WHAT HAPPENS WHEN THE GREEN NEW DEAL MEETS THE OLD GREEN LAWS?

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ABSTRACT

The multi-faceted infrastructure goals of the Green New Deal will be impossible to achieve in the desired time frames if the existing federal, state, and local siting and environmental protection statutory regimes are applied. Business, labor, property rights, environmental protection, and social justice interests will use them to grind the Green New Deal to a snail's pace. Using the renewable energy transition as the infrastructure case study, this Essay is a call to arms for the need to design New Green Laws for the Green New Deal. Part I briefly summarizes what we are learning about the pace and magnitude of climate change impacts and the need for rapid and robust mitigation and adaptation responses. Part II demonstrates the magnitude and urgency of new renewable energy infrastructure needed to fulfill Green New Deal goals. Part III points to the intensity of pushback that renewable energy has faced under existing siting and environmental protection laws. Part IV uses the Texas wind power experience to argue that mobilizing the Green New Deal energy transition will require resolving significant trade-offs regarding environmental protection, property rights, process, and sovereignty. Ultimately, for the Green New Deal to succeed in its renewable energy (and other) infrastructure agendas, siting and environmental protection regulatory regimes will need to tolerate more streamlined, top-down, preemptive processes, as well as extensive use of eminent domain powers, which necessarily will require new ways of satisfying demands for distributive justice and public participation.

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INTRODUCTION

It is one hour into the final presidential debate, and the moderator poses this question to the two candidates: *What is your vision for America's infrastructure?* The first candidate proclaims an agenda to "make America secure again." The candidate's plan is to increase oil and gas extraction, expand the Nation's pipeline systems, grow the Nation's highway network, and protect floodplain and coastal communities with enormous hardened levees and seawalls. The second candidate proclaims an agenda to "make America green at last." The candidate's plan is to wean the Nation off fossil fuels and nuclear power, turning us to 100% renewable wind and solar energy, electrify all automobile and light-duty vehicles, line rivers and coastlines with protective nature-based living infrastructure, and build a new national high-speed rail system to reduce demand for flying and driving.

These two infrastructure agendas could not be more different in vision, but they are very much alike in one key respect—each is an environmental impact assessment and project permitting nightmare. Anyone familiar with the past few decades of environmental law knows this is an obvious fate for the "make America secure again" agenda. Every proposed new stretch of pipeline, highway, seawall, and other form of "brown" infrastructure, as well as the resource extraction actions needed to supply the raw materials, has met stiff opposition from environmental protection, social justice, and "not in my backyard" (NIMBY) interests, who for decades have used federal and state siting and environmental protection laws to contest permits and litigate over project siting approvals and environmental compliance.[1] The same will be true for the "make America green at last" agenda.

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1. *See* James W. Coleman, *Pipelines & Power-Lines: Building the Energy Transport,* 80 OHIO ST. L.J. 263, 279–80 (2019) (describing how the federal and state governments, environmental groups, and landowners have been the major forces behind opposition to oil pipeline proposals, and how they can have the same impact on all types of energy projects); Sam Kalen, *A Bridge to Nowhere?: Our Energy Transition and the Natural Gas Pipeline Wars*, MICH. J. ENVTL. & ADMIN. L. (forthcoming) (manuscript at 38), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3450588 (chronicling pipeline litigation and disputes across country); John C. Ruple & Kayla M. Race, *Measuring the NEPA Litigation Burden: A Review of 1499 Federal Court Cases*, 50 ENVTL. L. (forthcoming 2020) (manuscript at 3, 17), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3433437 (showing the public land management and

The existing project siting and environmental protection regulatory regimes do not hand out a "green pass" to infrastructure projects that promote desirable environmental outcomes.[2] The ambitious "green at last" agenda may warm the hearts of those advocating for robust measures to abate and adapt to climate change, but infrastructure is infrastructure, plain and simple. It has to be built somewhere, and it has impacts on the environment. Wind turbines kill birds and bats; solar arrays disrupt habitat; lithium batteries require raw materials that must be mined; new natural coastal protection alters habitat; high-speed rail and new electric transmission lines cut through habitat and near neighborhoods.[3] And all of them change the landscape, whether on public or private property.[4]

Indeed, environmental protection interest groups, property rights interest groups, civil justice interest groups, public lands protection advocates, environmental protection groups, and business and labor interest groups have already begun challenging renewable energy and transportation infrastructure projects like those the "green" candidate proposes, and existing environmental laws are their weapon of choice.[5] If these early local and

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infrastructure development and approval agencies experiencing the highest levels of litigation under the National Environmental Policy Act); David B. Spence, *Regulation & the New Politics of (Energy) Market Entry*, 95 NOTRE DAME L. REV. 327, 330 (2019) (tracking opposition to fossil fuel infrastructure).

2. *See* John Copeland Nagle, *Green Harms of Green Projects*, 27 NOTRE DAME J.L. ETHICS & PUB. POL'Y 59, 96 (2013) (acknowledging that renewable energy projects must comply with environmental laws); Francesco Fuso Nereni et al., *Mapping Synergies and Trade-Offs Between Energy and the Sustainable Development Goals*, 3 NATURE ENERGY 10, 13 (2018) (emphasizing the need for new sustainable management practices to combat climate change that will also require changes to existing energy processes and structures).

3. *See* Nagle, *supra* note 2, at 62, 66, 77 (providing examples of environmental harms associated with solar and wind energy production); Nereni et al., *supra* note 2 (discussing the trade-offs, and degradation to natural systems, that will occur as new energy systems are designed); *see also* Samuel L. Brown & Lauren A. Bachtel, *A Decarbonized Economy: Risks and Opportunities*, 34 NAT. RESOURCES & ENV'T 50, 51 (2019) (discussing environmental and social harms from transitioning to massive electrification using battery technology for power storage); Cameron Holley et al., *Governing Energy Transitions: Unconventional Gas, Renewables and their Environmental Nexus*, 36 ENVTL. & PLANNING L.J. 427, 429–30 (2019) (discussing environmental impacts of transitioning to renewable power sources); *see generally* Amy Wilson Morris & Jessica Owley, *Mitigating the Impacts of the Renewable Energy Goldrush*, 15 MINN. J.L., SCI. & TECH 293 (2014) (discussing impacts of solar power projects and their mitigation under environmental laws); Benjamin K. Sovacol et al., *Sustainable Minerals and Metals for a Low-Carbon Future*, 367 SCIENCE 30 (2020) (discussing social and economic impacts of extraction of raw materials needed for solar photovoltaics, batteries, electric vehicle motors, wind turbines, fuel cells, and other climate adaptation technologies).

4. Uma Outka, *The Renewable Energy Footprint*, 30 STAN. ENVTL. L.J. 241, 251 (2011).

5. *See* Michael B. Gerrard, *Legal Pathways for a Massive Increase in Utility-Scale Renewable Generation Capacity*, 47 ENVTL. L. REP. 10,591, 10,596, 10,612 (2017) (pointing to renewable energy projects opposed and delayed through challenges under current environmental laws); J.B. Ruhl, *Harmonizing Commercial Wind Power and the Endangered Species Act Through Administrative Reform*, 65 VAND. L. REV. 1769, 1772–73 (2012) (examining how numerous groups have used the Endangered Species Act to attack the construction of renewable resources, especially wind power); Jeffrey Thaler,

regional renewable energy projects have met such stiff resistance from all sides, just imagine how the national-scale "green at last" agenda would fare on a national scale. It is naive to think that environmental protection advocates who have fought pipelines and electric transmission lines will rest easy simply because the new agenda is climate-friendly. As we have already witnessed, single-issue environmental activist groups will demand that the new climate-friendly infrastructure be bright green. Nor will entrenched business and labor interests gladly welcome the transition away from their industries to the new wave of green infrastructure.[6] And property rights advocates are never happy. Ironically, the playbook they all will use to block and tackle the "green at last" candidate's agenda was sketched out, page-by-page, by none other than the environmental protection interest groups who have been fighting "brown" infrastructure for the past five decades.[7]

It should be obvious that the fictional "make America green at last" agenda is the core of the proposed Green New Deal.[8] Its supporters are proving myopic. As enamored as they are of the federal, state, and local siting and environmental laws used to combat the "brown" infrastructure perpetuated in the other candidate's "secure again" agenda—the National

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Fiddling as the World Floods and Burns: How Climate Change Urgently Requires a Paradigm Shift in the Permitting of Renewable Energy Projects, 42 ENVTL. L. 1101, 1155 (2012) (arguing that existing environmental laws prevent us from reducing carbon emissions by building renewable energy sources).

6. A number of labor unions, particularly those representing workers in conventional fuel industries, have officially voiced opposition to agendas like the "green at last" candidate's. Nick Sobczyk, *Union Chief Says No to Green New Deal*, E&E NEWS (Apr. 24, 2019), https://www.eenews.net/special_reports/green_new_deal/stories/1060211973. Similarly, automobile industry labor unions have expressed resistance to the adoption of electric vehicles. Chester Dawson et al., *They Don't Need Us Anymore: Auto Workers Fear Electric Unrest*, BLOOMBERG (Sept. 27, 2019), https://www.bloomberg.com/news/articles/2019-09-27/-they-don-t-need-us-anymore-auto-workers-fear-electric-unrest.

7. The primary focus of this Essay is on the legal obstacles that siting and environmental protection laws pose for renewable energy and other climate change infrastructure projects. Even if these legal obstacles can be overcome, social opposition can be a significant barrier to siting projects of the scale involved for climate change mitigation and adaptation. *See, e.g.*, Neil Gunningham et al., *Social License and Environmental Protection: Why Businesses Go Beyond Compliance*, 29 L. & SOC. INQUIRY 307, 330, 337–38 (2004) (providing examples of the ways environmental groups gained influence in the siting and permitting of pulp and paper manufacturing facilities and noting that these techniques slowed industrial growth.).

8. The Green New Deal is generally identified with the agenda outlined in a resolution Representative Ocasio-Cortez introduced in the U.S. House of Representatives, and Senator Ed Markey introduced in the Senate, in February of 2019. H.R. Res. 109, 116th Cong. (2019). Among many other initiatives, the Resolution calls for "dramatically expanding and upgrading renewable power sources," *id.* § (2)(C)(i), investing in high-speed rail, *id.* § (2)(H)(iii), and "upgrading the infrastructure in the United States . . . by reducing the risks posed by climate impacts," *id.* § (2)(B)(iii). For broader descriptions of the Green New Deal infrastructure goals, see Tracy M. Roberts, *Greenbacks for the Green New Deal*, 17 PITT. TAX REV. (forthcoming 2019) and Robert Sussman, *Designing the New Green Deal: Where's the Sweet Spot?*, 49 ENVTL. L. REP. 10,428, 10,429 (2019). Commentary on the Green New Deal is extensive and growing, and a complete survey is outside the scope of this Essay.

Environmental Policy Act,[9] Endangered Species Act,[10] Clean Water Act,[11] National Historic Preservation Act,[12] Clean Air Act,[13] Migratory Bird Treaty Act,[14] and the list goes on, including in-state and local equivalents—the applicability of these laws to slow or halt Green New Deal infrastructure seems to have been lost on them. In short, even if the Green New Deal can overcome political opposition, technological feasibility, and funding constraints, it has one very big obstacle ahead of it—the Old Green Laws.

This is not news. Over the past decade, several environmental law scholars have pointed to the disconnect between rapid pursuit of climate change mitigation and adaptation infrastructure on the massive scales needed and the gauntlet of assessments, plans, permits, and litigation that siting and environmental laws put in the way.[15] Their solutions usually rely on amending existing statutes and regulations to "streamline" assessment and approval processes and shift burdens of proof, while keeping relatively intact the public participation and judicial review that define modern environmental law.[16] That may no longer be enough.

The Green New Deal makes no mention of simplifying and speeding up assessment and approval processes—that does not seem to be on the table for discussion. But it does demand that all the infrastructure it calls for be deployed with robust attention to environmental protection goals[17] and to distributive justice and democratic public participation goals.[18] Just as the siting of "brown" infrastructure presents those concerns, so too can "green"

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9. National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321–4370m-12 (2012).

10. Endangered Species Act, 16 U.S.C. §§ 1531–1544 (2012).

11. Clean Water Act, 33 U.S.C. §§ 1251–1387 (2012).

12. National Historic Preservation Act of 1966, 54 U.S.C. §§ 300101–320303 (2012).

13. Clean Air Act, 42 U.S.C. §§ 7401–7671q (2012).

14. Migratory Bird Treaty Act, 16 U.S.C. §§ 703–712 (2012).

15. Coleman, *supra* note 1, at 304–05; Gerrard, *supra* note 5, at 10,591; Uma Outka, *Environmental Law and Fossil Fuels: Barriers to Renewable Energy*, 65 VAND. L. REV. 1679, 1702–03 (2012); Ruhl, *supra* note 5, at 1798; Irma Russel, *Streamlining NEPA to Combat Global Climate Change: Heresy or Necessity?*, 39 ENVTL. L. 1049, 1051, 1058 (2009); Thaler, *supra* note 5, at 1155.

16. *See, e.g.*, Gerrard, *supra* note 5, at 10,599 (pointing to a federal program seeking to streamline wind project review); Ruhl, *supra* note 5, at 1799 (emphasizing the structural changes that should take place under the Endangered Species Act to facilitate wind power development); Thaler, *supra* note 5, at 1142 (advocating for a four-step solution to the current regulatory framework that addresses how to change current laws and enact new ones, all while retaining the fundamental underpinnings of environmental law).

17. *See* H.R. Res. 109, 116th Cong. § (1)(D) (2019) (resolving to secure "clean air and water;" "climate and community resiliency;" "healthy food;" "access to nature;" and "a sustainable environment").

18. The Resolution calls for "the use of democratic and participatory processes that are inclusive of and led by frontline and vulnerable communities and workers to plan, implement, and administer the Green New Deal mobilization at the local level." H.R. Res. 109 § (4)(F). Numerous other provisions permeate this theme throughout the Resolution. *Id.* § (4).

infrastructure.[19] That is well and good. Who can be opposed to environmental protection, distributive justice, and public participation? But this begs the critical question. Can we plan, site, and construct all the Green New Deal infrastructure in the timeframe needed to effectively abate and adapt to climate change *and* ensure the Green New Deal's commitment to environmental protection, distributive justice, and public participation? Can all these goals be harmonized and accomplished with synergy, or are there trade-offs between them requiring that we strike some balance? What would that balance be?

We do not know the answer to these questions, because we have never tried anything like the Green New Deal before. Green New Deal advocates recognize that they are calling for "a new national, social, industrial, and economic mobilization on a scale not seen since World War II."[20] As a nation we did mobilize at national scales during World War II,[21] and we have built national-scale infrastructure systems,[22] but we have no experience trying to mobilize a new national infrastructure agenda of the Green New Deal's scale through the modern siting and environmental law machinery. Certainly nothing like the modern siting and environmental law regimes existed during World War II, and the backbones of our vast national-scale infrastructure systems—the public road and interstate highway system, the intra-coastal waterway, levee systems, and much of the oil and gas pipeline network—were all planned and fully, or at least largely, in place before the rise of modern environmental law statutes in the 1970s.[23] Most of the disputes

19. *See* Uma Outka, *Environmental Justice Issues in Sustainable Development: Environmental Justice in the Renewable Energy Transition*, 19 J. ENVTL. & SUSTAINABILITY L. 60, 64–66 (2012) (describing the environmental justice issues associated with "green" infrastructure); *accord* Shelly Welton & Joel Eisen, *Clean Energy Justice: Charting an Emerging Agenda*, 43 HARV. ENVTL. L. REV. 307, 357 (2019).

20. H.R. Res. 109, Whereas Clause.

21. Thomas D. Morgan, *The Industrial Mobilization of World War II: America Goes to War*, ARMY HIST., Spring 1994, at 31, 33.

22. Andrea Stone, *When America Invested in Infrastructure, These Beautiful Landmarks Were the Result*, SMITHSONIAN MAG. (Dec. 10, 2014), https://www.smithsonianmag.com/history/when-america-invested-infrastructure-these-beautiful-landmarks-were-result-180953570/.

23. The 3,000-mile intracoastal waterway was completed by 1950. *Intracoastal Waterway*, ENCYCLOPÆDIA BRITANNICA, https://www.britannica.com/topic/Intracoastal-Waterway (last visited Apr 28, 2020); LYNN M. ALPERIN, HISTORY OF THE GULF INTRACOASTAL WATERWAY 1 (1983), https://www.publications.usace.army.mil/Portals/76/Publications/Miscellaneous/NWS_83-9.pdf. Railway mileage peaked in the United States in 1916 at 254,000 miles. *The Golden Age of American Railroading*, UNIV. OF IOWA LIBRARY (June–Aug. 1989), https://www.lib.uiowa.edu/exhibits/previous/railroad/; ASS'N OF AM. RAILROADS, A SHORT HISTORY OF U.S. FREIGHT RAILROADS (2019), https://www.aar.org/wp-content/uploads/2018/05/AAR-Short-History-American-Freight-Railroads.pdf. The majority of the public roads and highways in the United States, which today amount to over 4 million miles, were first constructed before 1920. *Public Road Mileage, Lane-Miles, and VMT 1920-2015*, U.S. DEP'T OF TRANSP., OFFICE OF HWY. POLICY INFO., https://www.fhwa.dot.gov/policyinformation/

channeled through environmental law since then have been over maintenance (e.g., dredging) and incremental expansion (e.g., new highway spurs) of those systems.[24] In contrast, the Green New Deal calls for new or vastly expanded build-out of multiple national-scale infrastructure systems, all at the same time.[25] That is an entirely new proposition for environmental law. To drive the point home, imagine there was no interstate highway system or intra-coastal waterway, and someone proposed building them out at national scales in, say, ten years. That would be an unprecedented environmental assessment and permitting process, not to mention the litigation quagmire that would ensue. The Green New Deal proposes no less of an infrastructure undertaking, and consequently no less of a siting and environmental law compliance challenge.

Two factors compound that challenge for the Green New Deal infrastructure in ways that prior national-scale infrastructure did not experience. First, climate change mitigation and adaptation are not optional, at least not if we wish to avoid unprecedented deterioration of social and environmental conditions.[26] That was not true of our prior national-scale infrastructure. Whether or not to build the interstate highway system was not an existential question in the 1960s, and public transport options were largely

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statistics/2015/vmt421c.cfm (last updated Dec. 14, 2016). The Interstate Highway System's 41,000 miles were largely built from 1956 to the end of the 20th century. *The Interstate Highway System*, HISTORY (Jun. 7, 2019), https://www.history.com/topics/us-states/interstate-highway-system. About half of the existing mainline natural gas transmission network and a large portion of the local distribution network were installed in the 1950s and 1960s. *Natural Gas Pipelines*, U.S. ENERGY INFO. ADMIN. (Dec. 5, 2019), https://www.eia.gov/energyexplained/natural-gas/natural-gas-pipelines.php. According to the American Society of Civil Engineers' annual report card on national infrastructure, the Nation's 90,000 plus large dams were built, on average, 56 years ago, and bridges average 43 years in age. AM. SOC'Y OF CIVIL ENG'R, DAMS: 2017 INFRASTRUCTURE REPORT CARD (2017), https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Dams-Final.pdf; AM. SOC'Y OF CIVIL ENG'R, BRIDGES: 2017 INFRASTRUCTURE REPORT CARD (2017), https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Bridges-Final.pdf. "[Seventy percent] of the grid's transmission lines and power transformers are over 25 years old," with the majority built in the 1950s and 1960s, with a 50-year life expectancy. AM. SOC'Y OF CIVIL ENG'R, ENERGY: 2017 INFRASTRUCTURE REPORT CARD (2017), https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Energy-Final.pdf; Sarah Gerrity & Allison Lantero, *Understanding the Grid*, U.S. DEP'T OF ENERGY (Nov. 17, 2014), https://www.energy.gov/articles/infographic-understanding-grid.

24. *See generally, e.g.* Nw. Envtl. Advocates v. Nat'l Marine Fisheries Serv., 460 F.3d 1125 (9th Cir. 2006) (challenging a dredging project in Washington under the NEPA); Senville v. Peters, 327 F.Supp.2d 335 (D. Vt. 2004) (challenging a highway project in Vermont under the NEPA).

25. *See* H.R. Res. 109 § (2) (listing the numerous investments needed across infrastructure systems).

26. *See* IPCC, SUMMARY FOR POLICYMAKERS: GLOBAL WARMING OF 1.5ºC 5 (2018), https://www.ipcc.ch/sr15/chapter/spm/ [hereinafter IPCC, GLOBAL WARMING] (providing an overview of the potential impacts and risks associated with climate change).

ignored.[27] By contrast, and to put it into environmental law terminology, the "no action" alternative for climate change mitigation and adaptation infrastructure leads to profoundly dire social-ecological conditions.[28] Second, the Green New Deal does not have as much time to get the job done as did our prior national-scale infrastructure initiatives. Atmospheric carbon dioxide levels, now at a level not experienced in several million years, keep rising.[29] Recent scientific studies reveal that some effects of climate change are coming online faster and harder than previous models suggested.[30] Each year we delay bending greenhouse gas emissions downward requires that we bend them downward more sharply the next year,[31] and each year we postpone adaptive infrastructure puts vulnerable communities in graver danger.[32] There is no time to waste. Indeed, there is less time than we thought we had.[33] The clock is ticking.

To put the challenge bluntly, the Green New Deal must undertake multiple national-scale infrastructure initiatives of magnitudes never before processed through existing siting and environmental law standards and procedures. The Green New Deal must do so in a timeframe more compressed than any similar infrastructure initiative faced in the past, while (in its ideal form) adhering to demanding standards of environmental protection, distributive justice, and public participation. Using renewable energy infrastructure as the case study, this Essay demonstrates how daunting that challenge is and argues that we do not have the luxury of waiting to see whether there are trade-offs and, if there are, deciding then what to do about them. Nor can the solution any longer be to propose tinkering with existing siting and environmental laws. That thinking is too small. Rather, decisive action *must* be taken, and *now*, to design New Green Laws for the Green New Deal. What that looks like is for another day. This Essay is the call to arms.

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27. *See* Richard F. Weingroff, *Original Intent: Purpose of the Interstate System 1954–1956*, U.S. FED. HIGHWAY ADMIN., https://www.fhwa.dot.gov/infrastructure/originalintent.cfm (last updated June 27, 2017) (remarking that decisionmakers did not consider several important effects of the interstate system, including potential impacts on transit).

28. *See* 40 C.F.R. § 1502.14 (requiring agencies to include "the alternative of no action" in environmental impact statements).

29. *See* UN ENV'T PROGRAMME, EMISSIONS GAP REPORT 2019: EXECUTIVE SUMMARY, at v (2019), https://unepdtu.org/publications/emissions-gap-report-2019-executive-summary/ (sounding the alarm that GHG levels show no sign of peaking in the coming years).

30. *See infra* Part I.

31. UN ENV'T PROGRAMME, *supra* note 29, at v.

32. CLIMATE CENTRAL, FLOODED FUTURE: GLOBAL VULNERABILITY TO SEA LEVEL RISE WORSE THAN PREVIOUSLY UNDERSTOOD 3 (2019), https://climatecentral.org/pdfs/2019CoastalDEMReport.pdf.

33. Naomi Oreskes et al., *Scientists Have Been Underestimating the Pace of Climate Change*, SCI. AM. (Aug. 19, 2019), https://blogs.scientificamerican.com/observations/scientists-have-been-underestimating-the-pace-of-climate-change/.

Part I briefly summarizes what we are learning about the pace and magnitude of climate change impacts and the need for rapid responses. Part II demonstrates the magnitude and urgency of new renewable energy infrastructure needed to fulfill Green New Deal goals. Part III points to the intensity of pushback renewable energy has faced under existing environmental laws. Part IV uses the Texas wind power experience to argue that mobilizing the Green New Deal energy transition will require resolving significant trade-offs regarding environmental protection, property rights, process, and sovereignty. Ultimately, for the Green New Deal to succeed in its renewable energy (and other) infrastructure agendas, environmental law will need to adapt. Whether this means more streamlined, top-down, preemptive processes, including extensive use of eminent domain powers, remains to be seen. But now is the time to question openly whether the Green New Deal can be achieved in a timely manner that also satisfies demands for environmental protection, distributive justice, and public participation.

I. FASTER AND STRONGER

Recent studies demonstrate two alarming trends: climate change is having effects in some contexts much sooner than anticipated in even recent scientific models,[34] and many of its effects will be more severe than has been estimated.[35] This is not a case in which faster and stronger call for cheers.

Green New Deal advocates point to these trends as all the more reason to support their mobilization agenda.[36] They make a strong case, but the consequence is that the mobilization also must be faster and stronger. But how much faster, and how much stronger? No one precisely knows. As a

34. *See* IPCC, SUMMARY FOR POLICYMAKERS: SPECIAL REPORT ON THE OCEAN AND CRYOSPHERE IN A CHANGING CLIMATE 7 (2019), https://www.ipcc.ch/site/assets/uploads/sites/3/2019/11/03_SROCC_SPM_FINAL.pdf (identifying effects of climate change on oceans, polar areas, and high-altitude glaciers that are taking hold faster than previously predicted); Oreskes et al., *supra* note 33 (warning that recent studies show escalating effects of climate change); Jonathan Tirone, *New Satellite Photos Show Climate Change is Sweeping Europe*, BLOOMBERG (Apr. 9, 2019), https://www.bloomberg.com/news/features/2019-04-09/new-satellite-photos-show-europe-s-changing-climate (highlighting the acceleration of climate change events in Europe).

35. *See* CLIMATE CENTRAL, *supra* note 32 (using advanced satellite imagery to correct for prior land level elevations measured from tree-tops instead of ground-level, meaning inundation will be more expansive for any given sea-level rise than previously estimated); IPCC, GLOBAL WARMING, *supra* note 26 (estimating the severity of impacts); IPBES, SUMMARY FOR POLICYMAKERS: THE GLOBAL ASSESSMENT REPORT ON BIODIVERSITY AND ECOSYSTEM SERVICES 12 (2019), https://ipbes.net/sites/default/files/2020-02/ipbes_global_assessment_report_summary_for_policymakers_en.pdf (explaining that biodiversity loss is happening more extensively and rapidly).

36. Lisa Friedman & Glenn Thrush, *Liberal Democrats Formally Call for a "Green New Deal," Giving Substance to a Rallying Cry*, N.Y. TIMES (Feb. 7, 2019), https://www.nytimes.com/2019/02/07/climate/green-new-deal.html.

recent *New York Times* editorial described it, there is no "cliff" we fall off of at a certain time if greenhouse gas emissions are not curtailed; rather, we are on a "slope we slide down."[37] But the angle of that slope is not the same all the way—it gets steeper the longer we delay action. To contain climate change to a 2°C warming scenario, recent studies strongly support the necessity of reducing greenhouse gas emissions at least 50% by 2030, and to move to net zero, if not net *negative*, by 2050.[38] Taking these as policy goals with fixed dates of achievement, every year we delay significant reduction of emissions means compressing the aggregate emissions reductions into a shorter time frame. In short, "every year of postponed peaking means that deeper and faster cuts will be required."[39]

Yet, there is no evidence that global greenhouse gas emission levels have peaked and turned the corner.[40] In November 2019, the International Energy Agency (IEA) estimated that world energy demand will continue to rise by 1.3% per year until 2040, and that the rise in greenhouse gas emissions, even with shifts already underway to renewable energy sources, will not peak before 2040.[41] Report after report issued in 2019 confirmed that there is little to suggest that emission reduction goals set through various international and domestic institutions are on track to be achieved.[42] Even the most climate-progressive states in the United States are falling behind.[43] This is mostly, but not all, due to politics. The inertia of infrastructure and time needed for

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37. Gernot Wagner & Constantine Samaras, Opinion, *Do We Really Have Only 12 Years to Avoid Climate Disaster?*, N.Y. TIMES (Sept. 19, 2019), https://www.nytimes.com/2019/09/19/opinion/climate-change-12-years.html.

38. *An Equitable Path to Net-Zero Emissions*, NATURE, Dec. 5, 2019, at 7; *Negative Emissions: The Chronic Complexity of Carbon Capture*, ECONOMIST, Dec. 7, 2019, at 22.

39. UN ENV'T PROGRAMME, *supra* note 29, at v.

40. *Id*.

41. INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK: EXECUTIVE SUMMARY 1 (2019), https://iea.blob.core.windows.net/assets/1f6bf453-3317-4799-ae7b-9cc6429c81d8/English-WEO-2019-ES.pdf.

42. UN ENV'T PROGRAMME, *supra* note 29, at v (noting that global greenhouse gas emissions rose on average 1.5 % annually over the past decade and "[t]here is no sign of GHG emissions peaking in the next few years"); ROBERT WATSON ET AL., FEU-US, THE TRUTH BEHIND THE CLIMATE PLEDGES, at i (2019), https://feu-us.org/behind-the-climate-pledges/ ("An analysis of current commitments to reduce emissions between 2020 and 2030 shows that almost 75 percent of the climate pledges are partially or totally insufficient to contribute to reducing GHG emissions by 50 percent by 2030, and some of these pledges are unlikely to be achieved.").

43. CITIZENS BUDGET COMM'N, GETTING GREENER: COST EFFECTIVE OPTIONS FOR ACHIEVING NEW YORK STATE'S GREENHOUSE GAS GOALS 1–2 (2019), https://cbcny.org/sites/default/files/media/files/REPORT_GettingGreener_120602019.pdf (identifying obstacles to achieving emission reduction goals); NEXT 10, CALIFORNIA GREEN INNOVATION INDEX 4 (2019), https://www.next10.org/sites/default/files/2019-10/2019-california-green-innovation-index-final.pdf ("California will reach its 2030 and 2050 goals in 2061 and 2157, respectively—representing a 31-year and a 107-year delay.").

turnover also plays a role.[44] For example, the average car on the road in the United States today is 12 years old, meaning cars sold in 2020 will continue to require gasoline until 2032, on average.[45] And there is little prospect that the new car fleet will become all-electric anytime soon—although electric car sales are rising, they still make up only less than 2% of the U.S. market[46]—meaning new combustion engine vehicles will continue to be put on the roads for many years to come. Similarly, given the enormous gap between domestic energy usage and current renewable power capacity (discussed below),[47] we will rely on fossil fuels to meet much, if not most, of our energy needs for decades to come. Indeed, the CO_2 emissions committed from existing fossil fuel power plants and those currently planned, permitted, and under construction (which are mostly in China and India) will alone consume the entire CO_2 budget that remains to limit warming to 1.5°C.[48] A significant decline in overall energy demand also is not likely. The U.S. Energy Information Administration (EIA) projects low but continued growth in U.S. end-use sector energy demand through 2050, even taking into account offsets from expected efficiency gains.[49] Turning the corner on emissions thus will require aggressive decommissioning of expiring fossil fuel infrastructure (which in itself presents environmental impact assessment issues) simultaneously with aggressive introduction of the new renewable (and clean) energy infrastructure.

To compound matters even more, it is not even clear that the goals demanded in recent studies and promised in a multitude of government instruments are actually enough to stall the effects of climate change. A constant background concern is that the climate system dynamically operates with multiple interrelated "tipping points" that, once crossed, cascade the effect and make it more resistant to reversal through emissions reductions.[50] An example is that loss of arctic sea ice amplifies regional warming, which

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44. *See* JAMES H. WILLIAMS ET AL., US 2050 TECHNICAL REPORT: PATHWAYS TO DEEP DECARBONIZATION IN THE UNITED STATES, at xv (2014), https://usddpp.org/downloads/2014-technical-report.pdf (highlighting that we must account for infrastructure turnover in our greenhouse gas reduction goals).

45. Wagner & Samaras, *supra* note 37.

46. EDISON ELECTRIC INST., ELECTRIC VEHICLE SALES: FACTS AND FIGURES (Apr. 2019), https://www.eei.org/issuesandpolicy/electrictransportation/Documents/FINAL_EV_Sales_Update_April2019.pdf.

47. *See infra* text accompanying notes 61–62.

48. Dan Tong et al., *Committed Emissions from Existing Energy Infrastructure Jeopardize 1.5°C Climate Target*, 572 NATURE 373, 373 (2019).

49. U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2019, at 90 (2019), https://www.eia.gov/outlooks/aeo/pdf/aeo2019.pdf.

50. Timothy M. Lenton et al., *Climate Tipping Points—Too Risky to Bet Against*, 575 NATURE 592, 592 (2019).

leads to more loss of sea ice, and so on.[51] In November 2019, a team of scientists warned that these tipping points may be approaching sooner than was previously thought and have more widespread impacts than anticipated.[52] This means the emission reduction goals currently used as the benchmarks, and which are in dire jeopardy of not being achieved, possibly understate how fast the reductions need to occur.

To have any real chance of success, therefore, the Green New Deal mobilization must be swift and relentless. It has to start today. As the next Part shows, Green New Deal advocates are well aware of the urgency and have charted such an agenda. It is not as clear, however, that the Green New Deal designers fully appreciate the scale of transition they have proposed.

II. HOW MUCH DO WE NEED?

As the Pathways to Deep Decarbonization project outlines,[53] a three-pronged strategy must be adopted for an energy transition scenario to succeed in reducing greenhouse gas emissions at levels and in time frames needed to contain climate change to a 2°C scenario:

> Deep decarbonization requires three fundamental changes in the U.S. energy system: (1) highly efficient end use of energy in buildings, transportation, and industry; (2) decarbonization of electricity and other fuels; and (3) fuel switching of end uses to electricity and other low-carbon supplies. All of these changes are needed, across all sectors of the economy, to meet the target of an 80% GHG reduction below 1990 levels by 2050.[54]

To achieve these, the core Green New Deal goal is to reduce human sources of greenhouse gases globally by "40 to 60 percent from 2010 levels by 2030" and achieve "net-zero global emissions by 2050."[55] Among the ambitious measures the Green New Deal advocates for doing so is "meeting 100 percent of the power demand in the United States through clean,

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51. *Id*.
52. *Id*. at 595.
53. *See* WILLIAMS ET AL., *supra* note 44, at xv.
54. *Id*. (emphasis omitted). *See also* THE WHITE HOUSE, MID-CENTURY STRATEGY FOR DEEP DECARBONIZATION 7 (2015), https://unfccc.int/files/focus/long-term_strategies/application/pdf/mid_century_strategy_report-final_red.pdf (emphasis omitted) (aiming to "transition[] to a low-carbon energy system, by cutting energy waste, decarbonizing the electricity system and deploying clean electricity and low carbon fuels in the transportation, buildings, and industrial sectors"). There is growing concern that even these initiatives, if achieved, will not suffice, and that carbon dioxide removal technologies must be developed to facilitate net negative emissions. *Negative Emissions*, *supra* note 38.
55. H.R. Res. 109, 116th Cong., Whereas Clause (2019).

renewable, and zero-emission energy sources."[56] The Green New Deal sets an aspirational ten-year timeframe for this and other goals of its "Green New Deal mobilization."[57] Whether nuclear power is in that energy mix is not specifically addressed in the Resolution. A "Launch" fact sheet document that briefly appeared on Representative Ocasio-Cortez's website the day she introduced the Resolution anticipates building no new nuclear plants and decommissioning all existing plants as soon as possible, ideally within ten years.[58] Although that document is not part of the Resolution, it may suggest what advocates of the Green New Deal will work towards in energy policy, if they get the opportunity to steer that policy space.[59] For illustration purposes, therefore, assume as a starting point that nuclear power is phased out of our nation's energy mix, as in "no new nukes."[60]

On that assumption, what is the gap that renewable energy sources must fill in for an "all renewables" policy? Answering this question involves projecting two scenarios—how much demand for energy will there be that must be satisfied from renewable energy, and how much new renewable energy generating capacity will be needed to meet that demand? Many factors, particularly the pace of technological change and global economic performance, are in play in answering those questions, producing a relatively wide range of possibilities. Some representative scenarios illustrate the magnitude of renewable energy infrastructure needed to fulfill the Green New Deal mobilization.

On the demand side, according to the EIA, the four energy end-user sectors—transportation, industrial, residential, and commercial—consumed 75.9 quadrillion BTUs (quads) of energy from all sources in 2018, a record

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56. *Id.* § (2)(C).

57. *Id.* § (2).

58. *Green New Deal: Fact Sheet*, https://assets.documentcloud.org/documents/5729035/Green-New-Deal-FAQ.pdf (last visited Apr. 28, 2020); *see also* Lisa Friedman, *What Is the Green New Deal? A Climate Proposal, Explained*, N.Y. TIMES (Feb. 21, 2019) (explaining that Representative Ocasio-Cortez's office initially distributed the fact sheet, but later retracted it).

59. A coalition of over 250 organizations advocating for adoption of the Green New Deal recently urged Congress to "reject expensive false solutions that extend our reliance on dirty energy, including biomass, nuclear, and carbon capture and storage." *250+ Groups Call on House Select Committee on the Climate Crisis to Heed Green New Deal,* FRIENDS OF THE EARTH (Nov. 22, 2019), https://foe.org/news/250-groups-call-house-select-committee-climate-crisis-heed-green-new-deal/ (linking to the letter and listing all the groups calling on the Committee for action).

60. To a large extent, whether new nuclear power infrastructure is in or out of the Green New Deal does not change the basic thesis of this Essay—new nuclear power facilities would face stiff opposition and be mired in lengthy permitting and litigation ordeals under existing environmental laws. *See* Brad Plumer, *Why America Abandoned Nuclear Power (and What We Can Learn From South Korea)*, VOX (Feb. 29, 2016), https://www.vox.com/2016/2/29/11132930/nuclear-power-costs-us-france-korea (noting that, after the *Calvert Cliffs* decision, citizen suits under the NEPA increased against nuclear plants).

high (this does not include the 38.3 quads of primary energy the electric power sector consumed to produce the electricity the other sectors consumed, which would be largely unnecessary in an all-renewable power scenario).[61] Of that amount, 11.5 quads—11% of the total—were supplied from renewable energy sources (geothermal, solar, wind, biomass, and hydroelectric).[62]

Boosting the share of demand supplied by renewable sources involves three related infrastructure initiatives. First, we have to build the renewable generating capacity to serve the 64.4 quads of end-use demand currently served by other sources.[63] Second, to the extent the new renewable generating facilities are not located near the existing electricity transmission grid, new transmission lines will need to be constructed.[64] Third—and just as important—we have to shift end uses currently consuming fossil fuel energy sources to using electricity as their energy source. This is not an insurmountable challenge for residential and commercial sectors, which consume primarily electricity and natural gas, as residential and commercial buildings can relatively easily switch from natural gas to electricity for much of their heating and cooking needs.[65] By contrast, the transportation sector depends on petroleum for over 90% of its energy, and the industrial sector depends on fossil fuels for over 75%.[66] Moving those two sectors, which combined consume two and a half times more energy than the residential and commercial sectors combined, into electricity will be a daunting challenge.[67] In short, it is not enough that we build out wind and solar generating facilities—we must build more transmission infrastructure to move the clean electricity *and* reconfigure the end-user infrastructure to use it.

Even assuming substantial progress is made on transmission and end-user infrastructures, to go "all renewable" will require a transition of the 64.4 quads currently supplied from other sources (petroleum, natural gas, coal, and nuclear) to renewable sources of electricity.[68] This is a monumental

61. *See U.S. Energy Facts Explained,* U.S. ENERGY INFO. ADMIN. (Aug. 28, 2019), https://www.eia.gov/energyexplained/us-energy-facts/ (showing that, in 2018, the transportation sector used 28.3 quads, the industrial sector used 26.3 quads, the residential sector used 11.9 quads, and the commercial sector used 9.4 quads, for a total of 75.9 quads).

62. *Id*.

63. *Id.*

64. *See infra* Part IV (discussing the Texas CREZ project, and how the transmission challenge for electric vehicles extends all the way to the charging unit infrastructure).

65. U.S. ENERGY INFO. ADMIN., *supra* note 61.

66. *Id*.

67. *See* WILLIAMS ET AL., *supra* note 44, at xv ("[T]ransformation would be required in other sectors . . . . The average fleet fuel economy of [light duty vehicles] would need to exceed 100 miles per gallon . . . . This would require the deployment of roughly 300 million alternative fuel vehicles by 2050.").

68. U.S. ENERGY INFO. ADMIN., *supra* note 61.

undertaking. To translate into more functional terms, a terawatt hour is the electrical energy consumption rate equal to a trillion watts consumed in one hour, and a quad equals 293 terawatt hours.[69] The "all renewable" scenario thus requires installing new renewable power generating capacity capable of supporting consumption demand of 18,874 terawatt hours.[70] Simply as a reference point, Texas, the leading state in wind power generation by far, is projected to have the capacity to supply 87 terawatt hours from wind in 2020.[71]

As a practical matter, however, virtually every assessment supports the conclusion that "[p]olicy makers should treat with caution any visions of a rapid, reliable, and low-cost transition to entire energy systems that relies almost exclusively on wind, solar, and hydroelectric power."[72] It is more realistic to chart a "high renewables" agenda that includes some nuclear and substantial "clean" fossil fuel sources, such as natural gas, for decades to come.[73] Relaxing the "no new nukes" constraint would help take the pressure off of renewable sources. Electricity generated from nuclear power facilities supplied 8% of end-use energy consumption in 2018[74] and could go substantially higher with new facilities, albeit not without overcoming the ferocious opposition any proposal for a new nuclear facility will undoubtedly confront.[75] For fossil fuels, it is not credible that we can fully transition out of them swiftly.[76] Even if we tried, the reality is that, under foreseeable technology innovation, not every use of energy in the United States can convert to electric power, particularly in the transportation sector (e.g., jets) and manufacturing sector (e.g., cement and steel).[77] For these and other

69. *See, e.g.*, *Convert Quads to Terawatt Hours*, KYLE'S CONVERTER, http://www.kylesconverter.com/energy,-work,-and-heat/quads-to-terawatt-hours (providing an online converter) (last visited Apr. 28, 2019).

70. *See id.* (converting 64.4 quads into 18,874 terawatt hours).

71. Press Release, Rystad Energy, Red States Go Green: Texas Wind Power on Track to Outpace Coal by 2020 (Sept. 19, 2019), https://www.rystadenergy.com/newsevents/news/press-releases/red-states-go-green-texas-wind-power-on-track-to-outpace-coal-by-2020/.

72. Christopher T.M. Clack et al., *Evaluation of a Proposal for Reliable Low-Cost Grid Power with 100% Wind, Water, and Solar*, 114 PROC. NAT. ACAD. SCI. 6722, 6722 (2017).

73. WILLIAMS ET AL., *supra* note 44, at xiii. The Deep Decarbonization Pathways project outlines four distinct scenarios employing substantially different decarbonization strategies, but all of which met the targets: High Renewable, High Nuclear, High CCS, and Mixed Cases. These primarily differ in the principal form of primary energy used in electricity generation, and in other aspects of energy supply and demand. That all met the target demonstrates that redundant technology pathways to deep decarbonization exist.

74. U.S. ENERGY INFO. ADMIN., *supra* note 61.

75. *See* Plumer, *supra* note 60 (discussing the slow permitting process surrounding nuclear development and negativity from some environmental groups).

76. Clack et al., *supra* note 72, at 6723.

77. Antonio García-Olivares et al., *Transportation in a 100% Renewable Energy System*, 158 ENERGY CONVERSION & MGMT. 266, 270 (2018). Transportation is perhaps the most difficult sector to

pragmatic reasons, the Democratic-led House of Representatives Committee on Energy and Commerce in 2020 issued its vision for legislation that would set "clean energy" as the goal to reducing emissions, which would accommodate nuclear power as well as natural gas and coal sources if they meet prescribed emission efficiency standards.[78]

Still, even assuming the Green New Deal goal is scaled back to a high renewables agenda, we can safely assume for planning purposes that new renewable energy infrastructure capable of satisfying 10,000 to 15,000 terawatt hours (roughly 30 to 50 quads) of energy demand will need to come on line by mid-century at the latest in order to get substantial traction on the Green New Deal's greenhouse gas emission reduction goals.[79] That is between three and five times the amount of renewable energy being consumed today.[80]

How much new renewable power generating capacity will be required to meet that aspired consumption demand? This is not a straightforward analysis either, as it depends on many factors. A key determinant is the capacity factor, the actual energy output from a generating plant over a period of time, usually framed as a year, as a fraction or percentage of the plant's capacity.[81] For coal and natural gas plants, the capacity factor generally reflects how much the plant is used and not shut down for maintenance or malfunction.[82] For wind turbines, the capacity factor is mostly a matter of how much and how fast the wind blows, since the turbine output varies with wind speed.[83] The capacity factor for wind power in the United States is usually 30% to 40%.[84] Solar power capacity likewise depends on its energy

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move close to an all-renewable power scenario and can only get close by assuming substantial changes in transportation technology and behavior. *Id.* at 267, 277.

78. H. COMM. ENERGY & COMMERCE, 116TH CONG., THE CLEAN FUTURE ACT 4–5 (Jan. 8, 2020), https://energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/documents/CLEAN%20Future%20Act%20Memo%2001.08.20.pdf.

79. *See* H.R. Res. 109, 116th Cong., Whereas Clause (2019) (outlining the Green New Deal's emission reduction dates).

80. *See supra* text accompanying note 62. Public and private energy conservation and demand reduction initiatives can also help take pressure off of the amount of energy source transition needed, and there is good reason to believe that private corporate incentives could drive substantial energy conservation. MICHAEL P. VANDENBERGH & JONATHAN M. GILLIGAN, BEYOND POLITICS: THE PRIVATE GOVERNANCE RESPONSE TO CLIMATE CHANGE 222–24 (2017).

81. Mike Mueller, *What Is Generation Capacity?*, U.S. DEP'T ENERGY (Jan. 29, 2018), https://www.energy.gov/ne/articles/what-generation-capacity.

82. *Id.*

83. *Cf. Wind Turbine Heights and Capacities Have Increased Over the Past Decade*, U.S. ENERGY INFO. ADMIN. (Nov. 29, 2017), https://www.eia.gov/todayinenergy/detail.php?id=33912 (explaining that turbine capacity increased alongside turbine height because wind speeds generally increase at higher altitudes, and also noting that blade length impacts turbine capacity).

84. Mueller, *supra* note 81. By contrast, nuclear energy has a capacity factor of around 92%, natural gas around 56%, and coal around 48%. *Id.*

source, the sun, which obviously is not shining all the time, and has a capacity factor of 20% to 30%.[85] Estimating the demand a facility can supply, therefore, requires factoring in this capacity factor fraction. For example, if a wind turbine capable of generating one megawatt of power has a capacity factor of 25%, its annual output is 2,190 megawatt hours (1 MW × 365 days × 24 hours × 0.25 = 2,190 MWh).

The other key factor on the supply side is transmission efficiency. The energy generated at a power facility has to travel to the consumer, and, along the way, some energy is lost due to resistance in the lines.[86] The EIA estimates that about 5% of the electricity that is transmitted and distributed is lost annually.[87]

A number of technological and other advancements could help reduce demand and improve capacity and transmission efficiencies. Energy conservation behavior could improve, as could the efficiency of end-use products from household appliances to electric vehicles.[88] There are energy-loss efficiencies that will be realized by converting to renewable electric energy as opposed to fossil fuel sources, especially in transportation.[89] Energy losses in the production and transmission of electricity could be further reduced through technological advancements, such as converting transmission to direct current lines and by improving the energy capture and storage efficiencies of wind turbines, solar receptors, and storage batteries.[90] Nevertheless, these behavioral and technological possibilities do not move the needle on demand or supply until they are developed and scaled up in production and use.[91] They should be pursued, but counting on them to "save

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85. *Id.*

86. *Frequently Asked Questions: How Much Electricity Is Lost in Electricity Transmission and Distribution in the United States?*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/tools/faqs/faq.php?id=105&t=3 (last updated Dec. 31, 2019).

87. *Id*.

88. *See* Tom King & Alex Laskey, *America: The Worldwide Leader in Wasting Energy*, FORBES (Feb. 22, 2013), https://www.forbes.com/sites/ciocentral/2013/02/22/america-the-worldwide-leader-in-wasting-energy/#70b32d6d1985 (pointing out that the United States ranks first in the world in energy waste and describing that chronically low energy productivity costs American businesses and households billions per year).

89. *See All-Electric Vehicles,* U.S. DEP'T OF ENERGY, OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY, https://www.fueleconomy.gov/feg/evtech.shtml (last visited Apr. 28, 2020) (highlighting that electric vehicles convert significantly more energy from the grid into power than traditional gas-powered vehicles).

90. Roger Faulkner, *AC vs. DC Powerlines and the Electrical Grid*, ENERGY CENTRAL (Apr. 2, 2013), https://www.energycentral.com/c/ec/ac-vs-dc-powerlines-and-electrical-grid.

91. *See* Alex Rau et al., *Can Technology Really Save Us From Climate Change?*, HARV. BUS. REV., Jan.–Feb. 2010, https://hbr.org/2010/01/can-technology-really-save-us-from-climate-change (exploring different approaches to address the lag between energy innovations and general adoption by the public).

the day," and thus waiting on the new technology before fully engaging a robust renewable energy agenda, would be a folly.

With that background, using a high renewables reference case incorporating plausible positive assumptions about conservation practices and technological innovation over time, the Pathways to Deep Decarbonization estimate of new generating capacity needed to meet projected demand is daunting:

> [M]eeting the 2050 target requires almost fully decarbonizing electricity supply and switching a large share of end uses from direct combustion of fossil fuels to electricity (e.g., electric vehicles), or fuels produced from electricity (e.g., hydrogen from electrolysis). In our four decarbonization cases, the use of electricity and fuels produced from electricity increases from around 20% at present to more than 50% by 2050.
>
> As a result, electricity generation would need to approximately double (an increase of 60-110% across scenarios) by 2050 while its carbon intensity is reduced to 3-10% of its current level. Concretely, this would require the deployment of roughly 2,500 gigawatts (GW) of wind and solar generation (*30 times present capacity*) in a high renewables scenario . . . .[92]

Similarly, the Obama Administration's Mid-Century Strategy for Deep Decarbonization adopted a benchmark scenario using a high renewables approach accommodating some nuclear and fossil fuel sources and incorporating positive assumptions regarding efficiency gains and technological innovations.[93] Under its scenario:

> Solar and wind energy account for the majority of capacity additions, with deployments of roughly 30 GW per year between 2016 and 2035 and over 50 GW per year between 2035 and 2050. This will require an increase in annual gigawatts of capacity additions of about 6 percent per year from 2020-2050 from the current expected pace of roughly 20 GW per year between 2016 and 2020.[94]

These two estimates frame a range of between 1,350 and 2,500 gigawatts of new wind and solar renewable power generating capacity that must come

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92. WILLIAMS ET AL., *supra* note 44, at vii (emphasis added).
93. THE WHITE HOUSE, *supra* note 54, at 47.
94. *Id*. at 48.

online between today and 2050—roughly 15 to 30 times the present generating capacity.[95] As Michael Gerrard recently concluded from his similar demand and capacity scenarios assessment, even a high renewables agenda falling short of the Green New Deal's goals for renewable energy transition thus calls "for the construction of a massive number of new central station renewable energy facilities, mostly wind and solar—many times higher than the amount of such construction ever previously achieved."[96]

This immediately raises two additional concerns beyond the challenge of financing and constructing solar, wind, and other commercial-scale renewable energy production facilities to fulfill the need. The first is the land mass required to house commercial scale energy facilities—the so-called "power density" factor.[97] To produce the same amount of electricity, solar and wind power generation need around 40 to 50 times more space than coal powered facilities and 90 to 100 times more space than natural gas powered facilities.[98] The second concern is transmission, given that prime areas for wind and solar generation do not necessarily (or even usually) correspond with existing transmission line and end-user geographies.[99] The Texas CREZ wind power project (discussed below),[100] for example, involved construction of 3,600 miles of new high-voltage transmission lines to move wind power produced in the rural Panhandle area to urban Texas markets.[101] The net effect is that renewable energy infrastructure, while reducing greenhouse gas emissions, can increase land-use impacts on habitat, urban neighborhoods, rural communities, and Native American cultural sites.[102]

Again, technological advances can help soften the land use blow. Land mass needs could be reduced by shifting to offshore wind production, albeit

95. *See id.* (calling for an additional 30 GW per year between 2016 and 2035, totaling 600 GW, and then an additional 50 GW per year between 2035 and 2050, totaling 750 GW, for an estimated total of 1,350 additional GW); WILLIAMS ET AL., *supra* note 44, at vii (calling for an additional 2,500 GW, representing 30 times the current capacity).

96. Gerrard, *supra* note 5, at 10,592.

97. *See* Uma Outka, *The Energy-Land Use Nexus*, 27 J. LAND USE & ENVTL. L. 245, 250–52 (2012) (discussing the massive amount of land needed for renewable energy production); John van Zalk & Paul Behrens, *The Spatial Extent of Renewable and Non-Renewable Power Generation: A Review and Meta-Analysis of Power Densities and Their Application in the U.S.*, 123 ENERGY POLICY 83, 83 (2018) (explaining that renewable energy typically has lower power density than other sources because of the physical space required).

98. van Zalk & Behrens, *supra* note 97, at 91 (2018).

99. Welton & Eisen, *supra* note 19, at 361; NAT'L COUNCIL ON ENERGY POLICY, ELECTRICITY TRANSMISSION: A PRIMER 14 (2004), https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/primer.pdf.

100. *See infra* notes 133–47 and accompanying text.

101. WARREN LASHER, THE COMPETITIVE RENEWABLE ENERGY ZONES PROCESS 8 (2014), https://www.energy.gov/sites/prod/files/2014/08/f18/c_lasher_qer_santafe_presentation.pdf.

102. Welton & Eisen, *supra* note 19, at 360–62.

that has presented its own set of siting and environmental compliance controversies.[103] Although considerably more expensive, transmission lines can be located underground to reduce aesthetic impacts, although trenching causes habitat disturbance and surface utility easements are still required.[104] The need for new commercial facilities and transmission lines can be reduced through distributed energy sources such as rooftop solar units.[105] For example, although it is an aggressive scenario, maximizing use of suitable rooftop spaces throughout the United States for solar power has been estimated as able to generate electricity equal to 39% of total current national electric sales—about 1,432 terawatt hours (4.9 quads).[106] That is but a dent in the total needed, but every little bit counts.

Still, as all new land uses present siting approval challenges, the prospect of siting the new commercial-scale renewable power generation and transmission infrastructure that lies ahead, even with generous assumptions about conservation, efficiency gains, and technology advancements, is an unprecedented undertaking. Yet, it is by no means an impossible undertaking. Impressively, renewable energy generation "provided a new record of 742 million megawatt hours . . . of electricity in 2018, nearly double the 382 million . . . produced in 2008," with the vast majority of the increases coming from solar and wind power.[107] But the pace must pick up considerably, and as noted it is equally as important to convert much of the energy consumption infrastructure, such as vehicles, to electric.

In short, if time is as much of the essence as the climate science and policy goals suggest,[108] we must begin building the renewable energy infrastructure and the new wave of vehicles and other end-use units with current technology, integrating new technology as it develops. This will be, to say the least, the most ambitious infrastructure project in our nation's history. To succeed, it must start now, go nationwide, and progress rapidly.

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103. See *infra* notes 111–13, 126–27 and accompanying text discussing the Cape Wind project.

104. *The Basics of Underground Power Transmission Lines*, ELEC. ENG'G PORTAL, https://electrical-engineering-portal.com/download-center/books-and-guides/power-substations/underground-power-transmission-lines (last visited Apr. 28, 2020).

105. *See* Jacques Leslie, *Utilities Grapple with Rooftop Solar and the New Energy Landscape*, YALE ENV'T 360 (Aug. 31, 2017), https://e360.yale.edu/features/utilities-grapple-with-rooftop-solar-and-the-new-energy-landscape (describing how distributed energy resources divert customers away from the grid and "defer infrastructure expansion by producing decentralized, renewable energy or by improving energy efficiency").

106. PIETER GAGNON ET AL., NAT'L RENEWABLE ENERGY LAB., ROOFTOP SOLAR VOLTAIC TECHNICAL POTENTIAL IN THE UNITED STATES: A DETAILED ASSESSMENT 34 (2016), https://www.nrel.gov/docs/fy16osti/65298.pdf.

107. *U.S. Renewable Electricity Generation Has Doubled Since 2008*, U.S. ENERGY INFO. ADMIN. (Mar. 19, 2019), https://www.eia.gov/todayinenergy/detail.php?id=38752.

108. *See supra* Part I.

Based on past experience with opposition to deploying renewable energy infrastructure—good luck with that.

III. THE RESISTANCE

Most people do not like the idea of an oil pipeline or electric transmission line running through their backyard.[109] Guess what—they do not like the idea of wind turbines or solar panels in their backyard, either.[110] For all its "greenness," renewable energy of all varieties has faced stiff opposition in many instances from a broad span of interests attacking on many fronts.

Local NIMBY opposition has been a prominent battleground.[111] Commercial-scale solar and wind power projects, which take up large areas and are highly visible, have enjoyed no "halo effect" at the local level.[112] The poster child for this is the Cape Wind offshore wind power project, which over the course of 16 years faced a gauntlet of challenges from affluent Cape Cod communities, Tribal groups, and other interests.[113] Solar facilities face similar objections. For example, San Bernardino County in California recently placed stiff restrictions on commercial-scale solar and other energy projects in desert areas of the county, citing protection of scenic views as a major reason, along with habitat protection.[114]

Another source of opposition is conflicts between renewable energy projects and existing commercial uses of the siting area needed. For example,

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109. *See, e.g.,* Mose Buchele, *Hill Country Landowners Get Ready for Another Pipeline Fight*, KUT (Oct. 2, 2019), https://www.kut.org/post/hill-country-landowners-get-ready-another-pipeline-fight (recounting Texas City residents' opposition to a crude oil pipeline).

110. *See, e.g.*, Robert Bryce, *San Bernardino County Says No to Big Renewables*, NAT'L REV. (Mar. 7, 2019), https://www.nationalreview.com/2019/03/renewable-energy-land-use-san-bernardino-county/ ("All across the country rural landowners and governments have been rejecting or restricting renewable projects . . . .").

111. Indeed, the assaults on renewable energy are so pervasive they prompted the creation of a law school pro-bono clinic to offer free legal assistance to renewable energy projects facing NIMBY opposition. *Renewable Energy Legal Defense Initiative*, SABIN CTR. FOR CLIMATE CHANGE L., https://climate.law.columbia.edu/content/renewable-energy-legal-defense-initiative (last visited Apr. 28, 2020).

112. David R. Baker & Millicent Dent, *NIMBYs Shoot Down Green Projects Next Door While the Planet Burns*, BLOOMBERG (Sept 17, 2019), https://www.bloomberg.com/news/features/2019-09-17/nimbys-shoot-down-green-projects-next-door-while-planet-burns.

113. Gerrard, *supra* note 5, at 10,600. For thorough timelines of the Cape Wind saga, see *Cape Wind*, U.S. DEP'T OF INTERIOR, BUREAU OF OCEAN ENERGY MGMT., https://www.boem.gov/renewable-energy/studies/cape-wind, and *Timeline of the Cape Wind Project*, CAPE COD TIMES (Dec. 2, 2017), https://www.capecodtimes.com/news/20171202/timeline-of-cape-wind-project.

114. Sandra Emerson, *It's Lights Out on Big Solar in San Bernardino County Desert*, SAN BERNARDINO SUN (Feb. 28, 2019), https://www.sbsun.com/2019/02/28/san-bernardino-county-board-to-prohibit-renewable-energy-development-in-key-desert-areas/.

offshore wind turbine projects have met resistance from commercial fishing interests, such as the scallop fishing and squid trawling groups that have opposed the prospect of offshore wind projects from Long Island to Massachusetts.[115] Broader and less visible business interest conflicts also pose barriers. The Trump Administration's support for the coal industry, for example, coincides with a slowing down of renewable energy project approvals on federal public lands.[116]

Environmental protection interests have also impeded the adoption of renewable energy by imposing demanding conditions on projects. In one case, for example, local opponents to a wind power project—that was projected to kill 26 protected bats over the course of 5 years of operation, and which agreed to mitigation measures that would have fully offset the impact of those losses for the species and would have actually improved the species's chances of recovery—argued that the project should nonetheless sacrifice substantial energy-generating capacity to reduce the number of bat mortalities.[117] As Professor David Spence has shown, this kind of local environmental group opposition (perhaps working in concert with NIMBY interests), has split the environmental protection interest group community in general, with national entities generally supporting commercial-scale renewable energy while their local chapters and other local groups often oppose it.[118]

Indeed, as Spence meticulously details, the sum total of opposition to renewable energy infrastructure, coming as it has from NIMBY, business, labor, environmental, and other interests, has led to the proliferation of non-governmental organizations (NGO) opposing solar facilities, wind facilities, and transmission lines carrying renewable energy in number and scale that rivals the NGOs opposing fossil fuel energy infrastructure projects.[119] These anti-renewable NGOs cite economic, environmental, and health concerns as reasons for opposition about as much as do the anti-fossil fuel NGOs, but cite justice concerns much less.[120] The anti-renewable NGOs also use legal intervention and political mobilization as opposition tactics at rates similar

115. Christopher Martin & Jennifer A. Dlouhy, *New York's Prized Sea Scallop Faces Off Against Offshore Wind*, BLOOMBERG (May 23, 2019), https://www.bloomberg.com/news/articles/2019-05-23/new-york-s-prized-sea-scallop-faces-off-against-offshore-wind; Benjamin Storrow & David Iaconangelo, *Wind Turbines and Fishing Nets Fight for Offshore Space*, E&E NEWS (Sept. 6, 2019), https://www.eenews.net/stories/1061111175.

116. Bobby Magill, *Renewables on Federal Land Hit Regulatory Snarl, Advocates Warn*, BLOOMBERG (Apr. 30, 2019), https://news.bloombergenvironment.com/environment-and-energy/renewables-on-federal-land-hit-regulatory-snarl-advocates-warn.

117. Union Neighbors United, Inc. v. Jewell, 831 F.3d 564, 568, 572, 578, 583 (D.C. Cir. 2016).

118. Spence, *supra* note 1, at 382–83.

119. *Id*. at 384–85.

120. *Id*.

to their use by anti-fossil fuel NGOs, but use protest and economic boycott less.[121]

When anti-renewable NGOs use legal intervention as an opposition tactic, federal and state licensing and siting approval laws, and the ancillary environmental assessment and compliance laws that are triggered by them, are as formidable in the anti-renewable arsenal as they are in the anti-fossil fuel war room.[122] As Professor Michael Gerrard has documented, the National Environmental Policy Act and federal species protection laws, such as the Endangered Species Act, Migratory Bird Treaty Act, and Marine Mammal Protection Act, have been invoked in many anti-renewable litigation challenges, and additional federal statutes used in efforts to block or delay renewable energy projects include the Coastal Zone Management Act, Clean Water Act, Federal Land Management and Planning Act, and National Forest Management Act.[123]

To be sure, environmental protection is a worthy policy goal—we have dedicated our careers to this pursuit. But using this array of laws to block renewable energy, ostensibly in the interests of environmental protection, undermines the energy transition needed to abate climate change and protect the very resources that are at stake for the long term. This irony seems lost on the antagonists.

And even if the anti-renewable agenda does not block all projects directly, it threatens to delay many, and delay can effectively block projects indirectly. As Michael Gerrard sums up:

> Approval delays are costly in several ways. Construction costs may escalate. New technologies or requirements may compel a revision in designs, leading to further delays. Applicants may become so discouraged by the delays that they give up, or their financing may vanish, or local opposition to siting may grow. Lenders who require speedy returns may be deterred from engaging at all. During the years that a renewable facility is not yet operating, the energy needs it will fill may be provided by fossil fuel facilities that add to the cumulative load of greenhouse gases.[124]

Of course, this is not to say that every renewable energy project proposal should be rushed to construction without regard to environmental impacts. But it is clear that environmental law has been used as a pawn by some

121. *Id*.
122. *Id*. at 339–43.
123. Gerrard, *supra* note 5, at 10,595, 10,598, 10,603, 10,609–10.
124. *Id*. at 10,591.

interests to impede renewable energy or make sure it is located "somewhere else," and as a weapon by other interests whose environmental heart may be pure but whose environmental eyes may be blind to the goal of reducing greenhouse gas emissions quickly.[125] In short, has the anti-renewable agenda's use of environmental law to demand the perfect become the enemy of the good?

IV. THE TRADE-OFFS

Demanding environmental and aesthetic perfection has not gone well for renewable energy. As mentioned above, the Cape Wind offshore wind energy project faced a staggering cast of well-funded opponents who used an array of federal, state, and local siting and environmental compliance laws to grind the project into oblivion after a fight lasting over 16 years and costing the developers $100 million.[126] The project developers relinquished their offshore lease rights in 2018.[127] Elsewhere, the largest planned land-based wind farm in U.S. history, the 2,500 to 3,000 megawatt Chokecherry and Sierra Madre Wind Project located on federal land in Wyoming, in 2019, moved a significant step closer to final necessary federal environmental approval.[128] The project was proposed in 2008 and required many other federal, state, and local siting and environmental approvals along the way.[129] It will be completed, assuming no further delays due to litigation, in 2026—*18 years* after being proposed.[130] At 2,500 megawatts of generating capacity, the project could deliver about 0.1 to 0.2% of the 1,350 to 2,500 gigawatts of new renewable energy generating capacity needed under a high renewables scenario.[131] That leaves at least 99.8% to go, in 30 years at the most, if we are to meet the Green New Deal's goals.[132] If the Cape Wind and Chokecherry outcomes guide our future, this seems implausible.

By contrast, a more promising story is offered by the Texas Competitive Renewable Energy Zones (CREZ) project.[133] Beginning with state

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125. Baker & Dent, *supra* note 112.

126. Katharine Q. Seelye, *After 16 Years, Hopes for Cape Cod Wind Farm Float Away*, N.Y. TIMES (Dec. 19, 2017), https://www.nytimes.com/2017/12/19/us/offshore-cape-wind-farm.html.

127. *Cape Wind*, *supra* note 113.

128. Matthew Bandyk, *Largest Planned Wind Farm in US Gets Key Federal Approval*, UTIL. DIVE (Oct. 25, 2019), https://www.utilitydive.com/news/largest-planned-wind-farm-in-us-gets-key-federal-approval/565795/.

129. *Id*.

130. *Id*.

131. *See supra* note 95 and accompanying text.

132. *See* H.R. Res. 109, 116th Cong., Whereas Clause (2019) (aiming to reach carbon neutrality by the year 2050).

133. *See* LASHER, *supra* note 101, at 10 (documenting the successes of CREZ).

authorizing legislation in 2005 and ending with project completion in January 2014, in under ten years CREZ resulted in 3,600 miles of new high-voltage power lines being built to connect the wind-generating Texas Panhandle area to the state's major metropolitan areas.[134] The CREZ lines have a transmission capacity of 18.5 gigawatts.[135] At the time of project completion, the state reached an onshore wind generation output of 8,863 megawatts,[136] and in 2020 the state is projected to have the capacity to supply 87 terawatt hours from wind power sources alone.[137]

What explains the difference in outcomes? One factor stands out above all else: the Texas electricity grid, known as ERCOT, is separate from the national grid and thus not subject to rate regulation by the Federal Energy Regulatory Commission (FERC).[138] The Texas CREZ lines also crossed no federal lands, for which federal land management agency approval would have been required, and did not trigger any federal line siting authority.[139] Freedom from FERC oversight and federal siting approvals meant freedom from satisfying the NEPA environmental impact assessment process and the ESA agency consultation process, and Texas has no state equivalent to the NEPA or the ESA.[140] In other words, Texas was in charge of siting, construction, and transmission. Within the state, this meant the legislature was able to put the Public Utility Commission of Texas (PUCT) in charge.[141] Acting pursuant to the CREZ legislation, the PUCT process for approval of the transmission line locations was streamlined.[142] It also heavily relied on eminent domain, which led to considerable controversy.[143] The PUCT leaves it largely to wind power developers and landowners to determine where

134. *Id.* at 3, 8.

135. *Id*. at 8.

136. *Id*. at 9.

137. Rystad Energy, *supra* note 71.

138. R. Ryan Staine, Note, *CREZ II, Coming Soon to a Windy Texas Plain Near You?: Encouraging the Texas Renewable Energy Industry Through Transmission Investment*, 93 TEX. L. REV. 521, 533 (2014).

139. *Id*. Electric transmission line siting is subject to federal authority only in limited circumstances; siting is left primarily to the states. *See generally* Jim Rossi, *The Trojan Horse of Electric Power Transmission Line Siting Authority*, 30 ENVTL. L. 1015 (2009) (providing an overview of state electric transmission siting laws and proposals for greater federal authority); Debbie Swanstrom & Meredith M. Jolivert, *DOE Transmissions Corridor Designations & FERC Backstop Siting Authority: Has the Energy Policy Act of 2005 Succeeded in Stimulating the Development of New Transmission Facilities?*, 30 ENERGY L.J. 415 (2009) (examining the effect of the Energy Policy Act of 2005 on the siting of transmission projects).

140. Staine, *supra* note 138, at 533.

141. *Id*. at 529.

142. *Id*. at 530–31.

143. Edward Klump, *Texas Fight Could Ripple Across US Grid,* E&E NEWS (July 10, 2019), https://www.eenews.net/stories/1060718759.

turbines are located.[144] The PUCT also decided that the $7 billion cost of the project's infrastructure would be borne by all the ratepayers in the state, rather than only those benefitting from the CREZ lines, thus strengthening the case for bond financing.[145] To be sure, other factors, such as abundant wind and a deregulated energy market, facilitated the CREZ success,[146] but its speed of deployment was largely attributable to dedicated authorizing legislation and freedom from the multitude of environmental laws used to block other renewable energy projects.[147]

The contrast between the Cape Wind and Texas CREZ experiences does not determine which way is the right way to mobilize the Green New Deal energy transition, but it does suggest the trade-offs that will be necessary to resolve as we design the way forward. The Green New Deal must acknowledge that these trade-offs exist and integrate solutions at the front end of the mobilization. Waiting for them to become salient and deciding what to do about them then is simply poor governance.

The first is the trade-off between short-term and long-term environmental protection goals. Laws like the NEPA and the ESA empower environmental protection interests to demand renewable energy projects meet stringent short-term goals—the "kill zero bats" standard—when doing so may jeopardize the long-term goal of saving all the bats, so to speak.[148] Environmental laws can also serve as cover for other anti-renewable interests.[149] The core motivation behind the Green New Deal has to be to put renewable energy infrastructure on the ground (and in the water) as fast as possible so as to stem the massive environmental destruction that will fall on ecosystems globally if we do not. It may not be practicable to spare every bat's demise along the way.

The second trade-off involves property rights. The renewable energy infrastructure needed to fulfill the Green New Deal will take up space—a lot of space.[150] This necessarily will require use of eminent domain on private lands and interference with existing uses, such as cattle grazing and scallop fishing.[151] The use of eminent domain has been a lightning rod for fossil fuel

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144. Staine, *supra* note 138, at 527, 530 n.69.

145. *Id*. at 533–34.

146. *Id*. at 525–26.

147. *Id.* at 533; *see also* Ophir Stemmer, *Why Is Texas the Leading State for Wind Power?*, GEO. WASH. J. ENERGY & ENV'T L. ONLINE (Mar. 20, 2011), https://gwjeel.com/2011/03/20/why-is-texas-the-leading-state-for-wind-power/(providing an overview of these features of the CREZ).

148. *See supra* note 117 and accompanying text.

149. Bryce, *supra* note 110; Baker & Dent, *supra* note 112.

150. *See supra* notes 97–106 and accompanying text.

151. James W. Coleman & Alexandra B. Klass, *Energy and Eminent Domain*, 104 MINN. L. REV. 659, 724 (2019) (suggesting that states could prioritize eminent domain for renewable energy infrastructure).

pipeline and transmission line projects.[152] Is there any reason to believe it will not be the same for commercial-scale wind power, solar power, and new "clean" transmission lines? Yet, without its robust application, the Green New Deal renewable energy infrastructure initiative will face significant barriers.[153] The affected property interests must be recognized through just compensation where due, but the prospect of just compensation has not kept property rights interests from opposing renewable energy projects through every means available, including lobbying for reform of eminent domain powers.[154]

That leads to the third trade-off: the balance between speed of process and public participation. There is little doubt that the process used for Texas CREZ line siting approval does not match up well with the Green New Deal's vision of a highly democratized and participatory process.[155] But can the Green New Deal's process vision avoid replicating the Cape Wind story many times over? Thirty years may now seem like a long time. The problem, however, is that it is not a matter of turning on all the switches for the first time in 2050—they need to be turning on every year between now and then, and we need a lot more switches than we have turned on so far.

The final trade-off involves sovereignty, as in who gets to decide the first three trade-offs. The Cape Wind project required approvals not only by federal authorities for placement of the turbines, but also by state and local authorities for the turbines, as well as for the onshore infrastructure needed to support the offshore infrastructure.[156] Indeed, conflicts ensued between state and local authorities, leading to preemptive action by the state.[157] By contrast, only one entity, the PUCT, ran the Texas CREZ show.[158] Mobilizing the Green New Deal energy transition will require infrastructure crossing federal, state, and local lands and jurisdictions. Countless authorities will be involved. Or, through its preemption powers, the federal government could put just one entity in charge of the whole show.

These four tradeoffs define two extremes. One extreme, which is roughly business as usual, will require renewable energy projects to comply

152. *Id.* at 661–62.

153. *Id*. at 663.

154. *See id.* at 702–03 (noting that environmentalists have even gone after wind power projects because their transmission lines affect property value and aesthetics); Jeffrey Tomich, *Battle Reignites Over $2.5B Midwest Transmission Line*, E&E NEWS (Dec. 19, 2019), https://www.eenews.net/stories/1061847775 (reporting that landowners groups are working to block a wind project through legislation preventing the use of eminent domain).

155. *See supra* notes 139–47 and accompanying text.

156. *See Timeline of the Cape Wind Project*, *supra* note 113 (chronicling the push and pull over state and federal permitting).

157. *Id*.

158. *See supra* notes 138–40.

with dozens of federal, state, and local siting and environmental laws, exposing each project to protracted public participation and litigation challenges over siting, environmental, and property rights compliance, and requiring final approvals by a multitude of federal, state, and local authorities.[159] If we go down this path, achieving the renewable energy goals required to meaningfully put a dent in climate change by 2050 is highly improbable. It would take decades, at a minimum, to plan, site, approve, litigate, and begin construction on all the needed infrastructure. We do not have decades.[160]

The other extreme would be to replace all that with one omnibus federal statute authorizing one federal agency to mandate a streamlined renewable energy infrastructure approval process that preempts state and local authority, while incorporating siting, environmental, and property rights goals. If we go down that path, achieving the highly democratized and participatory goals of the Green New Deal seems highly improbable.[161] Of course, there are countless alternatives in between these two extremes. The question is, can any get both of the jobs done, and if so, which one is it?

CONCLUSION

We are at a crossroads. We have roughly 30 years to deploy a massive new renewable energy infrastructure and to electrify the vehicle fleet, not to mention repair much of our existing infrastructure and put protective adaptation infrastructure in place. The Old Green Laws, if left intact and applied to their fullest, will throw up significant obstacles at every step of the way, and will likely derail much of the Green New Deal agenda and cause us to miss the targets. The consequences of that will be dire. To avoid them, it may not be sufficient to tweak every federal, state, and local law involved in the process so that renewable energy and other necessary mitigation and adaptation infrastructure is facilitated. The political battles involved in designing and approving the multitude of tweaks required would alone take years to play out. In short, the Green New Deal needs New Green Laws, or perhaps a New Green *Law*, that somehow balances the infrastructure deployment goals and timelines with the ideals of environmental protection, distributive justice, and public participation. To be sure, that is a political moonshot, but so is the Green New Deal. If the politics ever align to open the door to the Green New Deal, or at least to a high renewables version of it, the

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159. *See supra* notes 9–14 and accompanying text (outlining the various federal environmental laws that present challenges to renewable energy projects).

160. *See supra* notes 38–52 and accompanying text.

161. *See supra* notes 17–18.

politics at that moment should also consider building the New Green Laws. The hope of this Essay is that Green New Deal advocates will recognize this reality and begin work on designing the new regime. We plan to do so.