. CTR. & DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (DSIRE), https://s3.amazonaws.com/ncsolarcen-prod/wp-content/uploads/2020/09/RPS-CES-Sept2020.pdf [https://perma.cc/L3WZ-7ZQW].

2. Robert I. McDonald, Joseph Fargione, Joe Kiesecker, William M. Miller & Jimmie Powell, *Energy Sprawl or Energy Efficiency: Climate Policy Impacts on Natural Habitat for the United States of America*, 4 PLOS ONE 1 (2009), https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0006802 [https://perma.cc/VRU8-4S43]. The analogy with urban sprawl can only be taken so far, however, and I highlighted ways that "energy sprawl" differs from urban sprawl in my article, Uma Outka, *The Renewable Energy Footprint*, 30 STAN. ENV'T L.J. 241, 293–95 (2011) [hereinafter *Footprint*].

3. *See* McDonald et al., *supra* note 2 and accompanying text.

As state mandates took effect, it was soon clear that siting renewable energy would not always be easy. In addition to concerns for wildlife and landscape preservation, the shift to wind and solar, in particular, would decentralize electricity generation and make energy increasingly local for more people across the country. Although polluting power plants have long operated in close proximity to low-income communities of color—an enduring energy and environmental justice issue for the electricity sector[4]—the proliferation of wind and solar facilities, small and large, has made energy generation much more visible in areas where it never was before. This inevitably creates conflict—some projects are welcomed, some are opposed, and emotions run high when communities are split over perceived benefits and harms of hosting a new facility. Renewable energy siting represents the point at which broad energy policy aspirations intersect inextricably with local landscapes, local social and political contexts, and local land use law.

The last decade has reshaped the energy landscape and every new renewable energy facility involved a siting decision. Ten years ago, the United States only generated about ten percent of electricity coming from renewable resources, and at that time it was mostly legacy hydropower.[5] Today, the nation's electricity is about twenty percent renewable[6]—with much higher levels of renewable energy in some states—and wind surpassed hydropower in 2019 to be the leading renewable energy resource in the United States.[7] Together with increased reliance on gas-fired power plants, coal use for electricity has steadily declined.[8] Indeed, the U.S. Energy Information Administration (EIA) recently announced the significance of this with the headline: "U.S. renewable energy

4. *See, e.g.*, NAACP, COAL BLOODED: PUTTING PROFITS BEFORE PEOPLE 15, 23–31 (2016) (on proximity and impact of coal-fired power plants on African American communities); *see also* NAACP, FUMES ACROSS THE FENCE-LINE: THE HEALTH IMPACTS OF AIR POLLUTION FROM OIL & GAS FACILITIES ON AFRICAN AMERICAN COMMUNITIES (2017) (including facilities that supply gas-fired power plants).

5. *See Electricity Explained: Energy in the United States*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php [https://perma.cc/9BWZ-G2D6] (last updated Mar. 20, 2020).

6. *EIA Projects Renewables Share of U.S. Electricity Generation Mix Will Double by 2050*, U.S. ENERGY INFO. ADMIN. (Feb. 8, 2021), https://www.eia.gov/todayinenergy/detail.php?id=46676 [https://perma.cc/358F-SJF9].

7. *Wind Has Surpassed Hydro as Most-Used Renewable Electricity Generation Source in U.S.*, U.S. ENERGY INFO. ADMIN. (Feb. 26, 2020), https://www.eia.gov/todayinenergy/detail.php?id=42955 [https://perma.cc/A77S-CNH4].

8. *Wind and Natural Gas-Fired Generators Led U.S. Power Sector Capacity Additions in 2019*, U.S. ENERGY INFO. ADMIN. (Apr. 21, 2020), https://www.eia.gov/todayinenergy/detail.php?id=43415 [https://perma.cc/E2BB-L5SQ].

consumption surpasses coal for the first time in over 130 years."[9]

Over the last five years, EIA data shows "growth in U.S. renewable energy is almost entirely attributable to the use of wind and solar in the electric power sector."[10] There are now utility scale wind farms in forty-one states and electricity demand served by wind generation continues to break records across the grid.[11] For example, the Southwest Power Pool, with its footprint spanning the Plains States from Oklahoma to the Canadian border, hit a new hourly record of seventy-two percent in April 2020.[12] Although solar has trailed wind in growth to date, that is expected to change, as solar projects are expected to account for the largest share of new capacity in 2021.[13]

This growth, while encouraging, has been too slow when measured against the urgency of much more rapid decarbonization to stabilize the global climate. According to the United Nations, "[b]y 2030, emissions would need to be 25 per cent and 55 per cent lower than in 2018 to put the world on the least-cost pathway to limiting global warming to below 2ºC and 1.5°C respectively."[14] Consistent with this daunting projection, the Intergovernmental Panel on Climate Change concludes that, by 2030, CO_2 emissions must "decline by about 45% from 2010 levels" to avoid catastrophic effects of climate change on human health, food and water security, economic stability, biodiversity, and species extinction.[15] Taking these warnings seriously means this decade—2020–2030—is critical for decisive and effective global climate action. To date, however, current international commitments to climate change mitigation, including from the United States, are not on track to achieve these targets.[16] During the presidential administration of Donald J. Trump, the United States

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9. *U.S. Renewable Energy Consumption Surpasses Coal for the First Time in Over 130 Years*, U.S. ENERGY INFO. ADMIN. (May 28, 2020), https://www.eia.gov/todayinenergy/detail.php?id=43895 [https://perma.cc/T8CV-C3UA].

10. *Id.*

11. WINDExchange, *U.S. Installed and Potential Wind Power Capacity and Generation*, OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, https://windexchange.energy.gov/maps-data/321 [https://perma.cc/Q74Y-KQXP] (last visited Mar. 8, 2021).

12. *The Central United States Set Several Wind Power Records This Spring*, U.S. ENERGY INFO. ADMIN. (June 12, 2020), https://www.eia.gov/todayinenergy/detail.php?id=44075 [https://perma.cc/K4N2-TP9G].

13. *Renewables Account for Most New U.S. Electricity Generating Capacity in 2021*, U.S. ENERGY INFO. ADMIN. (Jan. 11, 2021), https://www.eia.gov/todayinenergy/detail.php?id=46416 [https://perma.cc/LLT7-ZVS6].

14. U.N. Env't Programme (UNEP), Emissions Gap Report 2019, xv (2019).

15. *See* Intergovt'l Panel on Climate Change (IPCC), Summary for Policy Makers 9–12 (2018).

16. U.N. ENV'T PROGRAMME (UNEP), EMISSIONS GAP REPORT 2020, xiv (2020) (stating unequivocally that the world is "[a]bsolutely not" on track to bridging the gap between countries' "climate mitigation pledges and the global emission levels from least-cost pathways that are aligned with achieving the temperature goals of the Paris Agreement.").

repudiated and eventually formally withdrew its pledge to reduce greenhouse gas emissions under the Paris Agreement.[17] Although wind and solar facilities continued to be constructed across the United States during President Trump's four years in office (driven largely by state policies and corporate demand for renewable energy[18]), the pace of development will need to accelerate under the Joseph R. Biden administration, as the United States rejoins the Paris Agreement and works to make up for lost time on a wide range of climate mitigation strategies.[19] Increasing renewable energy will be a central strategy for cutting carbon in the electricity sector, along with other clean energy approaches.[20] It becomes all the more important as electric vehicles integrate transportation with the electric grid.[21]

The start of this critical decade, then, is a good time to assess whether

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17. The Paris Agreement implements the United Nations Framework Convention on Climate Change, to which the United States is once again a Party, and went into force in 2016. *See* U.N. Framework Convention on Climate Change, Adoption of the Paris Agreement, FCCC/CP/2015/L.9/Rev.1 (Dec. 12, 2015), https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf [https://perma.cc/F83L-QH7J]. President Trump announced his intention to withdraw from the Paris Agreement in 2017, and the process concluded with formal withdrawal in 2020. *See Joint Statement on the US Withdrawal from the Paris Agreement*, U.N. CLIMATE CHANGE (Nov. 4, 2020), https://unfccc.int/news/joint-statement-on-the-us-withdrawal-from-the-paris-agreement [https://perma.cc/P2PW-5JRP] (expressing regret over U.S. withdrawal but restating commitment to the full implementation of the agreement).

18. I discuss the role of corporate demand in renewable energy development at length in prior work, see Uma Outka, *"100 Percent Renewable": Company Pledges and State Energy Law*, 2019 UTAH L. REV. 661 (2019).

19. Antony J. Blinken, *The United States Officially Rejoins the Paris Agreement*, U.S. DEP'T OF STATE (Feb. 19, 2021), https://www.state.gov/the-united-states-officially-rejoins-the-paris-agreement/ [https://perma.cc/8GB2-AXMH].

20. Clean energy includes renewable energy but also energy efficiency, energy conservation, and regulatory approaches to moderate demand to reduce the need for new generation and facilitate retirement of older, polluting plants. These complementary strategies are also essential but outside the scope of this article.

21. *See, e.g.*, Daniel Steinberg, Dave Bielen, Josh Eichman, Kelly Eurek, Jeff Logan, Trieu Mai, Colin McMillan, Andrew Parker, Laura Vimmerstedt & Eric Wilson, Nat'l Renewable Energy Lab'y, Electrification & Decarbonization: Exploring U.S. Energy Use and Greenhouse Gas Emissions in Scenarios with Widespread Electrification and Power Sector Decarbonization vi, 17 (2017), https://www.nrel.gov/docs/fy17osti/68214.pdf [https://perma.cc/2XMP-6USL] (exploring scenarios for "widespread electrification of end-use services across the transportation, buildings, and industrial sectors" which are expected to lead "to over a two-fold increase in electricity consumption by 2050," with transportation accounting for half of the increased load.). According to the study, substitution of conventional to electric vehicles is feasible and holds potential for significant greenhouse gas reductions. *Id.* at 29–30. States have made hundreds of legal and policy changes related to electric vehicles, laying the groundwork for an accelerated transition for transportation to the grid. *See* Allison Carr, Brian Lips, Autumn Proudlove & David Sarkisian, 50 States of Electric Vehicles: Q2 2019 Quarterly Report 5 (2019), https://static1.squarespace.com/static/5ac5143f9d5abb8923a86849/t/5d4a33dbe32d740001ff4a9c/1565144032132/Q219_EV_execsummary_Final.pdf [https://perma.cc/SGJ5-WPWJ]. For a discussion of legal issues surrounding transportation electrification, see generally Alexandra B. Klass, *Public Utilities and Transportation Electrification*, 104 Iowa L. Rev. 545 (2019).

the current legal context for *siting*—apart from other potential law and policy drivers—is sufficient to support an accelerated pace of renewable energy development.[22] Further, could reforms help ensure that accelerated development can take place in ways that minimize harmful effects on communities and landscapes?

Recognizing unchecked climate change is by far the greatest threat to species survival and human wellbeing, the Nature Conservancy calls even more strongly now than ten years ago for a rapid increase in renewable energy, with an emphasis on "low-impact areas—lands that have already been significantly altered for agriculture, infrastructure, and other development activities. . . ."[23] According to their modelling, there is "an abundance of low-impact lands with high renewable energy development potential [which . . . .] are more than enough—by many multiples—to meet the world's renewable energy needs."[24] Peer environmental organizations, such as the National Wildlife Federation and the National Audubon Society, likewise regard expanded renewable energy as necessary for climate change mitigation.[25] Yet, site selection remains largely developer-driven, and while that process continues to improve through beneficial collaborations between the wind industry, wildlife management agencies, and conservation groups, siting approvals can be unpredictable.[26] As will be discussed further below, the legal context for siting is largely the same varied patchwork across states, and even across localities within the same state, that it was ten years ago. Moreover, new

22. *See e.g.*, Am. Wind Energy Ass'n, Vision for Driving a Clean Energy Transformation: Executive, Regulatory & Congressional Priorities for 2021 (2020), https://cleanpower.org/wp-content/uploads/2021/02/AWEA_Vision1st100Days_Full_v1.pdf [https://perma.cc/F25B-S5AL] (providing other potential law and policy drivers for accelerating renewable development other than siting and outlining immediate recommendations for the Biden Administration and Congress to accelerate renewable energy development).

23. BRUCE MCKENNEY & JESSICA WILKINSON, THE NATURE CONSERVATORY, CLEAN AND GREEN PATHWAYS FOR THE GLOBAL RENEWABLE ENERGY BUILDOUT 3 (2020), https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_CleanAndGreen_FullReport_050520.pdf [https://perma.cc/B33K-WCW6].

24. *Id.*

25. *See* JIM MURPHY, LAUREN ANDERSON & NAT'L WILDLIFE FED'N, RESPONSIBLE WIND POWER AND WILDLIFE 23 (2019), https://www.nwf.org/-/media/Documents/PDFs/NWF-Reports/2019/Responsible-Wind-Power-Wildlife.ashx [https://perma.cc/5UZP-JWZP] (stating that "[r]esponsible wind power is a key solution to addressing the threat of climate change to people and wildlife" and "[u]nless substantial wind power and other renewable energy development occur in a rapid and timely manner, there will be significant and irreversible impacts to wildlife and biodiversity.").

26. The American Wind & Wildlife Institute, for example, is a collaboration of wildlife advocacy organizations, such as the National Audubon Society, Defenders of Wildlife, Union of Concerned Scientists, The Nature Conservancy, Natural Resources Defense Council and others, and renewable energy companies, such as EDF Renewables, NextEra Energy, National Grid Renewables, and Vestas. *See* AM. WIND & WILDLIFE INST., *About Us*, https://awwi.org/about-us/ [https://perma.cc/534U-HT7U] (last visited Mar. 9, 2021).

wind and solar facilities will continue to face local opposition in some communities, blocking or delaying development even on sites that are otherwise environmentally suitable.

There are no perfect solutions to these challenges, but it is possible to anticipate the challenges presented by accelerated renewable energy development. The start of this critical decade is the right time to craft strategies for a rapid buildout grounded in the urgency of decarbonization and centered by respect for local environments and local communities. Pending the potential impact of major federal climate legislation on the availability of federal incentives and other federal streamlining measures nationwide—and having no illusions that any strategy can please all—this article addresses three key areas of priority related to siting large-scale renewable energy facilities that will be important for rapid growth. First, it revisits state and local government roles in siting on private land. Second, it outlines the role of siting in pursuing new ambition for renewable energy development on public lands and waters. Lastly, this article addresses emerging technology and new priorities that present new issues for siting governance.

II. STATE AND LOCAL GOVERNMENT ROLES IN SITING REVISITED

Ten years ago, I studied renewable energy siting regimes closely to assess their capacity to minimize harmful impacts from energy land use. In *The Renewable Energy Footprint*, an article based on that research, I highlighted several key observations that remain relevant today.[27] First, as a threshold matter, land use is primarily regulated by state and local governments, and is therefore highly variable.[28] With the exception of hydroelectric facilities, which are licensed by the Federal Energy Regulatory Commission, siting infrastructure for electricity generation, transmission, and distribution is a state and local function.[29] Many states intervene on traditionally local land use authority for siting of power plants and transmission lines, given the clear public importance of such facilities, beyond the interests of a single locality.[30] However, even in states with

27. *See Footprint*, *supra* note 2.

28. *Id.* at 254–55.

29. The Federal Energy Regulatory Commission (FERC) has authority over licensing and relicensing hydroelectric facilities. 16 U.S.C. § 797(e) ("Issue of licenses for construction, etc., of dams, conduits, reservoirs, etc."); § 808 ("New licenses and renewals"); § 823e ("Promoting hydropower development at existing nonpowered dams").

30. A trend to centralized state siting for power plants to overcome local opposition shaped the law in this area in the early 1970s. For a discussion from the period and the trend to consolidate siting authority at the state instead of local level, see A. Dan Tarlock, Roger Tippy & Frances Enseki Francis,

centralized siting regimes for some or all power plant siting, local governments typically still have a significant role in the siting process.[31] In most places, little has changed in this regard over the last decade.[32] Regulatory variability and fragmentation still well-describes the legal context for renewable energy siting and contributes to delays and barriers to new projects.

Second, the focus of emerging siting approaches at that time was streamlining approvals by addressing either (1) "process/review," (2) "jurisdiction/authority," or (3) "site selection."[33] Even with reforms designed to hasten the siting process, however, siting regimes were nonetheless reactive-designed to structure the governmental response to developers or utilities proposing renewable energy facilities.[34] This approach, I highlighted at that time, leaves site selection largely to those private entities, missing the importance of pairing the emphasis on faster approvals with a regulatory commitment to steering projects to low-impact lands.[35] This, too, is mostly unchanged. Where private lands are

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Environmental Regulation of Power Plant Siting: Existing and Proposed Institutions, 45 S. CAL. L. REV. 502 (1972). Power plants at that time were mostly coal-fired and higher megawatt (MW) capacity than many renewable energy facilities, so as a result, state siting regimes from that era are not necessarily well-matched to renewable projects. *See Footprint*, *supra* note 2, at 256–60, 266–67.

31. *Footprint*, *supra* note 2, at 258. *See generally* ENV'T L. INST., STATE ENABLING LEGISLATION FOR COMMERCIAL-SCALE WIND POWER SITING AND THE LOCAL GOVERNMENT ROLE 55–61 (2011), https://www.eli.org/sites/default/files/eli-pubs/d21-02.pdf [https://perma.cc/B9AQ-VVU7] (providing an overview of state siting regimes, with attention to the role of local governments and model legislative provisions states can use to address issues ranging from preemption of local governments to siting standards). States also traditionally have jurisdiction over siting for electric power transmission lines. *See* Piedmont Env't Council v. FERC, 558 F.3d 304, 310 (4th Cir. 2009) (addressing the context for transmission line siting generally in contrast to the limited federal siting authority created by Congress in the Energy Policy Act of 2005, which allowed for designation of National Interest Electric Transmission Corridors by the Department of Energy, thereby investing siting authority in the Federal Energy Regulatory Commission). Insufficient transmission infrastructure can be a barrier to accelerated renewable energy development, especially when new renewable facilities are sited in remote areas without sufficient existing transmission capacity. Transmission line siting is critical to accelerating renewable energy development. Although transmission siting is outside the scope of this article, a good introduction to the issues specific to transmission lines is Alexandra B. Klass & Jim Rossi, *Reconstituting the Federalism Battle in Energy Transportation*, 41 HARV. ENV'T L. REV. 423 (2017) (considering both legal frameworks for electric power line siting and pipeline siting and potential reforms). Revitalizing the concept of National Interest Electric Transmission Corridors with strengthened FERC backstop siting authority is a 2021 legislative priority for the American Wind Energy Association. *See* AM. WIND ENERGY ASS'N, *supra* note 22, at 18, 21.

32. *See* Jaclyn Kahn & Laura Shields, *State Approaches to Wind Facility Siting*, NAT'L CONF. OF ST. LEGISLATURES (Sept. 9, 2020), https://www.ncsl.org/research/energy/state-wind-energy-siting.aspx#map [https://perma.cc/4CSP-E8ET] (includes interactive map showing states with local, hybrid, or state authority).

33. For in depth discussion on these three aspects of siting and how siting reforms have typically sought to address them see *Footprint*, *supra* note 2, at 270–84.

34. *See id.* at 283.

35. *See id.* at 283–84.

concerned, comprehensive, science-based large-area planning by states is still far from the norm despite the availability of information to support it.

To accelerate renewable energy development, new state level siting approaches may be necessary, trading the traditional reactive posture for energy land use planning in earnest, and restructuring, where possible, the role of local governments in siting decisions. As a growing number of states have dramatically increased their renewable energy mandates—thirteen states (plus Puerto Rico and Washington DC) now have 100 percent clean energy or net zero carbon goals in place—the need to improve siting regimes has already become apparent.[36]

A useful starting point for thinking about better state siting is to consider recent reforms in the state of New York, which has updated its long-standing power plant siting law in ways exemplary of the kinds of significant reform efforts other ambitious states may consider adapting to their own legal contexts. Early in 2020, New York lawmakers enacted the Accelerated Renewable Energy Growth and Community Benefit Act complementing the state's landmark 2019 legislation, the Climate Leadership and Community Protection Act, which mandates seventy percent of electricity to be powered with renewables by 2030, and commits to 100 percent zero emissions electricity by 2040.[37] According to Professor Michael Gerrard, a long-time New York attorney, "[a] new renewables siting process was essential to achieving the goals" of the ambitious climate law.[38] The longstanding power plant siting regime, dating to the 1970s, adapted in 2011 to facilitate renewable energy has been, in Gerrard's words, "a miserable failure" due primarily to delays at the municipal level in the form of moratoria or conditions that large-scale wind and solar projects would not be able to meet.[39] When the new siting law was enacted, sixteen wind projects and forty solar projects were stalled in the approval process; one project reportedly took eight years to obtain a certificate; and no projects under the prior law had yet become

36. NC CLEAN ENERGY TECH. CTR. & DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (DSIRE), *supra* note 1. Utilities are increasingly setting internal renewable energy targets as well. *See, e.g.*, Lori Bird & Tyler Clevenger, *2019 Was a Watershed Year for Clean Energy Commitments from U.S. States and Utilities*, WORLD RES. INST. (Dec. 20, 2019), https://www.wri.org/blog/2019/12/2019-was-watershed-year-clean-energy-commitments-us-states-and-utilities [https://perma.cc/Y42C-UUY3] (accessible summary of state and utility clean energy commitments).

37. Accelerated Renewable Energy Growth and Community Benefit Act, 2020 N.Y. Exec. L. § 94-c (McKinney 2020); Climate Leadership and Community Protection Act, 2019 N.Y. Sess. Laws Ch. 106 (McKinney).

38. Michael B. Gerrard & Edward McTiernan, *New York's New Statute on Siting Renewable Energy Facilities*, N.Y. L.J., May 14, 2020, at *1.

39. *Id*. at *1–2.

operational.[40] Other projects were defeated before they were even formally proposed in the face of local opposition and "hostile local boards."[41]

The new siting law made key changes to the state's siting approach, several of which are highlighted here for their relevance to challenges common across many states. First, the law reinforces the state's centralized siting process by building governance capacity with the creation of a new Office of Renewable Energy Siting within the New York Department of State.[42]

Second, it charges the new Office with developing uniform design and operational standards, within one year of the law's effective date, to avoid environmental harm in siting.[43] These standards, in draft form as of this writing, have the potential to streamline and strengthen the application of siting and impact mitigation requirements for projects with generation capacity of twenty-five MW or more.[44] The new law also authorizes an "endangered and threatened species mitigation fund" to be used for off-site mitigation when it is possible to achieve "a net conservation benefit" for species that may be affected by a proposed project.[45] In addition to natural landscape protections, regulations also require that projects minimize and mitigate visual impacts for nearby properties.[46]

Third, and more controversially, the law seeks to retain involvement by municipalities, but constrain their role with a strengthened state override provision for local restrictions that are "unreasonably burdensome in view of the [Climate Leadership and Community Protection Act renewable energy and zero emissions] targets and the environmental benefits of the proposed major renewable energy facility."[47] Permit applicants are required to consult with host municipalities, and the project must still comply with local laws that are

40. *Id.*

41. *Id.* at *2.

42. N.Y. Exec. L. § 94-c(3)(a) (McKinney 2020).

43. *Id.* at § 94-c(3)(c) ("The uniform standards and conditions . . . shall be designed to avoid or minimize, to the maximum extent practicable, any potential significant adverse environmental impacts related to the siting, design, construction and operation of a major renewable energy facility" and "shall apply to those environmental impacts the office determines are common to each type of major renewable energy facility," such as wind, solar, geothermal, or hydroelectric).

44. *Id.* at § 94-c(2)(h) (limiting application of the Act to 25 MW and larger facilities). The regulations are available at N.Y. COMP. CODES R. & REGS. tit. 19, § 900-1 et. seq. (2021), https://ores.ny.gov/system/files/documents/2021/03/chapter-xviii-title-19-of-nycrr-part-900subparts-900-1-through-900-15.pdf [https://perma.cc/8574-Q5CF].

45. N.Y. Exec. L. § 94-c(3)(e) (McKinney 2020).

46. *See* N.Y. COMP. CODES R. & REGS. tit. 19, § 900-6.4(k).

47. N.Y. Exec. L. § 94-c(5)(e) (McKinney 2020).

not "unreasonably burdensome."[48] However, this new standard suggests that local laws designed simply to block projects may be overridden in favor of the state's climate goals. Moreover, municipalities are preempted from adding other conditions.[49]

Fourth, the new law accelerates review and permit decisions with tight, strict time limits on the approval process. The Office of Renewable Energy Siting must make a completeness determination on a permit application within sixty days, and a final permitting decision with one year of when the application is deemed complete.[50] Importantly, the new law creates a strong time-based incentive for developers to propose project sites on "an existing or abandoned commercial use, including without limitation, brownfields, landfills, former commercial or industrial sites, dormant electric generating sites, and abandoned or otherwise underutilized sites."[51] Land reuse of this kind for renewable energy siting reduces the impact on undisturbed natural landscapes—a key goal of environmental advocates—by directing projects to low-impact areas, especially already degraded lands, as The Nature Conservancy has urged.[52] The Environmental Protection Agency (EPA) RE-powering America's Lands Program helps identify sites with renewable energy potential to support state and local governments to avoid new land disturbance.[53]

This kind of development can revitalize areas with long dormant sites, including those with a history of contamination. Existing infrastructure is often available in the land reuse context, which can reduce project costs significantly. For example, EPA has identified five types of beneficial infrastructure which are commonly available to be repurposed at "former contaminated lands, landfills, and min[ing] sites"—importantly, these include "electricity transmission and distribution system equipment," road access, fencing and other physical security features, dormant power generators, and other structures, such as storm water drainage, buildings,

48. *Id.* at § 94-c(5)(b), -c(5)(c)(ii), -c(5)(e).

49. *Id.* at § 94-c(6) (providing that, "no other state agency, department or authority, or any municipality or political subdivision or any agency thereof may . . . require any approval, consent, permit, certificate, contract, agreement, or other condition for the development, design, construction, operation, or decommissioning of a major renewable energy facility with respect to which an application for a siting permit has been filed").

50. *Id.* at § 94-c(5)(b), (f).

51. *Id.* at § 94-c(5)(f).

52. MCKENNEY & WILKINSON, *supra* note 23, at 24–26 (discussing the fourth Pathway: "Programs to Promote Projects on Contaminated and Degraded Lands").

53. *See generally What is Re-Powering*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/re-powering/learn-more-about-re-powering#what [https://perma.cc/4SLL-4GWX] (last visited Mar. 9, 2021) (describing the role of EPA's RE-Powering America's Land Initiative).

and water supply connections.[54] At the same time, it can have the effect of bringing facilities closer to more populated areas, raising equity considerations in some instances and increasing the likelihood of local opposition, depending on the size and scale of the project proposed.

A fifth feature of the new law responds to this concern, with provisions focused on ensuring economic benefits accrue to the local community, not just individual property owners who may privately benefit from a lease agreement. To that end, the law requires all siting permits to include provisions for a "host community benefit" to be determined by the state public service commission.[55] These might include utility bill discounts for host communities, or other benefits that may be identified by the commission, a host community, or an applicant.[56] Examples in the regulation are "Payments in Lieu of Taxes (PILOTs), other payments pursuant to a host community agreement or other project(s) agreed to by the host community."[57] The regulation goes further to address potential impacts on environmental justice communities, defining "Environmental Justice area" as "a minority or low-income community that may bear a disproportionate share of the negative environmental consequences resulting from the siting of a major renewable energy facility."[58] Community benefit agreements have been used for some time in connection with energy and other forms of land development, but typically are not required or orchestrated at the state level—two ways in which New York's new law innovates on an existing concept.[59]

A final feature of importance is the new siting law's creation of an intervenor fund to support public participation. For each MW of generating capacity being proposed, the applicant must contribute a

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54. U.S. Env't Prot. Agency, RE-Powering America's Land Initiative Discussion Paper: The Value of Existing Infrastructure for Renewable Energy Development 2–4 (2020).

55. N.Y. Exec. L. § 94-c(5)(f) (McKinney 2020).

56. *See* Gerrard & McTiernan, *supra* note 38, at *3.

57. N.Y. COMP. CODES R. & REGS. tit. 19 § 900-6.1(f) (2021).

58. *Id.* at §§ 900-1.2(u), 900-2.20. I've addressed this particular challenge in greater depth elsewhere. *See generally* Uma Outka, *Fairness in the Low-Carbon Shift: Learning from Environmental Justice*, 82 BROOK. L. REV. 789 (2017) (arguing environmental justice considerations should factor into the low carbon shift at an early stage to better resolve fairness questions); Uma Outka, *Environmental Justice Issues in Sustainable Development: Environmental Justice in the Renewable Energy Transition*, 19 J. ENV'T & SUSTAINABILITY L. 60 (2012) (considering environmental justice in the renewable energy context).

59. For a helpful overview specific to the energy context, see U.S. Dep't of Energy, Off. of Minority Bus. & Econ. Dev., Guide to Advancing Opportunities for Community Benefits Through Energy Project Development (2017), https://www.energy.gov/sites/prod/files/2017/09/f36/CBA%20Resource%20Guide.pdf [https://perma.cc/FG9Z-AGNB]. A good general resource on community benefit agreements is the Community Benefits Law Center, available at *Welcome to Community Benefits Law Center*, Cmty. Benefits L. Ctr., https://www.forworkingfamilies.org/cblc [https://perma.cc/C5Q4-66RC] (last visited Mar. 9, 2021).

thousand dollars into the fund "for the benefit of local agencies and community intervenors."[60] The funds are to be disbursed for participation in public comment periods and public hearings.[61] The regulations define a "potential community intervenor" as any person residing within the municipality where a facility is proposed—or outside the municipality but within a "mile of a proposed solar facility or five . . . miles of a proposed wind facility"—as well as "any non-profit organization that can demonstrate a concrete and localized interest that may be affected by a proposed facility and that such interest has a significant nexus to their mission."[62] The intervenor fund concept reduces the disadvantaged position of host communities and local non-profits, especially in an accelerated review process, to engage more quickly and effectively in public participation.

Centralized state siting offers possibilities for streamlining, standardization, and efficiency, but consolidating state siting authority may not be culturally or politically viable in every state—especially those that have not already adjusted to a state-centered siting process for power plants. There are nonetheless possibilities suggested by the New York approach for these states to facilitate accelerated renewable energy development with stronger support for local governments and community members, and clear guidance for developers.

For example, states can provide centralized access to information that will assist potential host communities in considering a project proposal. Localities that do not already host energy infrastructure may not have confronted or even considered large-scale energy land uses before. When they are approached and caught off guard, it is not uncommon for a local government to impose a moratorium on large-scale renewable energy development in order to put protective measures in place.[63] States can provide model ordinances and siting conditions to localities to accelerate the local regulatory process, although localities may need an incentive to pursue this ahead of receiving a project proposal, such as funding available for baseline local lawmaking ahead of projects being proposed.[64] It is also

60. N.Y. Exec. L. § 94-c(7)(a) (McKinney 2020).

61. *Id.*

62. N.Y. COMP. CODES R. & REGS. tit. 19 § 900-1.2(bh).

63. *See, e.g.*, SABIN CENTER FOR CLIMATE CHANGE LAW, OPPOSITION TO RENEWABLE ENERGY FACILITIES IN THE UNITED STATES (Feb. 2021), https://climate.law.columbia.edu/sites/default/files/content/Opposition%20to%20Renewable%20Energy%20Facilities%20in%20the%20US%202%2023%2021.pdf [https://perma.cc/J6FW-2SGV] (providing state by state summaries).

64. *See, e.g.*, NW. WIND RES. & ACTION CTR., WIND ENERGY PERMIT TOOLKIT (2015), https://sparknorthwest.org/wp-content/uploads/WindPermitToolkit_WA_Sept-2015.pdf [https://perma.cc/23XW-39M3] (explaining the basics for standardizing zoning to support wind

common for misinformation about renewable energy—particularly wind farms—to be circulated in communities by individuals who oppose a project. States can help ensure that localities have reliable, trustworthy sources of information as they evaluate both project proposals and concerns raised by members of the public. In Kansas, for example, a state without centralized siting except for nuclear power plants and transmission lines, the non-profit Climate + Energy Project and the Kansas Association of Counties held workshops for elected officials across the state to educate local officials about wind energy.[65] To do this, they partnered with the state Department of Commerce and Department of Wildlife, Parks and Tourism, as well as representatives from the wind industry and university research, to traverse the state presenting to local officials a primer on the wind industry, from the siting process to wildlife and property concerns, as well as economic impacts. There are significant economic benefits for the broader local community and the state as a result of large-scale renewable energy development, yet states without centralized siting regimes can do more to help ensure host communities benefit from projects.

Measuring economic benefits and effectively sharing the information is one way to help counter misinformation and mistrust, building support for renewable energy. In Indiana, for example, where renewable energy development has been slower than in Kansas, researchers studied the local economic impact from wind and documented significant benefits.[66] The study found that although "wind energy is associated with skepticism, suspicion, and opposition" in some areas of the state, "wind farms bring geographically diverse and long-lasting benefits, including millions of dollars in property tax revenue, annual lease payments for Indiana's

development); KAN. ENERGY COUNCIL, WIND ENERGY SITING HANDBOOK: GUIDELINE OPTIONS FOR KANSAS CITIES AND COUNTIES (2005), http://www.kansasenergy.org/Kansas_Siting_Guidelines.PDF [https://perma.cc/CJ8W-R727]; *Knowledgebase Collection: Solar Energy*, AM. PLAN. ASS'N, https://www.planning.org/knowledgebase/solar/ [https://perma.cc/ETG2-KXUS] (last visited Mar. 9, 2021) (containing model ordinances and guidebooks for local governments).

65. The author serves as a member of the board of directors for the Climate + Energy Project, a Hutchinson, Kansas based non-partisan 501(c)3 organization working to find practical solutions for a clean energy future in Kansas.

66. *See* Z. Bednarikova, R. Hillberry, N. Nguyen, I. Kumar, T. Inani, M. Gordon & M. Wilcox, An Examination of the Community Level Dynamics Related to the Introduction of Wind Energy in Indiana (2020), https://cdext.purdue.edu/wp-content/uploads/2020/09/Wind-Energy_Final-report.pdf [https://perma.cc/MQ8V-WS7C]. Most current data from American Clean Power reports Indiana has 3,284 MW, compared to 6,542 MW in Kansas. *Compare Clean Power Indiana*, Am. Clean Power (Feb. 2021), https://cleanpower.org/wp-content/uploads/2021/02/Indiana-clean-energy-factsheet.pdf [https://perma.cc/KDG4-79GE] (describing Indiana's clean energy output), *with Clean Power Kansas*, Am. Clean Power (Feb. 2021), https://cleanpower.org/wp-content/uploads/2021/01/Kansas-clean-energy-factsheet.pdf [https://perma.cc/GV6W-Y289] (describing Kansas' clean energy output).

farmers, and well-paid maintenance and construction jobs. . . ."[67] Similarly, researchers in Ohio—another state that has been slower to develop renewables—released a study last year on the economic impacts of utility-scale solar in the state, projecting annual tax revenues exceeding sixty-seven million dollars per year with aggressive development, bringing "high value to Ohio" and "keeping many millions of dollars within the state."[68]

Yet even in states like Kansas that have been leaders in renewable energy development—Kansas is among the top two states (with Iowa) for the highest percentage of electricity generation from wind—information about economic benefits is important.[69] Confusion and misinformation about wind farms is still common, even though 30 counties in Kansas already host wind facilities and wind grew from being a negligible percentage to over forty-one percent of the state's portfolio between 2010 and 2019.[70] Data from the American Clean Power (formerly the American Wind Energy Association) shows wind power has brought over eleven billion dollars of investment into the state.[71] Statewide in Kansas, over 3,000 jobs are associated with the clean energy industry.[72] In Colorado, a study of the economic impact of a 600 MW wind farm spanning four counties traced the combined effect of tax revenue for local governments combined with lease payments to local farmers and ranchers, permit fees, sales and use taxes, construction jobs, and longer term jobs paying in the range of $64,000 per year—a salary 9.5% higher than the average in the

67. BEDNARIKOVA ET AL., *supra* note 66, at 5.

68. GILBERT MICHAUD, CHRISTELLE KHALAF, MICHAEL ZIMMER & DAVID JENKINS, MEASURING THE ECONOMIC IMPACTS OF UTILITY-SCALE SOLAR IN OHIO 23 (2020), https://www.ohio.edu/voinovich-school/sites/ohio.edu.voinovich-school/files/sites/voinovichschool/files/Michaud%20G.%20et%20al.%20(2020).%20Measuring%20the%20Economic%20Impacts%20of%20Utility-Scale%20Solar%20in%20Ohio%20%20FINAL%20REPORT%2C%208.31.2020.pdf [https://perma.cc/9WKN-MUFN].

69. The two states both generate roughly forty-one percent of in-state electricity from wind power and have switched back and forth between the number one and number two position. *See Governor Laura Kelly Announces Kansas Receives National Recognition for Wind Energy Production, Capacity*, KAN. DEP'T OF COM. (Jan. 11, 2021), https://www.kansascommerce.gov/2021/01/governor-laura-kelly-announces-kansas-receives-national-recognition-for-wind-energy-production-capacity/ [https://perma.cc/2Y64-6QLW] ("In 2020, Kansas reclaimed the top spot it held in 2018 in percentage of energy generated by wind, as it was No. 2 in 2019 behind Iowa. Kansas also increased its installed wind power capacity significantly in 2020 in claiming the fourth-place spot."); *Clean Power Kansas*, AM. CLEAN POWER (Feb. 2021), https://cleanpower.org/wp-content/uploads/2021/01/Kansas-clean-energy-factsheet.pdf [https://perma.cc/GDH2-HMVS]; *Clean Power Iowa*, AM. CLEAN POWER (Feb. 2021), https://cleanpower.org/wp-content/uploads/2021/01/Iowa-clean-energy-factsheet.pdf [https://perma.cc/79GP-Z6S7].

70. *Clean Power Kansas*, AM. CLEAN POWER (Feb. 2021), https://cleanpower.org/wp-content/uploads/2021/01/Kansas-clean-energy-factsheet.pdf [https://perma.cc/GDH2-HMVS].

71. *Id.*

72. *Id.*

four counties, and more than twelve percent higher than the state average.[73] The research found the project generated $280 million for the state in just the construction period, boosted by the use of in-state manufacturing of turbines.[74] Research on the effect of wind farms on residential property values—which in Kansas found no statistically significant impact up or down—may also help ease the concerns of non-leasing property owners.[75]

Emphasis on local economic benefits has the potential to improve local responses to project proposals, neutralize stereotypes that only individuals who earn royalties from leasing land stand to gain, and build support based on a clear and tangible benefit to be gained by the community more broadly. As the researchers in Indiana noted, a key challenge is "to design policies that spread the economic benefits of the sector more widely and to communicate the ends and means of those policies more clearly."[76] Direct payments to the local government is the most obvious, but other approaches include local employment and procurement, discounted electricity, a community enhancement fund, or co-ownership.[77] One way a state could do this would be to provide models similar to New York's required host community benefit concept and appoint a state office with the task of assisting communities and

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73. Jeremy Stefek, Anna Kaelin, Suzanne Tegen, Owen Roberts & David Keyser, Economic Impacts from Wind Energy in Colorado Case Study: Rush Creek Wind Farm 6–7 (2019), https://www.nrel.gov/docs/fy19osti/73659.pdf [https://perma.cc/QE2W-J5HR].

74. *Id.* at 74. The long-term impact during operation is modeled as "180 long-term jobs and $20 million in GDP" per year over 25-years of operation. *Id.*

75. WICHITA STATE UNIV. CTR. FOR ECON. DEV. & BUS. RSCH., WIND PROJECT EFFECTS ON KANSAS COUNTIES' PROPERTY VALUES (2019), https://www.greaterhutch.com/media/userfiles/subsite_24/files/Wind%20Power%20Property%20Value%20Analysis.pdf [https://perma.cc/6VN4-DJ3Y]; *see also* CAROL ATKINSON-PALOMBO & BEN HOEN, RELATIONSHIP BETWEEN WIND TURBINES AND RESIDENTIAL PROPERTY VALUES IN MASSACHUSETTS 4 (2014), https://eta-publications.lbl.gov/sites/default/files/lbnl-6371e.pdf [https://perma.cc/9PBS-6UGR] (finding "results do not support the claim that wind turbines affect nearby home prices"); BEN HOEN, JASON P. BROWN, THOMAS JACKSON, RYAN WISER, MARK THAYER & PETER CAPPERS, A SPATIAL HEDONIC ANALYSIS OF THE EFFECTS OF WIND ENERGY FACILITIES ON SURROUNDING PROPERTY VALUES IN THE UNITED STATES 35 (2013), https://www.energy.gov/sites/prod/files/2013/12/f5/2013_wind_property_values.pdf [https://perma.cc/B9BZ-HNNA] (finding "there is no evidence that homes near operating or announced wind turbines are impacted in a statistically significant fashion"); BEN HOEN, RYAN WISER, PETER CAPPERS, MARK THAYER & GAUTAM SETHI, THE IMPACT OF WIND POWER PROJECTS ON RESIDENTIAL PROPERTY VALUES IN THE UNITED STATES: A MULTI-SITE HEDONIC ANALYSIS 75 (2009), https://eta-publications.lbl.gov/sites/default/files/report-lbnl-2829e.pdf [https://perma.cc/RJF9-DQ9Y] (finding "no evidence . . . that home prices surrounding wind facilities are consistently, measurably, and significantly affected by either the view of wind facilities or the distance of the home to those facilities").

76. BEDNARIKOVA ET AL., *supra* note 66, at 44.

77. Elana Fox, Emily Futcher, Augusta Gudeman & Monika Johnson, Beyond Renewable: Incorporating Social Sustainability & Community Benefits into Renewable Energy Projects 7 (2018), https://www.groundworkcenter.org/wp-content/uploads/originals/ae7gokye8tvmnsp2igf3.pdf [https://perma.cc/7R8R-JPQV].

developers in defining a community benefit that meets local needs. Wind developers often pursue economic development agreements for individual projects, but state support and guidance for community groups and local governments, especially those with very small staffs, as they evaluate proposals, could accelerate the approval process by helping secure meaningful benefits for the community and building trust in the process.[78] Importantly, however, as the Department of Energy stresses that in supporting community benefit agreements in the energy development context, state and local governments must "[r]espect the negotiating process and honor community coalition agreements."[79] A nationwide survey of 1,705 "wind power project neighbors" analyzed with reference to the academic literature found compensation increases positive perceptions of wind projects combined, even more importantly, with perceived distributive and procedural fairness in negotiations and the approval process.[80] Overall, the survey found positive attitudes outweighed negative attitudes by a ratio of 7:1.[81] State and local governments' active engagement in creating an approval process that is procedurally just and equitable in the distribution of benefits is going to be more important in the years ahead.[82]

Finally, states with local control can still assist the siting process with methods that complement and support efforts undertaken at the local level to encourage siting that will protect wildlife and natural resources and foster land reuse. If there is no centralized framework through which to steer siting to degraded land, as New York's new law seeks to do, local governments can proactively identify such sites, and state environmental

78. *See generally* Mhairi Aitken, *Wind Power and Community Benefits: Challenges and Opportunities*, 38 ENERGY POL'Y 6066, 6073–74 (2010) (describing case-study based research in the UK which also supports the concept of institutionalized guidance for community benefit agreements).

79. U.S. Dep't of Energy & Off. of Minority Bus. & Econ. Dev., *supra* note 59, at 8.

80. *See* Jeremy Firestone, Ben Hoen, Joseph Rand, Debi Elliott, Gundula Hübner & Johannes Pohl, *Reconsidering Barriers to Wind Power Projects: Community Engagement, Developer Transparency and Place*, 20:3 J. OF ENV'T POL'Y & PLAN. 370, 371, 374 (2018) (explaining that "[w]hether the decision to build a local wind project is considered 'fair' by local community members is influenced by both the outcome (distributive justice)—the wind project itself and how its effects are distributed—and the process (procedural justice)—the extent and depth of public participation and decision-making processes—that is, its legitimacy") (internal citations omitted); *see also* Ben Hoen, Jeremy Firestone, Joseph Rand, Debi Elliott, Gundula Hübner, Johannes Pohl, Ryan Wiser, Eric Lantz, T. Ryan Haac & Ken Kaliski, *Attitudes of U.S. Wind Turbine Neighbors: Analysis of a Nationwide Survey*, 134 ENERGY POL'Y 110981, 7–10 (2019) [hereinafter *Attitude of U.S. Wind Turbine Neighbors*] (recognizing compensation is important but "not a panacea," and that perceived fairness is even more significantly associated with positive perceptions).

81. Attitude of U.S. Wind Turbine Neighbors, supra note 80, at 4.

82. This proposition finds support in recent community-scale research in Michigan focused on wind farms. *See* Sarah Banas Mills, Douglas Bessette & Hannah Smith, *Exploring Landowners' Post-Construction Changes in Perceptions of Wind Energy in Michigan*, 82 LAND USE POL'Y 754, 762 (2019).

offices, or regional offices of the EPA, can provide consultation to ensure the safety of developing previously contaminated properties. Conversely, states and localities can map and avoid environmentally important lands where appropriate, like the state of Massachusetts did in implementing 2016 renewable energy legislation, providing incentives for solar energy developers based on land categories and making certain lands ineligible.[83] Conservation organizations have done much of the baseline work needed to make these determinations about land suitability.[84]

In sum, states can modernize law and policy to facilitate responsible and accelerated renewable energy siting, whether by updating a centralized siting regime as New York has done, or by more effectively partnering with localities to advance renewable energy development with community support. With the election of President Biden, which marks a decisive change in policy to reinstate climate action as a national priority early in the decade, states may soon find themselves pushed at the federal level to facilitate renewable energy development. Although a federal siting model is certainly one possible way to accelerate project timetables, the long-standing primacy of state and local governments in land use law seems unlikely to change.[85] Yet siting is only one facet of energy planning, and the need for strategic planning at the federal and state level has intensified. It is concerning that some states still do not have a functioning state energy office or state energy plan, nor have states with energy plans uniformly updated them to address pressing issues like grid modernization, the low carbon shift, environmental justice, energy-based economic development and industry transitions, energy efficiency, and

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83. *See* Solar Massachusetts Renewable Target Program, *Guideline Regarding Land Use, Siting, and Project Segmentation*, 225 C.M.R. 20.00(5) (2020) (making ineligible for incentives lands identified as "Core Habitat," "Priority Habitat," and "Critical Natural Landscape"). This approach is highlighted in MCKENNEY & WILKINSON, *supra* note 23, at 26.

84. For example, The Nature Conservancy developed a detailed interactive mapping resource, Site Wind Right, which received a Climate Adaptation Leadership Award for Natural Resources from the Association of Fish and Wildlife Agencies. *See Site Wind Right: Accelerating a Clean, Low-Impact Energy Future*, THE NATURE CONSERVANCY (updated Nov. 16, 2020), https://www.nature.org/en-us/what-we-do/our-priorities/tackle-climate-change/climate-change-stories/site-wind-right/?vu=sitewindright [https://perma.cc/47A5-TFHR]; *Hise Obermeyer Receive Fish Wildlife Agencies Award*, THE NATURE CONSERVANCY (Sept. 24, 2019) https://www.nature.org/en-us/newsroom/hise-obermeyer-receive-fish-wildlife-agenciesaward/ [https://perma.cc/RC4V-3KP2] (describing the leadership award and the recipients).

85. *See, e.g.*, Patricia E. Salkin & Ashira Pelman Ostrow, *Cooperative Federalism and Wind: A New Framework for Achieving Sustainability*, 37 HOFSTRA L. REV. 1049, 1086–87 (2009). I discuss the primacy of state and local government in more depth in prior work and do not repeat that here. *See Footprint*, *supra* note 2 at 254–56, 286–96. For helpful overviews of the origins and basic land use regulation, see Craig Anthony Arnold, *The Structure of the Land Use Regulatory System in the United States*, 22 J. LAND USE & ENV'T L. 441, 448–60 (2007) and John R. Nolon, *Historical Overview of the American Land Use System: A Diagnostic Approach to Evaluating Governmental Land Use Control*, 23 PACE ENV'T L. REV. 821, 821–34 (2006).

infrastructure resilience.[86] Siting renewable energy and related economic development are both inherently anchored to local conditions. State law and policy reforms with respect to siting and community impact will be especially important to accelerating renewable energy projects responsibly for communities and the local environment.

III. RENEWED FEDERAL AMBITION FOR SITING ON PUBLIC LANDS AND WATERS

The renewable energy potential on federal lands has been well-documented, yet the progress slowed during the Trump Administration as the Department of the Interior and, within it, the Bureau of Land Management (BLM), has been more focused on promoting fossil fuels.[87] At the start of this critical decade, with a new presidential administration, the time is ripe for renewed ambition for renewable energy development. This is especially true given that developing resources on public lands has bipartisan support. This was recently demonstrated with a 2019 bill proposed in the U.S. Senate, the Public Land Renewable Energy Development Act, suggesting assertive new policy by Congress and internally at Department of the Interior can play an important role in accelerating renewable energy.[88] Wind development offshore likewise holds tremendous resource potential, and yet the United States continues to lag far behind other coastal nations in harnessing the resource.[89] Accelerating renewable energy siting on public lands and waters will be a critical complement to new projects developed on private land.

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86. *See Statewide Comprehensive Energy Plans*, NAT'L ASS'N OF ST. ENERGY OFFS. (NASEO), https://naseo.org/stateenergyplans [https://perma.cc/YAX7-23F6] (last visited Mar. 9, 2021) (showing the following states as lacking a state energy plan: Alabama, Florida, Illinois, Kansas, Louisiana, South Dakota, Tennessee, and Wisconsin). According to NASEO, 30 states have energy "plans that were initiated through state legislation or executive order," while 12 were initiated by the state "[g]overnor (without executive order) or created by a state agency." NASEO, NASEO'S STATE ENERGY PLANNING GUIDELINES: GUIDANCE FOR STATES IN DEVELOPING COMPREHENSIVE ENERGY PLANS AND POLICY RECOMMENDATIONS 13 (2018).

87. *See* Nicole Gentile & Kate Kelly, Ctr. for Am. Progress, The Trump Administration is Stifling Renewable Energy on Public Lands and Waters (2020); Nikki Springer & Alex Daue, Key Economic Benefits of Renewable Energy on Public Lands 5 (2020) (noting that "progress on [renewable energy] implementation has slowed drastically in recent years").

88. Public Land Renewable Energy Development Act of 2019, S. 2666, 116th Cong. (2019); companion H.R. 3794, 116th Cong. (2019).

89. *See* Walter Musial, Philipp Beiter, Paul Spitsen, Jake Nunemaker, Vahan Gevorgian, Aubryn Cooperman, Rob Hammond & Matt Shields, 2019 Offshore Wind Technology Data Update 29 (2020), https://www.nrel.gov/docs/fy21osti/77411.pdf [https://perma.cc/WDA6-UFE3] (noting that the United Kingdom, Germany, China, Denmark, Belgium, and the Netherlands are currently the world leaders in offshore wind energy).

A. Renewable Energy Siting on Public Lands

As of 2019, ninety-six utility-scale renewable energy facilities were operational on federal public lands, with a generating capacity of over 5,000 MW,[90] and additional projects have been approved for construction.[91] Approvals have been slow, however, when it should be simpler with a single landowner, the federal government. According to American Clean Power (formerly the American Wind Energy Association), despite the strong wind resource on public lands, "only one percent of installed wind energy capacity in the U.S. is on federal public lands and waters."[92] The BLM manages vast landscapes with wind and solar potential—over "20 million acres of public lands with wind energy potential in 11 western states"[93] and "19 million acres of public lands with excellent solar energy potential" across six states.[94] There is also geothermal energy potential on public lands.[95]

The path forward to accelerate responsible renewable energy development on public land is fairly clear—significant groundwork has been laid through the designation of leasing areas based on environmental conditions and resource potential across federally managed lands. In 2012, the BLM finalized a Western Solar Plan, with seventeen designated leasing areas (DLAs) based on suitability criteria, prioritizing 285,000 acres in Solar Energy Zones "for utility-scale production of solar energy."[96] A similar, if more basic, program was put in place earlier for

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90. SPRINGER & DAUE, *supra* note 87, at 10.

91. *Public Land Renewable Energy Development Act: Hearing on S. 2666 Before the S. Comm. on Energy and Nat. Res.*, 116th Cong. (2019) (statement of Bureau of Land Mgmt., U.S. Dep't of the Interior), https://www.doi.gov/ocl/s-2666 [https://perma.cc/P3UW-S489] (reporting "BLM has approved over 125 renewable energy projects with the potential to provide nearly 18,000 megawatts (MW) of generation capacity").

92. AM. WIND ENERGY ASS'N, *supra* note 22, at 23.

93. *Wind Energy*, U.S. DEP'T OF THE INTERIOR, BUREAU OF LAND MGMT., https://www.blm.gov/programs/energy-and-minerals/renewable-energy/wind-energy [https://perma.cc/QA3K-G595] (last visited Mar. 9, 2021).

94. U.S. DEP'T OF THE INTERIOR, BUREAU OF LAND MGMT., BLM FACT SHEET: RENEWABLE ENERGY: SOLAR (2018), https://www.blm.gov/sites/blm.gov/files/Solar%20Fact%20Sheet.pdf [https://perma.cc/MS8S-S5M8].

95. U.S. DEP'T OF THE INTERIOR, BUREAU OF LAND MGMT., BLM FACT SHEET: RENEWABLE ENERGY: GEOTHERMAL, (2018), https://www.blm.gov/sites/blm.gov/files/Geothermal%20Fact%20Sheet.pdf [https://perma.cc/SEW3-QT5P].

96. *See* U.S. Dep't of the Interior, Bureau of Land Mgmt., Approved Resource Management Plan Amendments/Record of Decision (ROD) for Solar Energy Development in Six Southwestern States 2, 37 (2012). All documents related to the Western Solar Plan are available on a specialized website, see *Solar Energy Program: Western Solar Plan*, Bureau of Land Mgmt., https://blmsolar.anl.gov [https://perma.cc/N5R6-7HME] (last visited Mar. 9, 2021).

wind development.[97] In 2016, the BLM took two additional important steps: finalizing a Solar and Wind Energy Rule[98] and a Desert Renewable Energy Conservation Plan, covering ten million acres in California.[99] The Solar and Wind Energy Rule created incentives for developers to propose projects in vetted DLAs, streamlined the lease approval process in these areas, and simplified fees and financing for projects.[100]

The BLM will be able to reinvigorate these programs to make up for lost time, picking up where the Obama Administration left off, replenishing depleted funding for project review, and setting new, more ambitious targets. Likewise, the Bureau of Indian Affairs, also within the Department of the Interior, is in a position to better support tribes that wish to develop renewable energy potential on sovereign tribal lands.[101] However, if Congress enacts the bipartisan legislation that has been pending for some time—the proposed Public Land Renewable Energy Development Act—it would set new, more rapid development in motion. The bill sets a goal to "authorize production of not less than 25 gigawatts of electricity from wind, solar, and geothermal energy projects by not later than December 31, 2025."[102] Other noteworthy changes contained in the proposed bill include:

- Defining compliance with the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.) for solar, wind, and geothermal energy by supplementation to existing programmatic environmental impact statements previously finalized for each resource (in 2012, 2005, and 2008

97. *See* U.S. Dep't of the Interior, Bureau of Land Mgmt., Record of Decision: Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments (2005). For a helpful overview of this history, see Michael B. Gerrard, *Legal Pathways for a Massive Increase in Utility-Scale Renewable Generation Capacity*, 47 Env't L. Rep. News & Analysis 10591, 10594–98 (2017).

98. Competitive Processes, Terms, and Conditions for Leasing Public Lands for Solar and Wind Energy Development and Technical Changes and Corrections, 81 Fed. Reg. 92122 (Jan. 18, 2017) (to be codified at 43 C.F.R. pt. 2800, 2880).

99. For documents associated with the Desert Renewable Energy Conservation Plan, see *Desert Renewable Energy Conservation Plan*, U.S. DEP'T OF THE INTERIOR, BUREAU OF LAND MGMT., https://www.blm.gov/programs/planning-and-nepa/plans-in-development/california/desert-renewable-energy-conservation-plan [https://perma.cc/2JED-XYM5] (last visited Mar. 9, 2021).

100. For a helpful summary of the Solar and Wind Energy Rule with supporting documents, see *Solar and Wind Energy Rule*, U.S. DEP'T OF THE INTERIOR, BUREAU OF LAND MGMT., https://www.blm.gov/programs/energy-and-minerals/renewable-energy/laws/solar-and-wind-energy-rule [https://perma.cc/2HH4-739H] (last visited Mar. 9, 2021).

101. For more on this topic, see in this Symposium volume, Elizabeth Ann Kronk Warner, *Renewable Energy Depends on Tribal Sovereignty*, 69 U. KAN. L. REV. 835–36 (2021). For more on the challenges tribes have faced in seeking to develop renewable resources on tribal land, see Elizabeth Ann Kronk Warner, *Tribal Renewable Energy Development Under the Hearth Act: An Independently Rational, But Collectively Deficient, Option*, 55 ARIZ. L. REV. 1031, 1041–48 (2013).

102. Public Land Renewable Energy Development Act of 2019, S. 2666, 116th Cong. § 8 (2019).

respectively);[103]

- Clarifying that additional review under NEPA for projects is not required if they have "been sufficiently analyzed by a programmatic environmental impact statement"; [104]
- Mandating establishment of a National Renewable Energy Coordination Office[105] to assure efficient siting and requiring a memorandum of understanding between the Secretaries of the Interior, Defense, and Agriculture to "expedite the environmental analysis of applications for projects" in priority areas;[106]
- Requiring staff with "particular expertise" in enumerated areas of law relevant to project siting reviews, including federal responsibilities under Endangered Species Act (16 U.S.C. § 1536), permit requirements under the Clean Water Act (33 U.S.C. § 1344), the Federal Land Policy and Management Act (43 U.S.C. § 1701 et seq.), the Migratory Bird Treaty Act (16 U.S.C. § 703 et seq.), and more to be identified; [107]
- Establishes a Renewable Energy Resource Conservation Fund for use in "restoring and protecting" fish and wildlife habitat and water resources affected by renewable energy development.[108]

Conservation organizations support this bipartisan legislation with its aim to accelerate siting approvals for renewable energy projects on federal public lands informed with appropriate expertise and wildlife protections.[109] With sufficient staffing and resources, accomplishing the goals outlined in the legislation is achievable.

It is worth noting as well that, although not to the scale of federal public lands, the renewable energy potential on state lands is often overlooked. As I have explained elsewhere, although the legal contexts for state and federal lands differ in important ways—and also vary state

103. *Id.* at § 3(d).
104. *Id.* at § 4(a).
105. *Id.* at § 5(a)(2).
106. *Id.* at § 5(b)(1).
107. *Id.* at § 5(c)(1).
108. *Id.* at § 9(c).
109. *See, e.g.*, SPRINGER & DAUE, *supra* note 87, at 26–27; Joshua Axelrod, *Senate Looks to Modernize Renewable Energy on Public Land*, NRDC (Oct. 23, 2019), https://www.nrdc.org/experts/josh-axelrod/senate-looks-modernize-renewable-energy-public-land [https://perma.cc/QG4F-GCKV].

by state—state lands have long been important for energy development.[110] State-owned lands fall in a number of different categories, including state trust lands, sovereign state lands, and state forests and parks.[111] State lands have been used for oil and gas extraction and coal mining, and now are also being developed for renewable energy.[112] Research by the Environmental Law Institute (ELI) found that approximately half of the states had wind projects operating on or in the process of being sited on state lands, and that was ten years ago.[113] Although a state-by-state analysis of reforms to accelerate renewables on state lands is beyond the scope of this article, the ELI recommendations are as relevant now as they were then: states that have not done so should (1) assess state-owned lands and waters to determine where renewable energy facility siting is feasible and compatible; and (2) assess and modernize state lands planning as appropriate to ensure land management and leasing regimes can support renewable energy projects.[114]

B. Siting for Wind Energy Offshore

At the start of this critical decade, offshore renewable energy still represents mostly unrealized potential. Wind is the most significant offshore resource near-term, and key to accelerating offshore wind development will be state and federal cooperation on responsible expedited siting.[115] Coastal states' submerged land offshore extends three miles before exclusive federal control begins.[116] The submerged lands beyond state waters is a vast offshore extension of federal lands with both fossil and renewable energy resources, managed by the Department of the

110. *See* Uma Outka, *State Lands in Modern Public Land Law*, 36 STAN. ENV'T L.J. 147, 203–11 (2017).

111. *See* Env't L. Inst., Siting Wind Facilities on State-Owned Lands and Waters 2 (2011).

112. See id.

113. *Id.* at 1.

114. *Id.* at 3.

115. Ocean wave and tidal energy systems are not yet commercialized. *See generally Marine Energy Program*, OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, U.S. DEP'T OF ENERGY, https://www.energy.gov/eere/water/marine-energy-program [https://perma.cc/8UPZ-LA8W] (last visited Mar. 9, 2021) (discussing the challenges that impede marine energy development); *see also* Int'l Water Power & Dam Constr., *How are Major Wave and Tidal Energy Projects Progressing Around the World?*, NS ENERGY (Oct. 26, 2020), https://www.nsenergybusiness.com/features/tidal-energy-projects-2020/ [https://perma.cc/Q9VA-8RU6] (discussing development in wave and tidal energy).

116. Congress conveyed this title to states in the Submerged Lands Act of 1953, 43 U.S.C. § 1301. The Act states that "title to and ownership of the lands beneath navigable waters within the boundaries of the respective States . . . [are] vested in and assigned to the respective States." *Id.* at § 1311(a). These boundaries shall not extend "more than three geographical miles into the Atlantic Ocean or the Pacific Ocean, or more than three marine leagues into the Gulf of Mexico." *Id.* at § 1301(b).

Interior's Bureau of Ocean Energy Management (BOEM).[117] In ways similar to how the BLM has identified priority leasing areas within federal lands onshore, the BOEM has designed leasing areas offshore in U.S. waters for wind projects.[118]

Offshore wind development will be a key source of electricity generation on the modern grid, with the possibility of direct supply of electric power to the coastal population centers. With nearly half of the U.S. population living along the coast,[119] offshore wind avoids the need to site transmission lines across multiple states to bring wind power from the Great Plains states across long distances. Winds offshore are also "generally stronger and more consistent," according to the BOEM, creating increased demand for offshore wind.[120] The Department of Energy estimates the technical resource potential for offshore wind to be over 2,000 GW—nearly double the current total U.S. electricity use.[121] Although there is still only one small, operational offshore wind project, the Block Island Wind Farm off the coast of Rhode Island, there has been massive investment in planning for large scale offshore wind facilities that will dramatically increase offshore electricity generation.[122] There is now over 28,000 MW of offshore wind capacity represented by projects in the pipeline for federal lease areas, mostly along the Atlantic Coast.[123] Between 2018 and 2019, the number of projects with site control in lease areas and electric power off-take agreements grew by more than 200 percent.[124]

Although states have a role in the management of federal lands within their boundaries, state-federal cooperation and coordination is paramount

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117. For more on how the Outer Continental Shelf relates to federal public lands onshore and an overview of the history of marine spatial planning, see generally Robin Kundis Craig, *An Historical Look at Planning for the Federal Public Lands: Adding Marine Spatial Planning Offshore*, 6 GEO. WASH. J. ENERGY & ENV'T L. 1, 9–20 (2015).

118. *See* U.S. Dep't of Energy & U.S. Dep't of the Interior, National Offshore Wind Strategy: Facilitating the Development of the Offshore Wind Industry in the United States 10–11 (2016).

119. NOAA, *What Percentage of the American Population Lives Near the Coast?*, NAT'L OCEAN SERV., https://oceanservice.noaa.gov/facts/population.html [https://perma.cc/JED8-VZZS] (stating that in 2014, around 40% of the population resided in "coastal areas [that] account for less than 10% of the total land in the contiguous United States") (last updated Feb. 26, 2021).

120. *Renewable Energy Fact Sheet*, BUREAU OF OCEAN ENERGY MGMT. (2021), https://www.boem.gov/sites/default/files/documents/newsroom/fact-sheets/BOEM-FactSheet-Renewable.pdf [https://perma.cc/7KCV-KS2E].

121. U.S. Dep't of Energy & U.S. Dep't of the Interior, *supra* note 118, at 7, 9.

122. Am. Wind Energy Ass'n, U.S. Offshore Wind Industry Status Update (2020) (on file with author).

123. *See* MUSIAL ET AL., *supra* note 89, at 8–9. The offshore wind projects included in this figure were at various stages of development in 2019: 30 MW operating; 12 MW under construction; 6,439 MW sited and in the permitting stage; 17,440 MW under site control; and 4,600 MW in the planning phase. *Id.* at 9–10.

124. *Id.* at 8.

to offshore wind's future, given the jurisdictional and geographic context for developing offshore facilities.[125] A project in U.S. waters must cross state waters to reach the shore. As more coastal states have set ambitious renewable energy targets, states' interest in facilitating offshore projects has notably increased. There are now 11 states actively coordinating with BOEM on the projects in the offshore wind pipeline.[126] Offshore wind projects within state waters are also in progress, implicating state sovereign and offshore submerged state lands.[127]

Conservation organizations have joined together in support of offshore wind development stressing the need to site projects to minimize disturbance to coastal and marine wildlife.[128] One of the most important ways to avoid project delays and accelerate development is for state and federal siting offshore to heed these groups' guidance: (1) siting "outside important and sensitive habitats;" (2) minimizing and mitigating underwater noise by scheduling construction when sensitive animals are not present and taking sound muffling measures; (3) limiting ship speeds in siting areas during construction and maintenance to avoid strikes with wildlife; and (4) employing smart turbine design and light management to minimize bird collisions and migration patterns relevant to a siting choice.[129] Opposition from coastal communities poses challenges, not unlike those discussed in section II, although there will not typically be as significant a local government role in approving an offshore facility in state or federal waters. As with siting on federal lands onshore, staffing with appropriate expertise and resources will be critical over the next decade to choose environmentally suitable sites and accelerate the approval process.

IV. EVOLVING ISSUES FOR SITING

As the electricity sector evolves, new siting issues are emerging that

125. The Coastal Zone Management Act, 16 U.S.C. §§ 1451–67, structures state-federal interaction on coastal zones and supports states to develop comprehensive management plans for coastal resources.

126. MUSIAL ET AL., *supra* note 89, at 11.

127. *See, e.g.*, *Offshore Wind Applications in State Waters*, CAL. ST. LANDS COMM'N (Jan. 25, 2021), https://www.slc.ca.gov/renewable-energy/offshore-wind-applications/ [https://perma.cc/Q84U-PCZP] (discussing applications for floating offshore wind facilities and relevant state regulatory context).

128. *See, e.g.*, NAT'L RES. DEF. COUNCIL, HARNESSING THE WIND: HOW TO ADVANCE WIND POWER OFFSHORE 1–2 (2019), https://www.nrdc.org/sites/default/files/harnessing-wind-advance-wind-power-offshore-ib.pdf [https://perma.cc/5H3V-EX58] (NRDC is joined in the brief by the National Audubon Society, Defenders of Wildlife, Conservation Law Foundation, Southern Environmental Law Center, Surfrider Foundation, and other organizations).

129. *Id.* at 3–4.

federal, state, and local levels of government must prepare to address by adapting siting regimes to meet new opportunities. This section highlights key issues for siting in the face of technology innovations and new priorities: hybrid renewables, energy storage, and hydropower.

A. New Hybrid Renewable Energy Facilities and Energy Storage

Until recently, a renewable energy facility was typically based on one resource: wind, solar, geothermal, or hydropower. Increasingly, however, hybrid facilities are being developed that incorporate more than one type of renewable energy and/or storage technology, such as large-scale battery storage. An early example in the United States is Enel Green Power North America's Stillwater hybrid power plant outside Fallon, Nevada, which combines geothermal energy with 240 acres of photovoltaic solar panels and concentrated solar thermal technology using parabolic mirrors to increase the power plant output.[130]

It is becoming more common to combine wind and solar technologies to more effectively harness renewable energy through the day and night, as peak resource potentials transition between the sun and wind. Over 4.5 GW of hybrid capacity—wind and solar, but in some instances also oil and gas, co-located with battery storage—has already been developed in the United States, and the upward trend continues.[131] Whereas nineteen renewable/storage facilities were sited together in 2016, that number rose to fifty-three in 2019, and the U.S. Energy Information Administration (EIA) projects "the number of co-located sites may double by 2023 from

130. Scott Stark, *This Hybrid Power Plant Combines 3 Clean Energy Sources in One*, U.S. DEP'T OF ENERGY (Oct. 19, 2016), https://www.energy.gov/articles/hybrid-power-plant-combines-3-clean-energy-sources-one [https://perma.cc/5SM3-592Q].

131. *See* Ryan Wiser, Mark Bolinger, Will Gorman, Joe Rand, Seongeun Jeong, Joachim Seel, Cody Warner & Ben Paulos, Lawrence Berkeley Nat'l Lab'y, Hybrid Power Plants: Status of Installed and Proposed Projects 5 (2020), https://eta-publications.lbl.gov/sites/default/files/hybrid_plant_development_2020.pdf [https://perma.cc/VBH5-FQQ5] (listing current combinations of renewable, fossil, and storage resources in hybrid power plants); *see also* Will Gorman, Andrew Mills, Mark Bolinger, Ryan Wiser, Nikita G. Singhal, Erik Ela & Eric O'Shaughnessy, *Motivations and Options for Deploying Hybrid Generator-Plus-Battery Projects Within the Bulk Power System*, 33 Elec. J. 106739 (2020) (addressing co-location of utility-scale generation and battery storage and circumstances warranting hybrid design). For a less technical presentation of the same issues, see Will Gorman, *Hybrid Power Plants Are Growing Rapidly, But Are They a Good Idea?*, GreenTech Media (Apr. 3, 2020), https://www.greentechmedia.com/articles/read/hybrid-power-plants-are-growing-rapidly-but-are-they-a-good-idea [https://perma.cc/PB3R-9UTN]. As green hydrogen—a clean-burning fuel that can be derived from renewables—gets closer to large scale commercialization, it may also be combined onsite in a hybrid facility. *See* Elizabeth Connelly, Michael Penev, Anelia Milbrandt, Billy Roberts, Nicholas Gilroy & Marc Melaina, Nat'l Renewable Energy Lab'y, Resource Assessment for Hydrogen Production 12–32 (2020), https://www.nrel.gov/docs/fy20osti/77198.pdf [https://perma.cc/33N8-B2UT] (describing technical potential for producing hydrogen from renewable resources).

2019 levels."[132] Perhaps the most critical benefit of siting renewables and storage together, according to EIA, "is the ability to take advantage of common onsite infrastructure", thereby achieving, in ideal situations, both efficient energy land use and the ability to "store renewable-generated energy produced during periods of low electricity prices and low demand, and later supply that stored energy to the grid when both demand and electricity prices are higher."[133]

In addition to adapting siting regimes for hybrid power plants, states may need to update their siting laws to clarify how they apply to stand-alone utility-scale energy storage facilities. Energy storage is not always co-located with renewable energy generation, and in some contexts, independently sited storage can produce more value to the grid.[134] FERC Order 841 in 2018,[135] as well as a growing number of state energy storage mandates,[136] are among the factors driving growth in energy storage, in both stand-alone and hybrid modes.[137] Characterization of energy storage within traditional electricity sector categories and contexts has not always

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132. U.S. Energy Info. Admin., Battery Storage in the United States: An Update on Market Trends 26–27 (2020), https://www.eia.gov/analysis/studies/electricity/batterystorage/Pdf/Battery_storage.pdf [https://perma.cc/6ZKM-DFXR] [hereinafter U.S. ENERGY INFO. ADMIN., BATTERY STORAGE].

133. *Id.* at 27.

134. Gorman et al., *supra* note 131, at 11.

135. *See* Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, Order No. 841, 162 FERC ¶ 61,127 (Feb. 15, 2018) (to be codified at 18 C.F.R. pt. 35) (authorizing and providing structure for "the participation of electric storage resources in [U.S. wholesale] capacity, energy, and ancillary service markets operated by Regional Transmission Organizations (RTO) and Independent System Operators (ISO)").

136. Seven states currently have statewide mandates for energy storage deployment: California, Massachusetts, Nevada, New Jersey, New York, Oregon, and Virginia. *See Energy Storage Targets (Apr. 2020)*, NC CLEAN ENERGY TECH. CTR. & DATABASE OF ST. INCENTIVES FOR RENEWABLES & EFFICIENCY (DSIRE) (April 2020), https://s3.amazonaws.com/ncsolarcen-prod/wp-content/uploads/2020/04/DSIRE_Storage_Targets_April2020.pdf [https://perma.cc/Q28S-B475]. However, storage development and co-location of hybrid facilities is not limited to these states. *See, e.g.*, *Large Battery Systems are Often Paired with Renewable Energy Power Plants*, U.S. ENERGY INFO. ADMIN. (May 18, 2020), https://www.eia.gov/todayinenergy/detail.php?id=43775 [https://perma.cc/CWB9-BD8Y] (listing the top states for total "operating and planned renewable plus storage capacity" to be, in order from most to least: Texas, Nevada, California, Florida, New Mexico, Arizona, Georgia, Hawaii, Illinois, and Oklahoma); Kien Chau, *Most of Hawaii's Electric Battery Systems are Paired with Wind or Solar Power Plants*, U.S. ENERGY INFO. ADMIN. (Mar. 20, 2020), https://www.eia.gov/todayinenergy/detail.php?id=43215 [https://perma.cc/9WJH-6ZJQ] (describing Hawaii's current status and plans "to add an additional 45 megawatts (MW) of solar with battery capacity to the grid by 2022"; highlighting that two of the Hawaiian Islands, Maui and Hawaii Island, now require mandatory energy storage for new solar projects).

137. The FERC is evaluating rule changes to solidify participation in wholesale markets for hybrid resources. *See* Herman K. Trabish, *FERC Summit Highlights Reliability Concerns for Renewables + Storage, but has California Found a Solution?*, UTIL. DIVE (Sept. 3, 2020), https://www.utilitydive.com/news/ferc-summit-highlights-reliability-concerns-for-renewables-storage-but-h/582747/ [https://perma.cc/DH6Z-VYVJ].

been straightforward, however.[138] For example, a 150 MW energy storage project proposed in Massachusetts presented the question of whether the project required approval of the state Energy Facilities Siting Board, with the developer arguing it was not a "jurisdictional facility" because it was neither a generation nor transmission facility.[139] Siting regimes that have been developed around single resource projects will need to be adapted to account for more than one resource to avoid combined technologies causing delays.[140] An example of a state taking this approach can be found in California's 2017 energy storage siting law, which sought to avoid such confusion over energy storage and expedite siting, calling energy storage "a matter of statewide concern" and giving the governor's office authority to develop storage siting and permitting guidance for consistent use by communities with populations of 200,000 or greater.[141] Hybrid facilities and stand-alone energy storage can range in size from small to large scale,[142] so local governments that may have already made land use provision for rooftop solar or other small-scale onsite arrays should be ready to adapt local land use regulation for small scale wind systems as well.[143]

B. New Hydropower Pumped Storage and Enhanced Generation Capacity

Battery storage, the primary energy storage technology described above, is new compared to the longstanding water-based energy storage. As the urgency to accelerate renewable energy development intensifies, both new sites for pumped storage hydropower and the potential for new hydroelectric generation to be sited at existing non-powered dams are

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138. For a detailed overview of the practical and jurisdictional issues that have surrounded the status of energy storage as a generation, transmission, or distribution asset, see Amy L. Stein, *Reconsidering Regulatory Uncertainty: Making a Case for Energy Storage*, 41 FLA. ST. U. L. REV. 697, 716–30 (2014).

139. *See* Pet. of Cranberry Point Energy Storage, LLC for a Jurisdictional Determination Pursuant to 980 C.M.R. § 2.09, at *2 (Jan. 4, 2019) (EFSB 19-01).

140. *See generally* Andy Flavin, *Getting State Approvals for Energy Storage Siting*, LAW360 (Feb. 6, 2020, 3:10 PM), https://www.law360.com/articles/1240835/getting-state-approvals-for-energy-storage-siting- [https://perma.cc/66W8-GHWH] (highlighting the open question of energy storage status under state siting laws).

141. *See* Assemb. B. 546 ch. 380 (Cal. 2017).

142. *See Hybrid Wind and Solar Electric Systems*, U.S. DEP'T OF ENERGY, https://www.energy.gov/energysaver/buying-and-making-electricity/hybrid-wind-and-solar-electric-systems [https://perma.cc/A77P-NFL5] (last visited Mar. 9, 2021) (discussing the potential for use of small hybrid systems in residential settings).

143. *See* U.S. ENERGY INFO. ADMIN., BATTERY STORAGE, *supra* note 132, at 21–22 (discussing programs and incentives set up in Southern California encouraging home and small-scale solar systems).

becoming newly important.

According to the Department of Energy (DOE), pumped storage hydropower remains the leading form of U.S. energy storage, with 21.6 GW installed capacity and potential for new pumped storage estimated at thirty-six GW.[144] Pumped storage works by pumping and releasing water between different elevations, storing the water and generating electricity when it is released.[145]

In 2018, Congress enacted America's Water Infrastructure Act, requiring FERC to develop expedited siting procedures for licensing for closed-loop pumped storage.[146] As interest in developing this potential has grown, the DOE last year released an evaluation of the environmental effects of the two types of pumped storage hydropower: so-called open-loop pumped storage, which works by being "continuously connected to a naturally flowing water feature" and is the method used at all currently operating facilities in the United States, and closed-loop storage, which has no such continuous connection.[147] The study found that, in general, closed-loop storage systems do less terrestrial environmental harm than open-loop and have lower impact on surface waters, but higher impact on groundwater.[148] With all expected impacts considered, however, the research concluded that the environmental effects of closed-loop storage are generally lower than for open-loop for two main reasons related to siting: (1) they "are located 'off-stream,' potentially minimizing aquatic and terrestrial impacts," and (2) close-loop systems "often have greater siting flexibility than open-loop" systems do.[149] This research makes clear that siting for new pumped storage facilities presents unique challenges, as technically and environmentally suitable sites must meet precise specifications.[150]

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144. U.S. Dep't of Energy, Hydropower Vision: A New Chapter for America's 1st Renewable Electricity Source 7, 9 (2016) [hereinafter U.S. Dep't of Energy, Hydropower Vision], https://www.energy.gov/sites/prod/files/2018/02/f49/Hydropower-Vision-021518.pdf [https://perma.cc/7XM4-UZBZ].

145. Bo Saulsbury, A Comparison of the Environmental Effects of Open-Loop and Closed-Loop Pumped Storage Hydropower 1.1 (2020) [hereinafter U.S. Dep't of Energy, A Comparison], https://www.energy.gov/sites/prod/files/2020/04/f73/comparison-of-environmental-effects-open-loop-closed-loop-psh-1.pdf [https://perma.cc/XCT7-4QAR].

146. *See* America's Water Infrastructure Act, Pub. L. No. 115-270, Sec. 3004 (2018) (codified at 16 U.S.C. § 823f).

147. U.S. DEP'T OF ENERGY, A COMPARISON, *supra* note 145, at 1.1–1.2.

148. *Id.* at xiv–xv (providing summary tables of relative impacts).

149. *Id.* at 4.1.

150. *See* Kavya Balaraman, *To Batteries and Beyond: In a High-Renewables World, Pumped Hydro Storage Could be 'The Heavy Artillery'*, UTIL. DIVE (Oct. 13, 2020), https://www.utilitydive.com/news/to-batteries-and-beyond-in-a-high-renewables-world-pumped-hydro-storage-c/584958/ [https://perma.cc/CJ5A-X688] (citing the U.S. Energy Information

Given that siting approvals are centralized at the FERC, with its jurisdiction over hydroelectric projects, the FERC and other federal agencies with relevant expertise can develop consistent approaches to resolving environmental issues—or forgoing a site altogether due to environmental impacts.[151] One area, for example, that FERC continues to explore is whether abandoned mine sites can be safely repurposed for pumped storage, which may have an advantage of land reuse, but may also have harmful effects on groundwater.[152]

Beyond the prospect of new pumped storage facilities, the Department of Energy has also evaluated the potential for adding new hydropower generation capacity using existing infrastructure, dams, and canals, estimated at thirteen GW.[153] Expanding hydropower generation responsibly does not involve constructing new dams. As the International Renewable Energy Agency explains, it is possible instead to upgrade existing hydroelectric plants, harness the flow of the river without obstruction, and add electric power facilities to currently non-powered dams, where environmentally appropriate.[154] The same legislation that directed FERC to expedite siting for closed-loop pumped storage also laid the groundwork for accelerating hydropower development at existing nonpowered dams.[155] An advantage of gaining new generation capacity from existing infrastructure is there is no new siting per se, only site selection in the sense of identifying good candidates among nonpowered dams. Yet a potential environmental conflict is presented by the movement to remove dams. The U.S. Fish & Wildlife Service highlights how dam removal "provides an opportunity to restore a river's health and return it to its natural, free-flowing state."[156] As nonpowered dams are considered for hydropower, the siting questions will depend on suitability

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Administration staff as calling pumped storage "very difficult to site" because "[i]t has a lot of environmental issues with it").

151. U.S. DEP'T OF ENERGY, A COMPARISON, *supra* note 145, at 2.1–2.5 (discussing FERC's authority as applied to pumped storage hydropower); *see also* Hydroelectric Licensing Regulations Under the America's Water Infrastructure Act of 2018, Order No. 858, 167 FERC ¶ 61,050 (Apr. 18, 2019) (codified at 18 C.F.R. pt. 7) (establishing expediting process for licensing "qualifying facilities at existing nonpowered dams and for closed loop pumped storage [hydropower] projects").

152. U.S. DEP'T OF ENERGY, A COMPARISON, *supra* note 145, at 4.2–4.3.

153. U.S. Dep't of Energy, Hydropower Vision, *supra* note 144, at 7.

154. INT'L RENEWABLE ENERGY AGENCY, GLOBAL RENEWABLES OUTLOOK: ENERGY TRANSFORMATION 2050, at 28 (2020), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Apr/IRENA_Global_Renewables_Outlook_2020.pdf [https://perma.cc/YX4N-M768].

155. *See* America's Water Infrastructure Act, Pub. L. No. 115-270, Sec. 3003 (2018) (codified at 16 U.S.C. § 823e).

156. U.S. FISH & WILDLIFE SERVICE, DAM REMOVAL: AN OPPORTUNITY FOR OUR RIVERS 1, https://www.fws.gov/southeast/pdf/fact-sheet/dam-removal.pdf [https://perma.cc/HSA9-SYFF] (last visited Mar. 9, 2021).

of existing dams for electricity generation versus river restoration.

To address these issues, the non-profit organization American Rivers, a leading advocate for dam removal, and other conservation groups have worked with the government agencies, research centers, and the hydropower industry to develop a "Joint Statement of Collaboration on U.S. Hydropower: Climate Solution and Conservation Challenge . . . ."[157] The Statement recognizes that of over 90,000 existing U.S. dams, only 2,500 produce electricity, and over "the next decade, close to 30 percent of U.S. hydropower projects will come up for relicensing."[158] This presents collaborative opportunities for considering "*[r]etrofitting* powered dams and adding generation at non-powered dams to increase renewable generation; developing pumped storage capacity at existing dams; and enhancing dam and reservoir operations for water supply, fish passage, flood mitigation, and grid integration of solar and wind" but also "*[r]emoving* dams that no longer provide benefits to society, have safety issues that cannot be cost-effectively mitigated, or have adverse environmental impacts that cannot be effectively addressed."[159] As most non-powered dams are primarily state regulated, states will play an important role in navigating the process of retrofitting these dams for power generation but will need federal support and investment to accelerate this new development of water resources.

V. CONCLUSION

Over the next critical decade for climate change mitigation, a significant, nationwide expansion of clean energy infrastructure will have to be accomplished at a much faster pace than has ever been achieved. There are many law and policy drivers that can play a role in facilitating this transformation of the energy sector. This Article has focused narrowly on the role of siting in meeting the immediate need to accelerate utility-scale renewable energy projects. From state and local reforms to improve siting on private lands, to renewed ambition in siting on public lands and waters, to modernizing siting regimes in response to new technologies and priorities, there is significant legal work to be done.

In closing, it is important to emphasize the smaller scale siting contexts that are key complements to large-scale development. Onsite

157. AM. RIVERS CONNECT US, ET AL., JOINT STATEMENT OF COLLABORATION ON U.S. HYDROPOWER: CLIMATE SOLUTION AND CONSERVATION CHALLENGE (Oct. 13, 2020), https://woods.stanford.edu/sites/g/files/sbiybj5821/f/hydropower_uncommon_dialogue_joint_statement.pdf [https://perma.cc/V4CV-URAX] (all parties listed in Appendix).

158. *Id.* at 1.

159. *Id.*

renewable energy generation and other forms of geographically strategic distributed energy resources—from community solar to small-scale battery storage—also present evolving siting challenges as more is learned about how the location of distributed energy resources can maximize their benefit to the grid. State and local governments will need to be adaptable to these developments. Importantly, this transitional decade presents an opportunity to remedy environmental injustices tied to the energy sector by replacing polluting energy sources with renewables and expanding access to clean energy and the economic benefits of this transition to historically disadvantaged communities.