Article

Repurposed Energy

Alexandra B. Klass† & Hannah Wiseman††

Wildfires, weather extremes, and other conditions induced partially by climate change add urgency to the project of accelerating the clean energy transition from fossil fuels to zero-carbon energy infrastructure. Yet the hurdles to accomplishing such a massive industrial-scale transition are daunting. Indeed, large renewable energy generation projects regularly face denials or project-killing delays across the United States. This Article proposes a national policy to channel the bulk of new clean energy projects to targeted categories of both rural lands and urban, post-industrial lands that we define collectively as "repurposed energy" sites. Such lands will consist of marginal farmland, abandoned coal mines, retired or retiring coal plants, closed landfills, and other underutilized or abandoned properties known as "brownfields."

Repurposed energy addresses two core problems in the communities slated to host new clean energy generation projects like utility-scale (large) wind farms and solar plants. Developers predominantly pursue clean energy projects in rural and, to a lesser extent, post-industrial communities, where available land is

---

† James G. Degnan Professor of Law and Co-director, Environmental and Energy Law Program, University of Michigan Law School.

†† Professor, Penn State College of Law and College of Earth and Mineral Sciences; Co-director, Center for Energy Law and Policy. The authors are grateful to David Adelman, Nick Bagley, Andrew Buchsbaum, Liesel Clark, James Coleman, Brian Connelly, Thomas Daniels, Chris Elmendorf, Michael Gerrard, Megan Gibson, Rob Glicksman, Catie Hausman, Mark James, Noah Kazis, Sarah Mills, JB Ruhl, Gabe Tabak, Larry Shapiro, David Spence, Narayan Subramanian, and Shelley Welton, and participants at conferences and workshops at University of Pennsylvania, University of Michigan, University of Richmond, and University of Utah, for helpful comments on earlier drafts of this Article.

more plentiful, but climate change denial or opposition to clean energy projects can be significant. Yet many of these communities also have flagging economies, underutilized infrastructure, and abandoned lands previously used for energy resource extraction or industrial activities. Prioritizing such lands for clean energy projects addresses the dual problems of clean energy opposition and economic decline, and it comes at a perfect moment. The massive infusion of federal money from the recent federal infrastructure and climate bills can make repurposed energy a reality.

In this Article we build on existing legislative and regulatory efforts that prioritize clean energy development on already-disturbed lands to construct a more complete legal and policy framework for implementing repurposed energy. In doing so, we explore the existing laws that can support this approach as well as new policies and cultural narratives needed to ensure that the energy transition comprehensively addresses the governance issues, political economic barriers, procedural hurdles, and environmental and energy justice challenges associated with the massive build-out of U.S. energy infrastructure. This build-out is a critical step toward combating climate change. As with all challenges in the energy realm, repurposed energy is far from a complete solution, but it is an achievable one and, we argue, a central enabling pillar of a successful energy transition.

TABLE OF CONTENTS

INTRODUCTION

The rural and post-industrial communities of the United States are at a critical tipping point. On the one hand, they are slated to host the bulk of the massive amounts of new "clean energy" projects that will be needed to decarbonize the economy and help slow climate change.[1] This is seemingly good news, in that large clean energy investments could infuse revenue into the very communities suffering from economic decline, abandoned extractive industries and manufacturing, and inadequate services and infrastructure. Yet many of these communities vehemently oppose clean energy projects and are home to some of the most ardent climate change deniers.[2] This local opposition is often exacerbated by misinformation or disinformation campaigns funded by fossil fuel companies threatened by the clean energy transition.[3]

---

1. "Clean energy" typically refers to zero-carbon energy from renewable sources—the most common of which in the United States are solar and wind. It also sometimes refers to nuclear energy. We use clean energy here to describe wind and solar power projects. *See generally Clean Energy Standard*, N.Y. STATE ENERGY RSCH. & DEV. AUTH., https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Standard (describing New York state's clean energy initiative) [https://perma.cc/A34X-A6BY]; *U.S. State Electricity Portfolio Standards*, CTR. FOR CLIMATE & ENERGY SOLS. (last updated Aug. 2024), https://www.c2es.org/document/renewable-and-alternate-energy-portfolio-standards [https://perma.cc/33RQ-QTXY] (describing and comparing clean energy standards across different states). The U.S. trajectory toward a larger percentage of zero-carbon electricity generation is driven by multiple sources, including the Inflation Reduction Act, federal agency initiatives, U.S. commitments under the Paris Agreements (an international climate treaty), and state and local mandates for renewable energy. *See* Inflation Reduction Act of 2022, Pub. L. No. 117-169, 137 Stat. 1818 (codified in scattered sections of U.S.C.); OFF. OF POL'Y, U.S. DEP'T. OF ENERGY, DOE/OP-0019, ON THE PATH TO 100% CLEAN ELECTRICITY 4 (2023) (identifying challenges that must be addressed to achieve 100% clean electricity generation and calling for an "all-of-society approach" that combines federal, state, tribal, and private efforts to achieve clean electricity goals); *Renewable & Clean Energy Standards*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (2023), https://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2023/12/RPS-CES-Dec2023-1.pdf [https://perma.cc/MS9V-S7C9] (displaying the twenty-eight states plus District of Columbia that have renewable energy or clean energy standards or goals as of December 2023).

2. *See infra* notes 19–20 and accompanying text.

3. *See* Miranda Green et al., *An Activist Group is Spreading Misinformation to Stop Solar Projects in Rural America*, NPR (Feb. 18, 2023), https://www.npr.org/2023/02/18/1154867064/solar-power-misinformation-activists

These political and political economic realities sit atop numerous other hurdles to a clean energy transition away from fossil fuels and toward zero-carbon energy infrastructure.[4] These obstacles are best understood through the theoretical lenses of governance structures, political economy, administrative hurdles, and environmental and energy justice concerns. The

-rural-america [https://perma.cc/EUM3-223T] (describing how Citizens for Responsible Solar, an organization opposed to solar projects built on farmland and timberland, "stokes opposition to solar projects by spreading misinformation online about health and environmental risks"); Kathiann M. Kowalski, *Anonymously Funded Group Stokes Local Opposition to Ohio Solar Project*, ENERGY NEWS NETWORK (Dec. 18, 2023), https://energynews.us/2023/12/18/anonymously-funded-group-stokes-local-opposition-to-ohio-solar-project [https://perma.cc/MG23-8VQF] (highlighting how, in response to a rural Ohio solar project, a group called Knox Smart Development organized a "town hall meeting" including speakers with ties to fossil fuel and climate denial groups); Greg Alvarez, *Fossil-Fuel Funded Opposition is Blocking America's Clean Energy Transition. Permitting Reform Can Help.*, FORBES (Nov. 30, 2022), https://www.forbes.com/sites/energyinnovation/2022/11/30/fossil-fuel-funded-opposition-is-blocking-americas-clean-energy-transition-permitting-reform-can-help [https://perma.cc/PGQ7-YJJ2] (describing how a relatively small number of actors with fossil fuel ties have pushed for local ordinances that effectively ban new renewable projects and spread misinformation to encourage local opposition to proposed projects). For further discussions of "disinformation" and "misinformation" in the climate context, *see, e.g.*, Justin Farrell et al., *Evidence-Based Strategies to Combat Scientific Misinformation*, 9 NATURE CLIMATE CHANGE 191, 192 (2019) (noting that "misinformation and dismissal of scientific facts are commonplace" with respect to climate change contrarianism, and identifying potential strategies for counteracting such misinformation); Neelam Thapa Magar et al., *Climate Change Misinformation in the United States: An Actor-Network Analysis*, 5 JOURNALISM & MEDIA 595, 598 (2024) ("The term 'misinformation' broadly refers to inaccurate, misleading, or false information produced and disseminated either deliberately or unknowingly." (citation omitted)); Sander van der Linden et al., *Inoculating the Public Against Misinformation About Climate Change*, 1 GLOB. CHALLENGES, Feb. 27, 2017, at 1 (describing disinformation as intentional efforts to "publicly dispute the scientific consensus on various issues").

4. Zero-carbon electricity is electricity that does not release greenhouse gas emissions when generated, although balancing demand over time with non-renewable resources can lead to carbon emissions. *See* Vincent Xia, *When 100% Renewable Energy Doesn't Mean Zero Carbon*, STANFORD DOERR SCH. OF SUSTAINABILITY (May 23, 2019), https://sustainability.stanford.edu/news/when-100-renewable-energy-doesnt-mean-zero-carbon [https://perma.cc/V4PF-33D3] (explaining how using yearly averages to estimate greenhouse gas emissions from grid power can be deceptive because mismatched demand fluctuations and renewable generation capacity can cause the daily carbon content of grid electricity to differ substantially). There are also small emissions from the manufacturing and installation of the renewable energy generating equipment. *Id.*

impacts of these obstacles are real and apparent, with large renewable energy projects regularly facing denials or uneconomical delays.[5] Yet an accelerated clean energy transition is imperative, as evidenced by wildfires, droughts, floods, localized air and water pollution, and extreme weather induced by climate change.[6] So, too, is the revitalization of the geographic parts of the country that have—in many respects—been left behind.

A national policy of "repurposed energy" built on earlier, more limited efforts to prioritize development on already-distressed lands can help overcome these challenges. Repurposed energy is clean energy generation built (1) on marginal farmland[7] in rural areas, or (2) on abandoned coal mines; retired or

---

5. *See, e.g.*, Matthew Eisenson et al., *Opposition to Renewable Energy Facilities in the United States: June 2024 Edition*, SABIN CTR. FOR CLIMATE CHANGE L. 4 (June 2024), https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=1227&context=sabin_climate_change [https://perma.cc/R4BH-29QZ] (listing local laws in every state that "block, delay or restrict" renewable energy development); Lawrence Susskind et al., *Sources of Opposition to Renewable Energy Projects in the United States*, 165 ENERGY POL'Y, June 2022, at 1, 8 ("[R]enewable energy developers are likely to abandon projects when state regulatory requirements undercut their return on investment.").

6. *See generally Climate Change 2023 Synthesis Report*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 46–51, 60, 86–87 (2023), https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf [https://perma.cc/2DUZ-7NMX] (documenting the effects of climate change; analyzing the human contribution to these effects; observing that "[l]imiting human-caused global warming to a specific level requires limiting cumulative CO_2 emissions, reaching net zero or net negative emissions, along with strong reductions in other GHG [greenhouse gas emissions];" and observing that "[i]n global modelled pathways that limit warming to 2°C or below, almost all electricity is supplied from zero or low-carbon sources in 2050").

7. *See* Hannah J. Wiseman et al., *Farming Solar on the Margins*, 103 B.U. L. REV. 525, 541 (2023) (noting the importance of marginal farmland for renewable energy development). We acknowledge that encouraging renewable energy development on marginal farmland is a complex proposal because marginal farmland can provide important ecological value. *See, e.g.*, *Conservation Reserve Program CP-29: Marginal Pastureland and Wildlife Buffers*, U.S. DEP'T OF AGRIC., https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/FactSheets/archived-fact-sheets/pratice_cp29_marginal_pastureland_wildlife_buffer_jul2015.pdf [https://perma.cc/AAQ8-3UP2] (noting the ecological benefits of removing marginal pastureland from production). Renewable energy development can, however, in some cases improve habitat for wildlife if properly constructed and maintained. *See, e.g.*, Liz Kalies, *Making Solar Wildlife-Friendly*, THE NATURE CONSERVANCY (July 10, 2023), https://www.nature.org/en-us/about-us/where-we-work/united-states/north-carolina/stories-in-north

retiring coal plants; closed landfills; and other underutilized or abandoned contaminated properties known as "brownfields" located in both rural areas and urban, post-industrial areas.[8] Repurposed energy development does not displace prime farmland, sit atop pristine mountains, or fragment wildlife habitat prized for hunting or conservation purposes. At the same time—if properly designed and implemented—repurposed energy will bring much-needed revenue to communities plagued by the loss of manufacturing and extractive industries and the maladies associated with this loss, from opioid addiction to faltering public schools.[9] We propose that repurposed energy must be an essential driver of the clean energy transition and an approach to revitalize these distressed U.S. communities.[10]

This approach is needed because as the impacts of climate change become increasingly dire, there is growing urgency to accelerate a clean energy transition from fossil fuels to zero-carbon energy.[11] This energy transition involves a massive re-

---

-carolina/making-solar-wildlife-friendly [https://perma.cc/K8PS-Y2MD] (describing best practices for wildlife-friendly solar energy development). Defining land as "marginal" can also be fraught because governmental definitions of lands and soils that are "productive" or "high quality" versus "marginal" do not always match individuals' or communities' definitions of such lands. *See, e.g.*, Jennifer Baka, *Do Wastelands Exist? Perspectives on "Productive" Land Use in India's Rural Energyscapes*, RCC PERSPS., no. 2, 2019, at 57, 59–60.

8. See *infra* Part I.A for a more detailed definition of repurposed energy.

9. *Cf.* David Morley, *Recycling Land for Solar Development*, AM. PLAN. ASS'N (2012), https://icma.org/sites/default/files/304681_recyclingland.pdf [https://perma.cc/8XB2-FS62] (arguing that alternative reuse of sites, including reuse for solar energy, may be the "best current—if not the only—solution for a glut of brownfields, greyfields [underused commercial properties], and redfields [commercial properties 'in foreclosure or facing severe financial distress']" and noting the economic challenges that this reuse will address).

10. For helpful descriptions and analysis of economically distressed communities, see Press Release, Econ. Innovation Grp., New Research Finds 21st Century Economic Growth Failed to Lift the Most Vulnerable U.S, Communities Prior to Pandemic (Oct. 14, 2020), https://eig.org/new-research-finds-21st-century-economic-growth-failed-to-lift-the-most-vulnerable-u-s-communities-prior-to-pandemic [https://perma.cc/VGS4-Z4UG]; *Distressed Communities Index*, ECON. INNOVATION GRP., https://eig.org/distressed-communities/?geo=states&lat=38.01&lon=-96.42&z=4.33 [https://perma.cc/8XS6-WD5V].

11. *See generally* Paul Denholm et al., *Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035*, NAT'L RENEWABLE ENERGY LAB'Y 68 (2022), https://www.nrel.gov/docs/fy22osti/81644.pdf [https://perma.cc/XBM8-5Z6E] (highlighting rapid installation of new energy infrastructure as one key

industrialization of the United States. The hurdles to accomplishing this grand endeavor seem increasingly high in part because wind and solar energy plants have far less "spatial energy density" (meaning a larger energy footprint) than fossil fuel power plants.[12] This means a much larger land area is needed for renewable energy plants to replace energy generated from the fossil fuel plants that now predominantly power our electricity system.[13]

According to the National Renewable Energy Laboratory (NREL), there are multiple scenarios for the United States to achieve 100% clean energy generation by 2035 where the benefits exceed costs.[14] This may, however, require a footprint of up to 8.4 million acres, representing up to 0.44% of the total U.S. contiguous land area (if only direct impacts are included) or 112.7 million acres, representing 5.96% (if indirect impacts are also included).[15] Notably, though, even the highest estimated

---

action that is necessary for meeting clean electricity goals); NAT'L ACADS. OF SCIS., ENG'G., AND MED., ACCELERATING DECARBONIZATION IN THE UNITED STATES: TECHNOLOGY, POLICY, AND SOCIETAL DIMENSIONS 5–38, 307–09 (2023), https://nap.nationalacademies.org/catalog/25931/accelerating-decarbonization-in-the-united-states-technology-policy-and-societal [https://perma.cc/A7LT-MYWS] (emphasizing the urgency for the net-zero transition, and reporting on policy and market considerations associated with shifting toward clean electricity generation).

12. *See, e.g.*, Jonas Kristiansen Nøland et al., *Spatial Energy Density of Large-Scale Electricity Generation from Power Sources Worldwide*, 12 SCI. REPORTS, Dec. 8, 2022, at 1, 2, 21 tbl.17 (describing the annual energy density of different forms of power generation as "the annual electric energy that can be generated for a given amount of regulated site area of the power plant" and then showing that, across various comparisons of annual energy densities found in the literature, natural gas consistently has a higher energy density than solar and wind generation).

13. *See, e.g.*, Samantha Gross, *Renewables, Land Use, and Local Opposition in the United States*, THE BROOKINGS INST. 2–6 (Jan. 2020), https://www.brookings.edu/articles/renewables-land-use-and-local-opposition-in-the-united-states [https://perma.cc/Z9TU-UE6Q] (comparing energy density of different energy generation resources and discussing implications of same); Nøland et al., *supra* note 12, at 21 tbl.18 (showing that renewable energy sources would require more space than natural gas sources to meet 100% of primary energy use).

14. *See* Denholm et al., *supra* note 11, at 1–2.

15. *Id.* at 53 (showing a land-based wind and utility-scale solar direct footprint of 34,000 square kilometers, or 8.4 million acres, and an indirect footprint of 456,000 square kilometers, or 112.7 million acres); *State Area Measurements and Internal Point Coordinates*, CENSUS.GOV (last updated Dec. 16,

land use numbers using the most conservative renewables deployment scenario—an ambitious 100% deployment by 2035, occupying 5.96% of U.S. land—is *less* than the total repurposed energy acreage available for clean energy development.[16] These lands, which include closed landfills, abandoned mine lands, other brownfields sites, and marginal farmland, can and should be the locus of the extensive land-use changes that will occur through the energy transition.[17]

But land-based challenges are only one major hurdle to the energy transition. With respect to governance hurdles, a mismatch between the scale of projects and the level of the regulator hinders development, with local governments retaining permitting authority for projects of statewide importance.[18] Political economic barriers also abound and are particularly large in this space. For instance, the bulk of the energy infrastructure for the transition—wind and solar "farms" and long-distance electric transmission lines—must be constructed in rural and post-industrial communities, where skepticism associated with the inherent benefits of a clean energy transition is often strongest and both local and external interest groups wield powerful influence with local officials.[19]

2021), https://www.census.gov/geographies/reference-files/2010/geo/state-area.html [https://perma.cc/AVF3-ZCJX] (showing a contiguous U.S. land area of 7,653,005 square kilometers, or 1.89 billion acres); *see also infra* notes 59–66 and accompanying text (discussing NREL study findings).

16. Anelia R. Milbrandt et al., *Renewable Energy Potential on Marginal Lands in the United States*, 29 RENEWABLE & SUSTAINABLE ENERGY REVS. 473, 476 (2014) (estimating 864,826 square kilometers, or 213.7 million acres, of "marginal lands" in the contiguous United States).

17. *See infra* notes 68–69 and accompanying text (describing available U.S. "marginal lands" for clean energy development).

18. A well-documented similar mismatch exists for the interstate electric transmission lines needed to transport clean energy from where it can be generated to where it can be used. In most cases, states retain permitting authority over such projects even though their geographic scope and benefits are regional and national in nature. *See infra* note 147 and accompanying text (discussing the regulatory hurdles to building needed interstate electric transmission lines).

19. *See, e.g.*, David Roberts, *What Rural People Actually Think About Clean Energy*, VOLTS at 5:56 (Nov. 8, 2023), https://transcripts.volts.wtf/what-rural-people-actually-think-about-clean-energy [https://perma.cc/4UZB-GGEP] (positing that ten to twenty-five percent of rural people are in the "opposition" group to solar and that opposition in Republican areas is much higher in Trump-leaning areas, in particular); Zuzana Bednarikova et al., *An Examination of the*

Another source of opposition includes communities comprised of powerful "homevoters" and environmental advocacy groups that oppose clean energy infrastructure for its potential adverse aesthetic and environmental impacts, displacement of prime farmland in rural areas, and impacts on valuable open space in more urban areas.[20] Relatedly, the impacts of excessive "proceduralism" can also loom large, with the risk of cumulative and redundant permitting and environmental review requirements intentionally or inadvertently delaying or canceling beneficial clean energy projects.[21] And concerns about perpetuating historic injustices in energy siting—for example, placing more infrastructure in already-overburdened communities or failing to ensure that benefits flow to marginalized communities—are vivid and real.[22]

Community Level Dynamics Related to the Introduction of Wind Energy in Indiana, PURDUE UNIV. EXTENSION 15–16, 49–52 (June 2020), https://extension.purdue.edu/cdext/thematic-areas/community-planning/collaborative-projects/_docs/wind-energy/wind-energy_final-report.pdf [https://perma.cc/SM73-ZBJN] (describing lease benefits of energy as well as rural opposition to wind in Indiana); Cornelia Fraune & Michèle Knodt, *Sustainable Energy Transformations in an Age of Populism, Post-Truth Politics, and Local Resistance*, ENERGY RSCH. & SOC. SCI., Sept. 2018, at 1, 2 ("In the context of sustainable energy transition policy, right-wing populist parties . . . oppose the restructuring of the energy economy."); Thomas Dietz, *Political Events and Public Views on Climate Change*, CLIMATIC CHANGE, July 2020, at 1, 2 ("Over the last decade, . . . conservative Republicans have become less likely to see climate change as real and a cause for worry." (citation omitted)); Don E. Albrecht, *Donald Trump and Changing Rural/Urban Voting Patterns*, J. RURAL STUD., Apr. 2022, at 148, 149 (showing that rural America is overwhelmingly dominated by conservative Republican voters).

20. *See generally* WILLIAM A. FISCHEL, THE HOMEVOTER HYPOTHESIS 162–83 (2005); Susskind, *supra* note 5, at 3–12 (cataloging drivers of opposition to renewable energy projects).

21. *See* Nicholas Bagley, *The Procedure Fetish*, 118 MICH. L. REV. 345, 348–50 (2019) (critiquing liberal opposition to regulatory reform and noting that administrative law is full of arguably counterproductive procedural rules); J.B. Ruhl & James Salzman, *The Greens' Dilemma: Building Tomorrow's Climate Infrastructure Today*, 73 EMORY L.J. 1, 6–13 (2023) (urging the importance of hastening development of climate infrastructure even amidst environmental protection concerns); J.B. Ruhl & James Salzman, *What Happens When the Green New Deal Meets the Old Green Laws?*, 44 VT. L. REV. 693, 715–16 (2020) (asserting that current environmental protections and special interests will delay U.S. clean energy goals).

22. *See, e.g.*, Eric O'Shaughnessy et al., *Drivers and Energy Justice Implications of Renewable Energy Project Siting in the United States*, 25 J. ENV'T

The legal literature has begun to analyze these conceptual and practical hurdles to the energy transition,[23] yet we argue that there is a strategy—repurposed energy—that pulls all these strands together and effectively addresses them. First, repurposed energy can address governance challenges by prioritizing state siting and permitting reform efforts for clean energy projects on repurposed energy sites. This can act as an alternative to preempting local control over all clean energy projects, which has generated a backlash in some states.[24]

Second, repurposed energy also cuts to the heart of the political, political economic, procedural, and equity challenges in the energy transition. It infuses money into many communities—rural and post-industrial areas—that predominantly disagree with the policies of the left, including the energy transition.[25] This opposition is complex but arises in part from the years of underinvestment and under-attention to these communities.[26] Repurposed energy supports new clean energy

---

POL'Y & PLAN. 258, 259–60 (2023) (highlighting the growing literature that analyzes wind and solar siting in the context of energy justice).

23. *See* Bagley, *supra* note 21; *infra* note 185.

24. *See infra* Part III.B.

25. Albrecht, *supra* note 19, at 149 ("Trump's complete domination of rural America in 2020 was striking. In over one-half of the Category 9 [meaning "most rural" on the USDA Economic Research rural/urban continuum] counties, more than 75 percent of the voters supported Trump."); *id.* at 153 (showing that in non-metropolitan counties, the mean percentage of votes for Trump was 70.5 percent); Ruth Igielnik et al., *Behind Biden's 2020 Victory*, PEW RSCH. CTR. (June 30, 2021), https://www.pewresearch.org/wp-content/uploads/sites/20/2021/06/PP_2021.06.30_validated-voters_REPORT.pdf [https://perma.cc/5KAX-VPDG] (noting that among voters who self-reported as living in an urban, rural, or suburban area, "[i]n 2016, Trump won 59% of rural voters, a number that rose to 65% in 2020"). We acknowledge that although Donald Trump opposes renewable energy—particularly wind energy—voters who vote for Donald Trump do not consistently share this view. *See, e.g.*, Brian Kennedy & Alex Tyson, *How Republicans View Climate Change and Energy Issues*, PEW RSCH. CTR. (Mar. 1, 2024), https://www.pewresearch.org/short-reads/2024/03/01/how-republicans-view-climate-change-and-energy-issues [https://perma.cc/S6QG-GC55] (noting that in data compiled from several Pew Center surveys, seventy percent of Republicans supported more solar power farms and sixty percent supported more wind power farms).

26. *See generally* Ann M. Eisenberg, *Rural Disaffection and the Regulatory State*, 126 PENN ST. L. REV. 739 (2022) (discussing the persistence of and multiple drivers of rural distrust of federal regulation); Ann M. Eisenberg, *Economic Regulation and Rural America*, 98 WASH. U. L. REV. 737, 771–81 (2021)

infrastructure on lands unsuitable for farming and on polluted areas or abandoned infrastructure with net-negative economic value. It can address local "Not in My Backyard" (NIMBYism) from both the political left and right by placing clean energy generation projects on already-disturbed sites rather than in sensitive wildlife habitats or on productive farmland.[27] Indeed, a 2024 Lawrence Berkeley National Laboratory survey showed that residents of communities that are already home to large-scale solar projects strongly favored new renewable energy development to be located on repurposed energy sites like closed landfills, closed and closing coal plants and coal mines, former industrial sites, and marginal farmland.[28]

Third, repurposed energy also lowers the procedural hurdles to renewable energy development, particularly if governments—as some have begun to do—present clean energy developers with build-ready repurposed sites or adopt streamlined permitting processes.[29] In the sphere of energy justice, repurposed energy also allows for an energy transformation that empowers communities to build the type of home-grown, zero-carbon energy that best suits them rather than simply adding more infrastructure burdens to those already present.[30] Further, communities can negotiate with developers to ensure that the benefits of new clean energy, including reducing localized air and water

(exploring the economic factors, such as deregulation of key industries, that led to extensive infrastructural and service-based underinvestment in rural American and the overall "abandonment" of rural America); Delia Baldassarri & Scott E. Page, *The Emergence and Perils of Polarization*, PROC. NAT'L. ACAD. SCIS., Dec. 14, 2021, at 1 (exploring the factors driving partisan identification).

27. For examples of opposition to clean energy projects on farmland, see Tim Faulkner, *Massive Solar Facility Would Displace Farmland, Forest*, ECORI NEWS (Nov. 25, 2020), https://ecori.org/2020-11-23-conn-solar-farm-criticized-for-displacing-farmland-and-woodlands [https://perma.cc/GJ2Q-88DV] (discussing opposition to a Connecticut solar project proposed on agricultural land); *Large-Scale Solar Farms: Their Worst Effect*, ELKHART CNTY., IND. PLAN. & DEV., https://elkhartcountyplanninganddevelopment.com/doc/Citizen%20submittal_2.pdf [https://perma.cc/VFG3-CM94] (showing an Indiana citizen's submission opposing a solar farm because of its "devastation" of farmland and food supply).

28. Joseph Rand et al., *Perceptions of Large-Scale Solar Project Neighbors: Results from a National Survey*, BERKELEY LAB 77 (2024), https://live-etabiblio.pantheonsite.io/sites/default/files/ccsd_t2_results_summary_final.pdf [https://perma.cc/5VMH-MDAY].

29. *See infra* Part III.B.

30. *See infra* Part II.D.

pollution, increasing taxes, and lowering electricity bills, flow from new clean energy projects through community benefits agreements and similar arrangements.[31]

Focusing on repurposed energy within the energy transition comes at a perfect moment. The billions of dollars in grants and loans from the Infrastructure Investment and Jobs Act of 2021 (IIJA),[32] the Inflation Reduction Act of 2022 (IRA),[33] and supporting federal and state policies, can make a repurposed energy transition a reality, particularly in rural America and post-industrial communities. This funding is sitting in federal coffers, destined expressly for rural and post-industrial communities that have long served as hosts to abandoned or underutilized fossil fuel infrastructure and energy-related waste disposal sites.[34]

---

31. New York mandates that renewable energy developers pay "host community benefit[s]" determined by the permitting agency. N.Y. PUB. SERV. LAW § 142(6) (McKinney 2024). The state agency also adopted a rule requiring that developers pay electricity bill credits. N.Y. Pub. Serv. Comm'n, Order Adopting a Host Community Benefit Program, at 24 (Feb. 11, 2021), https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterSeq=62773 [https://perma.cc/CR7C-K6MZ] (click on the "Filed Documents" tab; then click on the hyperlink titled "Order Adopting a Host Community Benefit Program" from the "Document Title" column) (requiring payments of $500/MW for solar facilities and $1,000/MW for wind energy facilities, both with a twenty-five MW minimum capacity, for the first ten years of operation). Michigan legislation in 2023 requires host community agreements between renewable energy developers and local governments that include payments to local communities of $2,000 per megawatt of energy capacity for police, fire, and other local infrastructure. Act effective Nov. 29, 2024, pt. 8, § 227, 2023 Mich. Pub. Acts 233 (codified at MICH. COMP. LAWS § 460.1227 (2023)). For a collection of community benefits agreements, see *Community Benefits Resource Inventory*, CLEAN AIR TASK FORCE, https://www.catf.us/infrastructure-deployment/community-benefits-resource-inventory [https://perma.cc/CV2Y-NWAV]. For an analysis of research showing how perceived socio-economic benefits can build social acceptance for clean energy projects, see O'Shaughnessy et al.*, supra* note 22, at 259–60.

32. Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021) (codified in scattered sections of U.S.C.); *see also infra* Part III.B.

33. Inflation Reduction Act of 2022, Pub. L. No. 117-169, 13 Stat. 1818 (codified in scattered sections of U.S.C.); *see also infra* Part III.B.

34. *E.g.*, § 22001, 13 Stat. 1818 at 2018–19 (amending the Farm Security and Rural Investment Act of 2002, 7 U.S.C. § 8103, by appropriating a further $1 billion for forgiving loans for renewable energy projects in rural areas); *see also* Clare Cannon, *Examining Rural Environmental Injustice: An Analysis of Ruralness, Class, Race, and Gender on the Presence of Landfills Across the United States*, J. RURAL & CMTY. DEV., Apr. 14, 2020, at 89, 104–07 (exploring

Moreover, this influx of federal funding coupled with cheaper wind and solar energy has prompted some electric utilities across the country to accelerate proposed retirement dates for coal plants from the 2030s to the late 2020s.[35] Using these soon-to-be retired coal plant sites for new renewable energy generation mitigates the reduced tax revenues and job losses for communities while taking advantage of the electric grid interconnection capacity that already exists at these sites.[36] Indeed, expert analysis in 2024 indicates there is the potential for up to 250 gigawatts (GW) of new clean energy capacity at existing fossil fuel generation plant sites around the country.[37] These projects can take advantage of IRA financial incentives to reduce costs for electricity customers by billions of dollars per year and

---

the relationships among socio-demographics, ruralness, and hazardous/non-hazardous landfill presence).

35. *See, e.g.*, Taylor Kuykendall et al., *Inflation Reduction Act to Accelerate US Coal Plant Retirements*, S&P GLOBAL (Feb. 10, 2023), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/inflation-reduction-act-to-accelerate-us-coal-plant-retirements-74196498 [https://perma.cc/84NY-7KJH] ("Of the 58.7 GW of coal plant capacity projected for retirement by 2030, about 24.3 GW, or 41.4 percent, are due to the Inflation Reduction Act . . . ."); Joe Schulz, *Wisconsin's Largest Utility Moves Up Plans to Stop Using Coal as a Fuel Source*, WIS. PUB. RADIO (Oct. 31, 2023), https://www.wpr.org/wec-energy-we-energies-utility-plans-stop-using-coal-fuel [https://perma.cc/8Z2E-XQM8] (suggesting that a Wisconsin utility's plan to hasten coal retirement may have been influenced by federal requirements to meet emissions requirements by 2032); Metin Celebi et al., *A Review of Coal-Fired Electricity Generation in the U.S.*, BRATTLE 6 (2023), www.brattle.com/wp-content/uploads/2023/04/A-Review-of-Coal-Fired-Electricity-Generation-in-the-U.S..pdf [https://perma.cc/LRP2-RGPF] ("Looking forward, we expect actual retirements by 2030 to exceed the currently announced retirements by that time due to factors such as natural gas price, renewable energy technology improvements, and tax incentives for renewable and low- and zero-carbon resources in the recently passed IRA, among other factors.").

36. *See infra* Part I.D.1.

37. Kate Siegner & Alex Engel, *Clean Repowering: A Near-Term, IRA-Powered Energy Transition Accelerant*, RMI (Jan. 16, 2024), https://rmi.org/clean-repowering-a-near-term-ira-powered-energy-transition-accelerant [https://perma.cc/93TM-ADC9]; Jacob Becker & Becky Xilu Li, *How Utility Regulators Can Unlock $12.7 Billion in Annual Savings for Customers*, RMI (Feb. 14, 2024), https://rmi.org/how-utility-regulators-can-unlock-12-7-billion-in-annual-savings-for-customers [https://perma.cc/C9WT-6VQS] (same); Daniel Moore, *Clean Energy Projects at Fossil Sites Lured by Fast-Lane Reviews*, BLOOMBERG L. (Apr. 15, 2024), https://www.bloomberglaw.com/product/blaw/bloomberglawnews/environment-and-energy/BNA%2000000188-fd5c-dd22-a5bc-fd5e814a0001?utm_source=Email_Share [https://perma.cc/KE32-VKNK] (same).

also avoid the interconnection queue delays that are plaguing new wind and solar developments.[38] In other words, there is a window of time over the next decade to focus the nation's attention on repurposed energy as a major component of the U.S. clean energy transition.

Some recent projects, described below, show the range of opportunities for repurposed energy:

Amazon, which owned 479 wind and solar projects across the globe at the end of 2023 and is the world's largest buyer of clean energy, has begun to convert a forty-five-acre former coal mine in Maryland into a 300,000-panel solar farm as part of its efforts to reach a 100% renewable energy supply target.[39] Like many other repurposed energy sites, Amazon chose the site for its access to power lines and public roads.[40]

Xcel Energy in Minnesota received state regulatory approval in 2022[41] and is investing more than $1 billion to build a solar plant with a capacity of more than 700 megawatts (MW) on

38. Siegner & Engel, *supra* note 37; *cf.* Kristoffer Tigue, *Midwest States Have Approved Hundreds of Renewable Energy Projects. So Why Aren't They Online?*, Inside Climate News (June 17, 2024), https://insideclimatenews.org/news/17062024/midwest-renewable-energy-project-delays-power-grid [https://perma.cc/8RCQ-YAMB] (citing multi-year delays in grid interconnections and the high cost of grid upgrades imposed on wind and solar developers as expensive obstacles that prevent clean energy sources from reaching consumers).

39. Emma Penrod, *Amazon Turns to Brownfields, Other "Challenging" Projects to Accelerate Clean Energy Progress*, UTIL. DIVE (Nov. 29, 2023), https://www.utilitydive.com/news/amazon-turns-to-brownfields-other-challenging-projects-to-accelerate-cle/700887 [https://perma.cc/E4NF-U3K3]; *Amazon is the World's Largest Corporate Purchaser of Renewable Energy for the Fourth Year in a Row*, AMAZON (Jan. 16, 2024), https://www.aboutamazon.com/news/sustainability/amazon-renewable-energy-portfolio-november-2023-update [https://perma.cc/9H44-W8PD].

40. *See* sources cited *supra* note 39.

41. Application of Xcel Energy for Route and Site Permits for Transmission Lines and Sherco Solar Energy Generating System in Sherburne County, Docket Nos. E-002/TL-21-189 to -191 Minn. Pub. Util. Comm'n (Sept. 22, 2022), https://eera.web.commerce.state.mn.us/eera/web/project-file/12296 [https://perma.cc/7UTE-DY2M] (order issuing site and route permits); *Xcel Energy's Sherco 3 Solar Project*, MINN. COM. DEP'T, https://apps.commerce.state.mn.us/web/project/15104 [https://perma.cc/3JML-LFEC] (showing the current status of the docket for the Sherco Solar 3 Project).

and adjacent to the site of the largest coal plant in the state.[42] The coal plant began closing in phases in early 2024, and construction of the solar plant has begun.[43] The solar plant will be paired with a 100-hour battery storage facility and will take advantage of the existing electric transmission infrastructure at the site.[44]

The Omaha Public Power District in Nebraska is partnering with Douglas County to convert a 160-acre landfill that closed in 1989 into a solar farm.[45] According to the utility, the site has good sun exposure, cannot be easily developed for other purposes, and may see less community opposition as a result.[46]

On a statewide level, Nebraska welcomed $3 million in IRA federal funding for state climate planning in 2023.[47] The Nebraska Department of Environment and Energy (NDEE) then solicited input from Nebraskan stakeholders about how to spend

---

42. *Xcel Energy Retires First Coal Unit at Minnesota Power Plant*, XCEL ENERGY (Jan. 4, 2024), https://stories.xcelenergy.com/ArticlePage/?id=Xcel-Energy-retires-first-coal-unit-at-Sherco [https://perma.cc/P5FX-GH78]; Ivan Penn, *Coal Power Defined this Minnesota Town. Can Solar Win It Over?*, N.Y. TIMES (Aug. 19, 2024), https://www.nytimes.com/2024/08/19/business/energy-environment/coal-solar-power-minnesota.html [https://perma.cc/UFL5-BTGH].

43. *Id.*

44. *Id.*; *see also* Jeffrey Tomich, *Michigan's Biggest Utility Adding Batteries at Former Coal Plant*, ENERGYWIRE (June 11, 2024), https://subscriber.politicopro.com/article/eenews/2024/06/11/michigans-biggest-utility-adding-batteries-at-former-coal-plant-site-00162552 [https://perma.cc/M96E-SNFB] (reporting on DTE Energy commencing construction on "the largest battery storage system in the Great Lakes region at the site of a former coal plant as part of its strategy to reach net-zero carbon emissions . . . ."). For another example of repurposing a coal-fired power plant to solar (supported by IRA funds), see Dan Gearino, *In Northeast Ohio, Hello to Solar and Storage; Goodbye to Coal*, INSIDE CLIMATE NEWS (July 25, 2024), https://insideclimatenews.org/news/25072024/inside-clean-energy-ohio-solar-farm-battery-storage [https://perma.cc/PY9D-BBSD] (describing a Painesville, Ohio, project converting a coal-fired power plant to a solar farm and battery storage system).

45. *OPPD, Douglas County Hope to Turn Landfill into Solar Farm*, 3 KMTV NEWS NOW OMAHA (Sept. 20, 2023), https://www.3newsnow.com/news/local-news/oppd-douglas-county-hope-to-turn-landfill-into-solar-farm [https://perma.cc/9WHZ-JUXP].

46. *Id.*

47. *ONE RED – Opportunity for Nebraska: Reducing Emissions and Decarbonization*, NEB. DEP'T OF ENV'T & ENERGY (Aug. 14, 2024) [hereinafter *ONE RED Reducing Emissions*], http://dee.ne.gov/ndeqprog.nsf/onweb/cprg [https://perma.cc/G5EH-6NEA].

the funds, ultimately culminating in the Priority Climate Action Plan that was submitted to the U.S. Environmental Protection Agency (EPA) in 2024.[48] More recently, NDEE was selected to receive a $307 million Climate Pollution Reduction Implementation Grant from the EPA.[49] One program included in the funding package involves encouraging the state's electric utilities to focus on using parking lots, rooftops, and other currently underutilized land for solar energy development.[50]

In Kentucky, one of the largest coal mines in the eastern part of the state—the closed Starfire Mine—is slated to become a new solar energy center under a partnership between electric vehicle manufacturer Rivian, power producer BrightNight, and the Nature Conservancy.[51] The $1 billion investment is expected to be one of the largest renewable power facilities built on a former mine and includes a twenty-mile transmission line, which could allow for even more power generation at the site and in the surrounding area.[52] Developers have promised significant jobs and tax revenues for the community associated with the development.[53]

---

48. *ONE RED – Priority Climate Action Plan*, NEB. DEP'T OF ENV'T & ENERGY, http://dee.ne.gov/ndeqprog.nsf/onweb/pcap [https://perma.cc/7ZAJX7YA]; *see also Nebraska Priority Climate Action Plan*, NEB. DEP'T OF ENV'T & ENERGY 2–3 (2024) (last updated Aug. 14, 2024), http://dee.ne.gov/ndeqprog.nsf/xsp/.ibmmodres/domino/OpenAttachment/ndeqprog.nsf/58652F94FF1707EA86258B7900703120/Attachment2/54094503.pdf [https://perma.cc/65F5-VJXQ] (describing the process for developing Nebraska's PCAP).

49. *ONE RED – Implementation Grant*, NEB. DEP'T OF ENV'T & ENERGY (Aug. 14, 2024), http://dee.ne.gov/ndeqprog.nsf/onweb/cprg-implementation [https://perma.cc/E3M9-6S7D].

50. *Id.*; *see also Nebraska Priority Climate Action Plan*, *supra* note 48, at 26–27 (proposing the program for developing solar projects on unused/contaminated land in greater detail).

51. Rebekah Alvey, *Defunct Coal Mine Will Become Solar Energy Site*, E&E NEWS PM (Aug. 1, 2023), https://subscriber.politicopro.com/article/eenews/2023/08/01/defunct-kentucky-coal-mine-will-become-solar-energy-site-00109194 [https://perma.cc/LZD6-BGPB].

52. *Id.*

53. *Id.*; *see also* Cara Buckley, *Coming Soon to This Coal County: Solar in a Big Way*, N.Y. TIMES (Jan. 2, 2022), https://www.nytimes.com/2022/01/02/climate/coal-mines-solar-climate.html [https://perma.cc/G2UK-DLQ5] (discussing the Appalachian region's potential for renewable energy projects and noting the prospective temporary economic boosts that such projects could bring); *Reclaimed Kentucky Coal Mine Sees the Sun Shining on New Solar Power*

These projects highlight the broader potential for repurposed energy as part of the energy transition, particularly now with the retirement of coal plants, coal mines, and other legacy fossil fuel sites.

As communities understandably express concern over job losses and reduced tax revenues associated with fossil energy plant closings, repurposing land for solar, battery, clean energy manufacturing plants, and other clean energy development provides a promising response to the NIMBY problem and communities' economic woes.[54] But a few success stories are insufficient for the scale of development required both to support communities and accomplish a clean energy transition. This scale-up will require targeted federal, state, and local programs that include funding, technical support, and permitting reform.[55] It will also require rigorous empirical studies to evaluate which programs are having the greatest success and where to invest additional resources. This Article argues for a comprehensive policy of repurposed energy that will move energy development forward using these strategies. As with all challenges in the energy realm, repurposed energy will not be a simple solution, but it is an achievable one and, we argue, a central enabling pillar of a successful energy transition.

Purchase Agreement with Toyota, TOYOTA (May 24, 2023), https://pressroom.toyota.com/reclaimed-kentucky-coal-mine-sees-the-sun-shining-on-new-solar-power-purchase-agreement-with-toyota [https://perma.cc/C7W9-U5G3] (touting the Martin County Solar Project, another coal-to-solar development project, as "an example of how renewable energy [virtual power purchase agreements] can bring new opportunities to former coal and energy communities"). Former coal mines, many of which hold water from rain and snowmelt, are also beneficial for pumped storage, through which a company uses electricity to pump water to a higher point during periods of low electricity demand and then releases the water to generate hydroelectricity when more electricity is needed. *Overview*, LEWIS RIDGE PUMPED STORAGE PROJECT, https://lewisridgeproject.com/project.html [https://perma.cc/84ZT-QESY]. The DOE is funding such a project in Kentucky. *See* LEWIS RIDGE PUMPED STORAGE PROJECT, https://lewisridgeproject.com [https://perma.cc/S73U-WR8K].

54. Bethel W. Tarekegne et al., *Coal-dependent Communities in Transition: Identifying Best Practices to Ensure Equitable Outcomes*, PAC. NW. NAT'L LAB'Y 2 (2021) https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-31909.pdf [https://perma.cc/4WHG-3VXH] (noting job losses, declining tax revenues—particularly for school districts—and environmental and social challenges in transitioning coal communities).

55. *See* OFF. OF POL'Y, U.S. DEP'T. OF ENERGY, *supra* note 1, at 10–11 (calling for an "all-of-society approach" to achieve 100% clean electricity).

Part I of the Article defines the contours of repurposed energy and explores the importance of this approach to energy development. Part II analyzes how repurposed energy connects and addresses two core modern U.S. challenges—economic stagnation and decline in many rural and post-industrial parts of the United States, and barriers to an extensive transformation of U.S. energy infrastructure. Part III then constructs a policy and legal framework for implementing repurposed energy, building from and expanding on existing brownfields law. Part IV proposes a comprehensive suite of cultural shifts, in addition to the policy reforms introduced in Part III, to effectuate repurposed energy.

I. DEFINING REPURPOSED ENERGY AND ITS IMPORTANCE

Repurposed energy is a solution-centric framework. Climate change poses formidable challenges that demand a rapid transition from carbon-centric energy to "clean" (zero-carbon) sources of energy such as solar and wind. The impacts of climate change, and the extent of the transition needed to address it, sometimes seem so large as to foment despair and inaction. We argue, instead, for solutions that address the sociopolitical and economic barriers to a transition that is technologically within our grasp.

This Part analyzes the challenge and opportunity associated with achieving a clean energy transition and the role repurposed energy can play in that transition. It does so by first identifying the scope and scale of the challenge and providing a working definition of repurposed energy. It then details how a focus on repurposed energy can take advantage of current funding opportunities while providing a new focus for clean energy projects. This approach can support rural and post-industrial economic development in a way that may counteract the growing community opposition to such projects.

A. THE ENERGY TRANSITION: BUILDOUT NEEDED TO REACH CLIMATE GOALS

There is global consensus that the pathway to address climate change is a zero-carbon or even negative-carbon economy in which more carbon dioxide and other gases are removed from the atmosphere than emitted into it.[56] Such an economy will require a wholesale transition of the energy sector to zero-carbon fuels—accomplished primarily through the construction of renewable energy and energy storage projects along with new, long-distance transmission lines to expand the existing electric grid.[57] It will also require carbon removal actions.[58]

The pace of solar and wind energy development will have to grow at more than four times the pace of 2022 levels of development if we are to achieve 100% zero-carbon electricity (or close to that) by 2035.[59] There are multiple scenarios to reach this goal, all of which are technically feasible, so long as the nation can accelerate the construction of the types of wind and solar plants already being deployed and significantly expand the

---

56. *Climate Change 2023 Synthesis Report*, *supra* note 6, at 60 ("Limiting human-caused global warming to a specific level requires limiting cumulative CO2 emissions, reaching net zero or net negative CO2 emissions, along with strong reductions in other GHG emissions . . . .").

57. *See* Denholm et al., *supra* note 11, at xix–xx (outlining actions that are necessary for getting the United States on the path to net-zero emissions, including transforming the country's energy infrastructure).

58. *Carbon Dioxide Removal*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, https://www.ipcc.ch/report/ar6/wg3/downloads/outreach/IPCC_AR6_WGIII_Factsheet_CDR.pdf [https://perma.cc/Z26Y-HBQZ] (observing that carbon dioxide removal "is required" to achieve net-zero targets). There are many forms of carbon removal, including, for example, planting forests. Another type of removal is carbon capture and sequestration, alternatively defined as a carbon capture and storage, which involves removing carbon dioxide from the air through direct air capture or removing carbon dioxide from pollution streams and then injecting the carbon dioxide into the pores of underground rock formations. Exec. Off. of the President, *Council on Environmental Quality Report to Congress on Carbon Capture, Utilization, and Sequestration*, THE WHITE HOUSE 10 (2021), https://whitehouse.gov/wp-content/uploads/2021/06/CEQ-CCUS-Permitting-Report.pdf [https://perma.cc/2Y99-JV6Z].

59. Denholm et al., *supra* note 11, at xi (estimating that the United States must build a combined two terawatts (2,000 GW) of wind and solar energy to achieve a carbon-free United States by 2035). In that scenario, wind and solar energy would constitute sixty to eighty percent of total generation in the least-cost electricity mix modeled. *Id.* This would be three times the amount of U.S. installed wind and solar energy capacity as of 2020 and would constitute an annual growth rate more than four times the rate in 2022. *Id.*

existing electric transmission grid.[60] However, these technologies must be scaled up significantly. This will require a massive amount of investment in land across the country, much of which is in private ownership, and for which community opposition in the form of restrictive local zoning requirements and bans is a major obstacle to success.[61]

According to NREL, achieving 100% clean energy generation in the United States by 2035 using the most renewables-heavy scenario would require an additional 946 GW of solar energy and 1,224 GW of wind energy on approximately 8.5 million acres of land, or 0.44% of the total contiguous land area of the United States, if only the "direct" impacts of renewable generation facilities are included.[62] By comparison, corn ethanol

60. *See*, *e.g.*, *id.* at xix ("A 90% clean grid can be achieved at low incremental cost by relying primarily on new wind, solar, storage, advanced transmission, and other technologies already being deployed at scale today."); Eric Larson et al*., Net-Zero America: Potential Pathways, Infrastructure, and Impacts Final Report Summary*, PRINCETON UNIV. 6 (2021), https://netzeroamerica.princeton.edu/the-report [https://perma.cc/L3DD-JZXJ] (click "Download Final Report Summary (Oct. 2021)") (modeling five different "technologically and economically plausible energy systems pathways for the U.S. to reach net-zero emission by 2050" and concluding that each net-zero pathway "could be accomplished with annual spending on energy that is comparable or lower as a percentage of GDP to what the nation spends annually on energy today" but that "foresight and proactive policy and action are needed to achieve the lowest-cost outcomes").

61. *See, e.g.*, News Release, Nat'l Renewable Energy Lab'y, NREL Analysis Quantifies Impacts of Setback Ordinances on Land Available for Renewable Energy Deployment (Aug. 3, 2023), https://www.nrel.gov/news/press/2023/news-release-nrel-analysis-quantifies-impacts-of-setback-ordinances-on-land-available-for-renewable-energy-deployment.html [https://perma.cc/ARH5-94GM] (discussing impacts of local setback ordinances on land available for wind and solar development); Kelsey Tamborrino, *Wind and Solar Projects Stymied by Community Opposition, Zoning and Grid Issues, DOE Lab Finds*, ENERGYWIRE (Jan. 29, 2024), https://subscriber.politicopro.com/article/eenews/2024/01/29/wind-and-solar-projects-stymied-by-community-opposition-zoning-and-grid-issues-doe-lab-finds-ee00137622 [https://perma.cc/W7CD-EQDR] (reporting on and linking to a DOE survey of developers).

62. *100% Clean Electricity by 2035 Study*, NAT'L RENEWABLE ENERGY LAB'Y, https://www.nrel.gov/analysis/100-percent-clean-electricity-by-2035-study.html [https://perma.cc/5KCK-RFPH] (showing 1,342 gigawatts of wind and 1,022 GW of solar generation under the "No CCS" (most renewable energy-ambitious) strategy and showing the United States as already having 118 GW of wind and 76 GW of solar in the reference case—2020); Denholm et al., *supra* note 11, at 53 (showing footprint projections for the "No CCS" case, among other

development already occupies 2% of U.S. contiguous land area.[63] If the acreage calculation also includes "indirect" impacts, such as the space between wind farm towers that is still usable for farming, grazing, and other purposes, then the maximum acreage is larger—112.7 million acres, or 5.96% of total U.S. contiguous land area.[64]

The NREL study contains a map (Figure 1) and table comparing the land required for various decarbonization scenarios with other land use activities such as grazing, railroads, ethanol production, and the like.[65] Less ambitious renewable energy scenarios, including models with carbon capture and storage to reach net zero energy, require even less land than the numbers provided above but still involve meaningful land use changes.[66]

---

scenarios). This statistic includes only "direct" land usage by wind turbines and solar panels required to reach a wholly zero-carbon electricity fleet by 2035 (34,000 square kilometers). *Id.* at 53. Wind towers occupy only approximately 2% of "the total area within a wind power plant," leaving the remaining 98% of the land for other uses, such as grazing. *Id.* at 51. Excluding inland waters and state coastal waters, the total contiguous U.S. land area is roughly 7.6 million square kilometers. *State Area Measurements and Internal Point Coordinates*, *supra* note 15; *see also* Denholm et al., *supra* note 11, at 98 (using the same U.S. Census number, from 2012, to identify total contiguous U.S. land area).

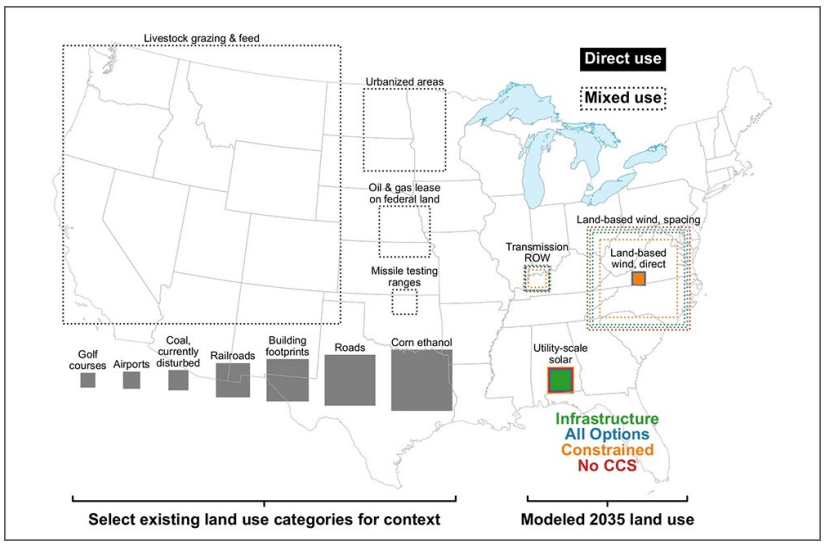
63. Denholm et al., *supra* note 11, at 52 (map). For more moderate estimates of decarbonization costs (ninety-five percent "net decarbonization" by 2050, rather than 2035), see Peter Gagnon et al., 2023 *Standard Scenarios Report: A U.S. Electricity Sector Outlook*, NAT'L RENEWABLE ENERGY LAB'Y, at vi (2023), https://www.nrel.gov/docs/fy24osti/87724.pdf [https://perma.cc/6MJB-R683].

64. Including the total area of wind plants (direct and indirect land use, including the space between the wind towers) leads to 456,000 square kilometers occupied by solar and wind installations. Denholm et al., *supra* note 11, at 53. These estimates for direct and indirect land use are the most conservative estimates for achieving net-zero electricity, meaning that of all the scenarios considered by NREL for reaching net-zero electricity emissions by 2035, this scenario (the "No CCS" scenario) assumes the most renewable energy deployment. *Id.* at 7 (explaining for the "No CCS" scenario that "[t]his is the only scenario that includes no fossil fuel capacity or generation in 2035"); *see also id.* at 53 (showing the largest solar and wind capacities projected to be installed under the "No CCS" scenario).

65. *Id.* at 52–53.

66. *Id.* at vii, 53.

Figure 1. Total Land Area Projected to be Occupied by Wind and Solar Farms Under 100% Clean Energy Scenarios (Compared with Other Land Uses)[67]



Significantly, however, even the highest estimated land use numbers using the most extensive renewables deployment scenario—an ambitious 100% deployment by 2035, occupying 5.96% of U.S. land—fall below total repurposed energy acreage available for development. Approximately 11% of total U.S. contiguous land area (more than 200 million acres—an area twice the size of California) consists of "marginal lands."[68] As defined by the authors who investigated the renewable energy potential of these lands, marginal lands include lands with "inherent disadvantages of lands marginalized by natural and/or artificial forces," including, for example, abandoned croplands, barren lands, brownfields sites, transmission lines and other rights-of-way, landfills, and abandoned mine lands.[69] These are the types of lands that we describe and define as "repurposed energy" in the next Section.

67. Denholm et al., *supra* note 11, at 52 fig.30.
68. Milbrandt et al., *supra* note 16, at 476.
69. Milbrandt, *supra* note 16, at 474.

B. DEFINING "REPURPOSED ENERGY"

We define "repurposed energy" as clean energy development on lands that have already been disturbed by energy extraction (e.g., coal mines and abandoned oil and gas wells) or energy generation (e.g., coal plants); lands where development is impaired by the presence or potential presence of hazardous substances or pollutants from any activity or source, and thus meets the federal definition of a brownfields site; "marginal farmland," whether or not that land is enrolled in a federal conservation reserve program;[70] and abandoned or closed industrial facilities.[71] We define "marginal farmland" as agricultural land that does not fall within the U.S. Department of Agriculture classifications of "prime farmland," "unique farmland," "farmland of statewide importance," or "farmland of local importance."[72] "Clean energy development," in turn, refers to any form of energy generation or storage that emits zero greenhouse gas emissions, similar to the definition found in a growing number of states' clean energy

70. For a discussion of ways to promote renewable development on farmland enrolled in conservation reserve programs (where solar energy development is currently not permitted), see Wiseman et al., *supra* note 7, at 545.

71. Our definition of repurposed energy is similar to the definition of "marginal lands" in Milbrandt et al., *supra* note 16, at 474–75. This definition of "marginal lands" includes "abandoned lands" that "were previously used for human-related activities (agriculture, forestry, mining, etc.) but are no longer in use"; "disturbed lands" that "suggest a human intervention, where the natural ecosystems have been altered or modified, as with mining or oil drilling" and that "do not rehabilitate naturally in the short term"; "under-utilized lands" that "may have the potential to be productive but for economic or physical (e.g. accessibility reasons) they are not"; "wastelands" (barren lands); "underused formerly contaminated sites," "degraded lands" with "reduced or lost biological or economic productivity and complexity"; and "idle lands" currently not in use (a term that typically does not encompass prime land, which is "rarely vacant for long"). *Id.*

72. *Soil Data Access (SDA) Prime and other Important Farmlands*, U.S. DEP'T OF AGRIC., https://efotg.sc.egov.usda.gov/references/public/LA/Prime_and_other_Important_Farmland.html [https://perma.cc/N6CA-38WB]. The USDA also identifies "additional farmland of local importance"—local areas where "there is concern for certain additional farmlands for the production of food, feed, fiber, forage, and oilseed crops, even though these lands are not identified as having national or statewide importance." 7 C.F.R. § 657.5 (2023). Some state and local codes define "prime" farmland as farmland that falls within specific USDA "soil capability" classifications, often defining Classes I through III as "prime." SOIL CONSERVATION SERV., U.S. DEP'T OF AGRIC., AGRIC. HANDBOOK NO. 210, LAND-CAPABILITY CLASSIFICATION 6–7 (1961).

standards.[73] We focus primarily on solar energy, wind energy, and solar or wind plus battery storage examples of repurposed energy because these are the dominant new forms of zero-carbon energy development in the United States.[74]

Existing federal and state programs that address some aspects of what we categorize as "repurposed energy" follow a variety of definitions. The largest federal program that supports renewable energy on disturbed lands, U.S. EPA's RE-Powering America, includes "current and formerly contaminated lands, landfills, and mine sites."[75] By comparison, the IRA provides a ten percent bonus credit for several new clean energy tax credits for projects located in "energy communities," defined as (1) brownfield sites as defined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); (2) communities with a designated minimum percentage of direct employment or tax revenues associated with fossil fuel production, use, or storage; or (3) communities that have hosted or are adjacent to a coal mine or coal-fired power plant that has closed after a designated date.[76] New York State, in turn, creates "build-ready" sites for renewable energy developers that prioritize energy development on "[e]xisting or abandoned commercial

73. *See, e.g.*, Galen Barbose, *U.S. State Renewables Portfolio & Clean Electricity Standards: 2023 Status Update*, LAWRENCE BERKELEY NAT'L LAB'Y (June 2023), https://eta-publications.lbl.gov/sites/default/files/lbnl_rps_ces_status_report_2023_edition.pdf [https://perma.cc/7TCX-UXTP]; *Renewable Energy Explained: Portfolio Standards*, U.S. ENERGY INFO. ADMIN. (July 30, 2024), https://www.eia.gov/energyexplained/renewable-sources/portfolio-standards.php [https://perma.cc/HN6R-JW3U].

74. *See infra* Part I.B.

75. *What Is RE-Powering?*, U.S. ENV'T. PROT. AGENCY, https://www.epa.gov/re-powering/what-re-powering [https://perma.cc/WGL6-8PRU]. Note, however, that other forms of zero-carbon energy development will also be important, and some forms that we discuss here may be particularly well-suited to marginal lands. For example, pumped storage—storing water at a higher location and then releasing it to produce hydroelectricity when electricity is needed—may be a good fit for abandoned coal mine shafts. *See* Elisa Colas et al., *Overview of Converting Abandoned Coal Mines to Underground Pumped Storage Systems: Focus on the Underground Reservoir*, J. ENERGY STORAGE, Dec. 20, 2023, at 1, 11.

76. *See infra* Part III.B.

sites, brownfields, landfills, former commercial or industrial sites, dormant electric generation sites, [and] parking lots."[77]

Our definition of repurposed energy is both broader and narrower than those used in these existing federal and state policies and programs. It is broader because it includes a more diverse range of underutilized properties, including depleted or less productive marginal farmland that is not impacted by either contamination or energy production. It is narrower because it does not include properties defined under the IRA as "energy communities" solely because a minimum percentage of the area's direct employment or local tax revenues is related to the extraction, processing, transport, or storage of coal, oil, and natural gas. As a result of these differences, our definition of repurposed energy sites would not include an entire metropolitan statistical area like San Francisco, which meets the employment or tax revenue criteria for an energy community in the IRA.[78] There may, however, be many specific properties within broadly-defined energy communities that would fit our repurposed energy definition because they are brownfields or contain a retired coal plant or abandoned industrial facility. Likewise, our definition of repurposed energy would include a rural area with marginal farmland even if the area is not a brownfields property.

We prefer this definition because it focuses on a wider yet more individualized range of underutilized properties where clean energy can provide important redevelopment and economic opportunities. In contrast, the IRA's focus on energy communities can in some cases sweep too broadly. Indeed, much of

77. *Build-Ready Program*, N.Y. STATE ENERGY RSCH. AND DEV. AUTH., https://www.nyserda.ny.gov/All-Programs/Build-Ready-Program [https://perma.cc/JH7J-YEUU]. See *infra* Part III.B for other state definitions similar to our "repurposed energy" definition, such as New Jersey's.

78. *See* Daniel Raimi, *Takeaways from the New Federal Guidance on the Tax Credit for Energy Communities*, RESOURCES (Apr. 7, 2023), https://www.resources.org/common-resources/takeaways-from-the-new-federal-guidance-on-the-tax-credit-for-energy-communities [https://perma.cc/C6NF-HGU9] (expressing concern over breadth of lands included in energy communities); Daniel Raimi & Sophie Pesek, *What is an "Energy Community"? Alternative Approaches for Geographically Targeted Energy Policy*, RES. FOR THE FUTURE (Nov. 2022), https://media.rff.org/documents/Report_22-12_AxXwJqy.pdf [https://perma.cc/8G6K-9RQD] (mapping potential energy communities); *see also* Uma Outka, *Evolving Legal Conceptions of "Energy Communities"*, 78 U. MIAMI L. REV. 471, 478 (2024) (discussing variability in policies focusing on energy communities).

Colorado is an "energy community" eligible for the ten percent bonus credit in the IRA.[79] Using this broad of a definition of areas in which clean energy development should be prioritized can limit the goal of channeling resources to individual communities most in need of revitalization. Our definition of repurposed energy sites also incorporates rural and other lands where opposition to clean energy redevelopment may be reduced by emphasizing repurposed energy sites.

Our definition is purpose-based. It intends to best address the goals we explore here: (1) avoiding development of "greenfields"—previously undeveloped or relatively open lands such as farmland—and the associated political, environmental, procedural, and NIMBYist challenges to the use of those lands, and (2) revitalizing rural and post-industrial communities. We generally exclude infrastructure that tends to fall within only one of these categories or that has been discussed at length in other work. For example, while renewable energy development along existing rights-of-way such as highways is vital, it does not consistently benefit rural and post-industrial communities, although it often can. The same is true for distributed renewable energy on, for example, rooftops and parking lots, which avoids the impacts of greenfield development but has primarily benefited wealthier segments of society. The literature has also already explored in depth the benefits of distributed energy, including its avoidance of greenfield development.[80]

C. THE URGENT NEED FOR REPURPOSED ENERGY

Repurposed energy is critical *now* because renewable energy is rapidly expanding at this moment. If the United States chooses to address climate change in earnest, the next three decades must witness a massive transformation of the entire U.S. energy system toward close to 100 percent zero-carbon resources, in addition to the necessary expansion of negative-

79. *Energy Community Tax Credit Bonus*, INTERAGENCY WORKING GRP. ON COAL & POWER PLANT CMTYS. & ECON. REVITALIZATION, https://energycommunities.gov/energy-community-tax-credit-bonus [https://perma.cc/EKH9-ZSG8]; *infra* Part III.B.

80. *See, e.g.*, Sara C. Bronin, *Curbing Energy Sprawl with Microgrids*, 43 CONN. L. REV. 547, 559 (2010); Uma Outka, *The Renewable Energy Footprint*, 30 STAN. ENV'T. L.J. 241, 302 (2011); Hannah J. Wiseman, *Localizing the Green Energy Revolution*, 70 EMORY L.J. ONLINE 59, 84 (2021).

carbon technologies in the form of carbon removal.[81] If this course of action is pursued, all aspects of energy must change. Transportation—the largest contributor to U.S. carbon emissions—must use zero-carbon fuel or be electrified, and that new electricity demand, plus all the electricity already used to power the remainder of the economy, must come from zero-carbon generation.[82] Newly-built wind and solar farms will provide nearly all of that new generation because new nuclear projects—another important zero-carbon form of generation—have stalled in the United States to date.[83] Nor is there much space, or appetite, for new, large-scale hydroelectricity, another form of renewable energy that historically led the small chunk of U.S. renewable development that has already occurred. Alongside the rapid increase in solar and wind generation, battery storage must continue to expand to help address the variable nature of wind and solar generation and ensure a reliable electricity supply.

Largely in response to the climate crisis, numerous state renewable portfolio standards and clean energy standards require most or all electricity to come from renewable or zero-carbon

81. Achieving the targets of the most recent international climate agreement—the Paris Agreement—will also require changes in many sectors beyond energy, including, for example, changes to land use, the food system, and the built environment. *See, e.g.*, ACHIEVING THE PARIS CLIMATE AGREEMENT GOALS (Sven Teske, ed., 2019). We focus on energy here because it is one of the major pathways toward reducing carbon emissions and mitigating climate change.

82. *See, e.g.*, Denholm et al., *supra* note 11, at xix ("[E]lectrification of end uses in buildings . . . and much of transportation and industry is likely a key part of the most cost-effective pathway to achieving large-scale decarbonization across the economy."); Larson et al., *supra* note 60, at 74 (identifying electrification of energy demand, especially for transportation and buildings, as one of the eight key priorities for the 2020s). Electrification of fossil fuel-based resources beyond transportation, such as industrial processes, commercial and residential heating, and cooking, as well as growing demands for electricity from activities such as artificial intelligence, will also substantially increase electricity use. *See* SAUL GRIFFITH, ELECTRIFY: AN OPTIMIST'S PLAYBOOK FOR OUR CLEAN ENERGY FUTURE 29–45, 51–62 (2022) (discussing the scale of present-day energy demands, and estimating that the U.S. will need to generate 1,500–1,800 GW of electricity to satisfy post-electrification electricity demand).

83. Paul Day, *Cancelled NuScale Project Weighs Heavy on New Nuclear*, REUTERS (Jan. 10, 2024), https://www.reuters.com/business/energy/cancelled-nuscale-contract-weighs-heavy-new-nuclear-2024-01-10 [https://perma.cc/L3ZA-29MG] (highlighting commercial and regulatory challenges for new nuclear developments).

energy within the next several decades.[84] Federal tax incentives, grants, loans, and other programs under the IRA and IIJA commit billions of dollars of support to renewable energy projects.[85] And raw economic forces are also driving development in this direction, with wind and solar energy now constituting the lowest cost new energy generation sources in the United States.[86]

The sea change toward a zero-carbon grid must happen *now* to avoid potentially catastrophic climate impacts. New solar and wind farms also must be built quickly because of deadlines set by policymakers for financial incentive eligibility. State renewable energy and clean energy standards have similarly established express deadlines by which a specific percentage of electricity or clean energy within the state must come from renewable energy.[87] Many IRA and IIJA deadlines for project commencement, financing, or spending expire by 2034, or even earlier.[88]

---

84. *U.S. State Electricity Portfolio Standards*, *supra* note 1 (displaying an interactive map that catalogues state standards).

85. *Building a Better America: A Guidebook to the Bipartisan Infrastructure Law for State, Local, Tribal, and Territorial Governments, and Other Partners*, THE WHITE HOUSE 150 (May 2022), https://www.whitehouse.gov/wp-content/uploads/2022/05/BUILDING-A-BETTER-AMERICA-V2.pdf [https://perma.cc/EU2F-UNNE] (summarizing grants, loans, and other financial support available for renewable energy and other programs); *Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action*, THE WHITE HOUSE 10, 22 (Jan. 2023), https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf [https://perma.cc/LJQ9-DEE7] (noting, for example, grants of "$7 billion to provide financial and technical assistance to low-income and disadvantaged communities to deploy or benefit from zero-emissions technologies" and $40 billion "in loan authority to guarantee loans for innovative clean energy projects").

86. *See, e.g.*, *Levelized Cost of New Generation Resources in the* Annual Energy Outlook 2022, U.S. ENERGY INFO. ADMIN. 1, 17 tbl.A1a (Mar. 2022), https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf [https://perma.cc/4G2K-GRBC] (displaying lower levelized cost of electricity for onshore wind and standalone solar resources than for combined cycle resources that are entering service in 2024).

87. *Renewable & Clean Energy Standards*, *supra* note 1.

88. For instance, the $250 billion in IRA funding for the Energy Infrastructure Reinvestment (EIR) loan guarantee program administered by the Department of Energy's Loan Programs Office (LPO) and described in more detail in Part III.B must be committed by September 30, 2026, and funds drawn down through September 30, 2031. Jason G. Eisdorfer et al., *Federal Support*

Private commitments from corporations responding to investor pressure for environmental and social governance also create urgency. In states with or without renewable energy policy mandates, a growing number of large corporations have made zero-carbon commitments with deadlines measured by decades, or even shorter units.[89] These corporations are entering into long-term contracts called power purchase agreements, under which renewable energy generators commit to sell specific amounts of energy over a long time-frame—typically twenty years.[90]

Renewable energy developers are responding to these multiple levers pushing for rapid deployment. They are proposing massive new solar farms, some of which individually cover thousands of acres of land, to uphold their commitments with corporations such as Google and Amazon or to fulfill state-based contracts or mandates.[91] Thousands of new solar energy and battery

---

Opportunities to Remediate and Redevelop Energy Assets, PAC. NW. NAT'L LAB'Y 4–7 (Apr. 2023) [hereinafter *PNNL Report*], https://www.energy.gov/sites/default/files/2023-05/FSOTRREA%20Report.pdf [https://perma.cc/3BDH-JXBS].

89. Alan Schwarz, *Net Zero Leaders*, FORBES (May 30, 2024), https://www.forbes.com/lists/net-zero-leaders/?sh=19a6802b55de [https://perma.cc/77JU-ZVYS]; Ken Shimokawa, *Investor Activism Campaigns Hit Record Mark in H1 2022*, S&P GLOBAL (Aug. 19, 2022), https://www.spglobal.com/marketintelligence/en/news-insights/blog/investor-activism-campaigns-hit-record-mark-in-h1-2022 [https://perma.cc/HY32-SY6R] (breaking down corporate ESG campaigns, including in the energy sector).

90. *See, e.g.*, *Amazon Is the World's Largest Corporate Purchaser of Renewable Energy for the Fourth Year in a Row*, *supra* note 39; Natasha Luther-Jones, *Corporate Power Purchase Agreements (PPAs): What Are They*?, DLA PIPER (Nov. 12, 2019), https://www.dlapiper.com/en/insights/publications/2019/11/what-are-corporate-power-purchase-agreements-ppa [https://perma.cc/LF3C-2TJ5] (describing contract structures for corporate power purchase agreements); *Corporations Brush Aside Energy Crisis, Buy Record Clean Power*, BLOOMBERGNEF (Feb. 9, 2023), https://about.bnef.com/blog/corporations-brush-aside-energy-crisis-buy-record-clean-power [https://perma.cc/LY35-9F5Y] (highlighting organizations which have announced clean power purchase agreements).

91. *Amazon Solar Farm Virginia – Southampton*, CMTY. ENERGY, https://www.communityenergyinc.com/projects/amazon-solar-farm-virginia-southampton [https://perma.cc/Y2M5-R332] ("Amazon Solar Farm Virginia – Southampton is a solar project in Southampton County, Virginia supplying Amazon Web Services data centers in Virginia under a long-term Power Purchase Agreement . . . [it is the] largest solar farm ever constructed in Virginia.").

storage projects are listed in formal "queues" of developers waiting in line to interconnect with the transmission grid.[92]

Despite the urgency and this progress, this change is happening at a pace that will not adequately address the climate crisis. Even in the face of numerous longstanding state mandates and growing federal support for renewable energy, in 2022 renewable energy sources only accounted for 21.3 percent of U.S. electricity generation, with fossil fuels still dominating the mix.[93] Current policies are not adequately hastening renewable energy enough due to a variety of barriers—particularly political and economic obstacles including NIMBY opposition. As we explore below, there have been a variety of proposals to overcome these barriers, including, for example, state preemption of local authority to ban or limit renewable energy projects. But these approaches are politically infeasible today in many parts of the United States, and full preemption may not be advisable. We argue that repurposed energy can have broad appeal and application across the political and economic spectrum.

D. RURAL AND POST-INDUSTRIAL COMMUNITIES AND CLEAN ENERGY: OPPORTUNITY AND OPPOSITION

Repurposed energy is not only a key mechanism to address climate change and other environmental impacts of fossil fuels.[94]

---

92. *Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection*, LAWRENCE BERKELEY NAT'L LAB'Y (2023), https://emp.lbl.gov/queues [https://perma.cc/Z3B6-6XEF] (showing in the graphic about 2,000 GW of total generation and storage capacity seeking grid connections in 2022, "over 95% of which is for zero-carbon resources like solar, wind, and battery storage"); *see also supra* note 38 and accompanying text (discussing interconnection queue delays); Building for the Future Through Electric Regional Transmission Planning and Cost Allocation, 89 Fed. Reg. 49,280, 49,280 (June 11, 2024) (to be codified at 18 C.F.R. pt. 35) (requiring grid planners to consider regional interconnection queues in planning for regional transmission line projects).

93. Carbon-free nuclear energy provided an additional 18.2 percent of the U.S. electricity mix. *What is U.S. Electricity Generation by Energy Source?*, U.S. ENERGY INFO. ADMIN. (last updated Feb. 29, 2024), https://www.eia.gov/tools/faqs/faq.php?id=427&t=3 [https://perma.cc/W2YH-PMGR].

94. Beyond climate impacts, fossil fuels cause illness, missed workdays, and premature deaths through the emission of pollutants that are not greenhouse gases—particulate matter, for example. *Deaths Associated with Pollution from Coal Power Plants*, NIH RSCH. MATTERS (Dec. 12, 2023), https://www.nih.gov/news-events/nih-research-matters/deaths-associated-pollution-coal-power-plants [https://perma.cc/8S8Z-UVAN].

It is equally important for its ability to respond to one of the other major social problems currently facing the United States: the economic decline of rural and post-industrial communities. As scholars such as Ann Eisenberg have documented, the "ripple effects" of this decline move far beyond economics, leading to issues including aging and unsafe infrastructure; underfunding of schools, healthcare, and other social services; high unemployment rates; opioid addiction; and other effects.[95] Repurposed energy is important because the communities slated to host the bulk of the infrastructure for the energy transition are those that could—with careful design—benefit most from the transition with the redevelopment of underused and abandoned industrial and other lands.[96] And there are major federal funds committed

95. Tarekegne et al., *supra* note 54, at 2 (describing ripple effects); JULIE M. LAWHORN ET AL., CONG. RSCH. SERV., FEDERAL ECONOMIC ASSISTANCE FOR COAL COMMUNITIES 16–17 (2023) (documenting negative impacts in coal communities); Kelli F. Roemer & Julia H. Haggerty, *Coal Communities and the U.S. Energy Transition: A Policy Corridors Assessment*, ENERGY POL'Y, Apr. 2021, at 1, 2; Ann M. Eisenberg, *Distributive Justice and Rural America*, 61 B.C. L. REV. 189, 224–28 (2020).

96. As we discuss in Part II, many rural communities host repurposed energy sites, and rural communities economically benefit directly from renewable energy and from the remediation of contaminated sites. Eman Ahmed Hamed Shoeib et al., *Who Benefits from Renewable Electricity? The Differential Effect of Wind Power Development on Rural Counties in the United States,* ENERGY RSCH. & SOC. SCI., Mar. 2022, at 1, 4–6 (finding that rural wind development has positive benefits on income and poverty reduction across counties but that it is unevenly distributed, and hypothesizing that some counties inadequately take advantage of the benefits); Michael C. Slattery et al., *State and Local Economic Impacts from Wind Energy Projects: Texas Case Study*, 39 ENERGY POL'Y 7930, 7930 (2011) (estimating $730 million in total economic activity to local communities over twenty-year life cycle of wind farms (1398 MW) based on the Jobs and Economic Development Impacts model); *Linking Renewable Energy Development to Rural Development*, ORG. FOR ECON. COOP. & DEV. (2012), https://www.oecd-ilibrary.org/urban-rural-and-regional-development/linking-renewable-energy-to-rural-development_9789264180444-en [https://perma.cc/B6AA-Q8RY] (documenting throughout the report the direct and indirect beneficial effects of rural renewable energy development on rural communities); *Clean Energy Policy*, CTR. FOR RURAL AFFS., https://www.cfra.org/clean-energy-policy [https://perma.cc/YHZ2-W326] ("New tax revenue from these projects help shore up local infrastructure, like schools and emergency services, while reducing the local tax burden on rural people. Meanwhile, farmers and landowners receive land-lease payments from project developers in an unpredictable farm economy. In addition, new jobs are created by the increased demand for local manufacturing and project operators."); Anuj Krishnamurthy & Oscar

to these communities—namely, $464 billion in "rural-significant appropriations" in the IIJA, IRA, and federal legislation for semiconductors and scientific investments.[97] Yet rural and post-industrial areas also host some of the strongest resistance, as explored here.

1. Revitalizing Rural and Post-Industrial Communities

The economic decline of rural and post-Industrial America is well-documented and has, to a large degree, contributed to the political rift that threatens not only the energy transition but, more fundamentally, the fabric of U.S. democracy.[98] Clean energy projects are critical for these left-behind communities, although they are not an economic panacea. Such projects sometimes only create substantial local jobs, for example, during the construction process.[99] Yet they represent mid-length investments—twenty to thirty years—and a continuous flow of revenue to communities that have lost their industrial or extractive base, such as a coal mine, a coal-fired power plant, or manufacturing.[100] These communities need revenue to repair aging roads and other infrastructure, fund schools, and support social programs for displaced workers. In some Colorado communities, for

Serpell, *Harvesting the Sun: On-Farm Opportunities and Challenges for Solar Development*, KLEINMAN CTR. FOR ENERGY POL'Y (2021), https://kleinmanenergy.upenn.edu/wp-content/uploads/2021/07/KCEP-Harvesting-the-Sun.pdf [https://perma.cc/P48K-R4W2]; Env't Mgmt. Support, Inc., *Beneficial Effects of the Superfund Program*, U.S. ENV'T PROT. AGENCY (2011), https://semspub.epa.gov/work/HQ/175526.pdf [https://perma.cc/D32Y-K8GH] (exploring benefits of contaminated site cleanup for communities).

97. Anthony F. Pipa & Elise Pietro, *What's in It for Rural? Analyzing the Opportunities for Rural America in IIJA, CHIPS, and IRA*, THE BROOKINGS INST. (Dec. 18, 2023), https://www.brookings.edu/articles/whats-in-it-for-rural-analyzing-the-opportunities-for-rural-america-in-iija-chips-and-ira-2 [https://perma.cc/B65V-JJ62].

98. *See* sources cited *supra* note 26.

99. Post-construction jobs are typically limited to site maintenance such as mowing, infrastructure maintenance (often conducted by out-of-state workers from the energy company), and (for some projects) site security. Recent national data, however, suggests that the long-term jobs and income spurred by wind energy projects may be underestimated. *See*, *e.g.*, *infra* notes 134–136 and accompanying text.

100. *Solar Leases*, CORNELL COOP. EXTENSION, STEUBEN COUNTY (Nov. 11, 2022), https://putknowledgetowork.org/energy/solar-leases [https://perma.cc/M7UJ-65F5] ("As a landowner, a solar lease can also provide a steady income stream, ranging from $250 - $2500/acre/year.").

example, coal mining previously generated nearly two-thirds of school funding.[101] When coal mines close, this leaves a large revenue gap.[102]

An energy transition focused on repurposed energy, including clean energy development on former coal mines and coal-fired power plants and marginal farmland, for example, will help to generate revenue for infrastructure and services in rural and post-industrial communities in several key ways. These include tax revenues from clean energy developers and from landowners leasing land,[103] community benefits payments,[104] remediation of contaminated sites (with associated jobs),[105] and the provision of energy or energy bill savings to residents or the municipality.[106]

a. Taxes and Lease Payments

Tax programs for renewable energy projects vary, but many offer substantial revenue for local governments to use for local infrastructure and services. States such as New York provide a real property tax exemption for one-to-five-megawatt (MW) solar energy projects from which local governments can opt out and negotiate payments in lieu of taxes (PILOT).[107] In Ohio, most solar developers opt for a PILOT approach that provides a steady and predictable stream of revenue, calculated by the generating capacity of solar panels, to the local government.[108] And in Pennsylvania, solar projects on agricultural lands enrolled in

101. Jennifer Baka et al., *The Local Social and Economic Context of Energy Transitions*, PENN. STATE UNIV. CTR. FOR ENERGY L. & POL'Y 10 (Apr. 2022), https://celp.psu.edu/wp-content/uploads/2023/12/Local-Social-and-Econ-Context-of-EnergyTransitions_Apr2022-New-Cover-Page.pdf [https://perma.cc/R3SW-J4TE].

102. *Id.*; Tarakegne et al., *supra* note 54, at 2.

103. *See infra* Part I.A.1.a.

104. *See infra* Part I.A.1.b.

105. *See infra* Part I.A.1.c.

106. *See infra* Part I.A.1.b.

107. *Solar Payment-In-Lieu-Of-Taxes (PILOT*), N.Y. STATE ENERGY RSCH & DEV. AUTH. 131 (May 2023), https://apa.ny.gov/Mailing/2021/05/LocalGov/NYSERDA-Solar-PILOT-Toolkit.pdf [https://perma.cc/QPR4-PVJ9].

108. *Qualified Energy Project Tax Exemption*, OHIO DEP'T OF DEV., https://development.ohio.gov/business/state-incentives/qualified-energy-project-tax-exemption [https://perma.cc/L5NE-8FJU]; OHIO REV. CODE ANN. § 5727.75 (LexisNexis 2023–24); OHIO ADMIN. CODE § 122:23-1-02 (2017).

voluntary preferential tax assessment programs result in large back-payments of taxes to counties by project developers.[109]

Few states have quantified the extent to which renewable energy has increased tax revenues, but initial results are compelling. For example, the North Carolina Sustainable Energy Association found a "nearly 2,000 percent increase" in overall tax revenues on properties with solar facilities after the facilities were built.[110] More in-depth analysis is needed to determine how much of this increase was the result of solar development specifically, as other factors could also have contributed to post-development tax revenue changes. In Ohio, a solar company that received approval for a PILOT estimated that, based on a $9,000 per megawatt payment for a 120-megawatt project, total revenues to the county, school district, career center, parks district, library, a city within the county, and two townships would amount to $42.84 million over forty years.[111] Further breakdown of the projected revenues included substantial amounts of the county payments being allocated to children's services, a community health center, and support services for mental health and developmental disabilities, among other functions.[112]

Leases of land to clean energy companies also generate important revenues for local governments. Landowners who lease their land pay higher property taxes due to increased assessed value and, where municipalities tax income, higher income taxes

109. *Clean & Green*, COMMONWEALTH OF PA., https://www.pa.gov/en/agencies/pda/plants-land-water/farmland-preservation/clean-and-green.html [https://perma.cc/R9EV-VWS4] (describing the "rollback tax"). *But see* 2023 Mich. Pub. Acts 230 (codified at MICH. COMP. LAWS §§ 324.36101, 324.36104a to .36104e) (allowing solar development on farmland without farmers losing tax benefits).

110. Claire Carson et al., *Increased North Carolina County Tax Revenue from Solar Development,* N.C. SUSTAINABLE ENERGY ASS'N 3 (2019), https://energync.org/wp-content/uploads/2019/07/Small_Increased-NC-County-Tax-Revenue-from-Solar-Developmentv3.pdf [https://perma.cc/5ZVW-4ZPV].

111. Frasier Solar, LLC, *Application for a Certificate of Environmental Compatibility and Public Need for the Fraiser Solar Project, Case No. 23-0796-EL-BGN*, OHIO POWER SITING BD. 28 (Oct. 10, 2023), https://opsb.ohio.gov/cases (filter for case number 23-0796-EL-BGN, select Frasier Solar, then click "Application narrative") [https://perma.cc/C562-AJRB].

112. *Id.*

due to lease revenue.[113] Further, solar developers, although they enjoy tax exemptions in some states, pay sales taxes in some cases.[114] Municipalities leasing out their own land also receive direct revenues. Revenues from leasing municipal lands are particularly relevant for repurposed sites, because in many cases municipalities own contaminated or under-utilized lands (such as landfills) or acquire contaminated lands for beneficial reuse.[115] For example, Westport, Massachusetts leased a capped landfill to a solar company, generating $650,000 in revenue from the lease over twenty years.[116]

---

113. *See* Thomas B. Murphy & Joy R. Dohan, *Municipal Officials' Guide to Grid-Scale Solar Development in Pennsylvania Section 7: Tax Implications of Land Conversions for Grid-Scale Solar Development*, PA. STATE UNIV. 6, https://bpb-us-e1.wpmucdn.com/sites.psu.edu/dist/0/147548/files/2022/12/municipal-officials-guide-to-grid-scale-solar-development-in-pa-section-07.pdf [https://perma.cc/D6ET-9RWG] (noting "potential increased real estate taxes" for landowners leasing their land for grid-scale solar development in Pennsylvania).

114. *Solar as a Revenue Generator for Local Governments*, THE SOLAR FOUND. 2 (Mar. 30, 2012), http://my.solarroadmap.com/userfiles/TSF_RevGen-Fact-Sheet.pdf [https://perma.cc/R7T4-H6MT]; Logan Fenimore et al., *Economic Analysis of Utility-Scale Solar*, FL. STATE UNIV. 2 (July 2023), https://coss.fsu.edu/economics/wp-content/uploads/sites/10/2023/08/Utility-Scale-Solar.pdf [https://perma.cc/8JGA-SU8X] (estimating that converting a citrus farm to a solar farm would generate "$1.2M in cumulative county tax revenue" over ten years); Jennifer R. Pusch, *A Primer on State and Local Taxation of Utility-Scale Wind and Solar Projects*, A.B.A. TAX TIMES (Aug. 30, 2022), https://www.americanbar.org/groups/taxation/publications/abataxtimes_home/22sum/22sum-salt-pusch-utility-scale-wind-and-solar [https://perma.cc/8PJH-CQQR].

115. *See, e.g.*, *RE-Powering America's Land: Evaluating the Feasibility of Siting Renewable Energy Production on Potentially Contaminated Land*, EPA (Apr. 2013), https://www.epa.gov/sites/default/files/2015-07/documents/fs_snohomish_wa.pdf [https://perma.cc/J8YD-UAYA] (describing Snohomish County's plans for solar energy at a landfill); *Reclaiming Brownfields: A Primer for Municipalities*, DELAWARE VALLEY REG'L PLAN. COMM'N 5 (Sept. 2008), https://www.dvrpc.org/reports/09002.pdf [https://perma.cc/5UPC-8NDX] (describing as a "common" brownfield redevelopment scenario "Public-led Redevelopment," in which the "municipality takes ownership of the property by foreclosure, eminent domain, or voluntary purchase"); *cf. Local Governments and Contaminated Property*, WIS. DEP'T OF NAT. RES., https://dnr.wisconsin.gov/topic/Brownfields/LGU.html [https://perma.cc/GCQ5-CDW9] (noting state liability exemptions for "local governments that take control of contaminated land").

116. Arlene Karidis, *Ameresco to Launch Solar System on Capped Westport, Mass., Landfill*, AMERESCO (July 30, 2019), https://www.ameresco.com/ameresco-to-launch-solar-system-on-capped-westport-mass-landfill [https://perma.cc/9PW8-M574].

Another significant benefit of clean energy leasing is income to the residents themselves and to individual local governments. In many rural areas, leases of farmland for wind and solar projects can provide the income needed to sustain farmers who earn too little from volatile commodity sales.[117] For instance, one solar development company in the southeast focused on Black and small-scale farmers in North and South Carolina reports that landowners receive yearly lease payments of approximately $500 to $750 per acre, which is up to five-to-seven-times higher than the $155 per acre cropland rental rate for land in the area.[118]

Additional evidence points to large total benefits from leasing. A University of Michigan report evaluating landowner revenues associated with wind and solar projects in a rural Michigan county determined that annual lease payments to each landowner for a large solar project were $125,000 per year ($1 million to 1.2 million per year for the landowners as a group), or approximately $833 per acre per year, with an expected project duration of twenty-five years.[119] The total property taxes paid over the life of the solar project were expected to be $20 to 25 million.[120] The same report evaluated a 120 MW wind development in the county and concluded that both the wind project and the solar project provided approximately $100,000 per MW in taxes over the life of the project.[121]

---

117. *See Solar Leases*, *supra* note 100 ("[S]olar leases can help diversify farm revenues"); Ryan Milhollin & Juo-Han Tsay, *Leasing Land for Solar Energy Development*, UNIV. OF MO. EXTENSION (Aug. 2024), https://extension.missouri.edu/publications/g431 [https://perma.cc/7LC6-ASJK] (exploring benefits and costs of leasing farmland, but observing that "returns per acre from a utility-scale solar energy lease—even after property taxes and other land ownership costs—can far exceed farm enterprise returns or farmland cash rents. This could create greater cash flow from that piece of land").

118. Daniel Walton, *Solar Leases Help NC Farm Owners Up Revenues, Keep Homestead*, PUB. NEWS SERV. (Apr. 4, 2024), https://www.publicnewsservice.org/2024-04-04/energy-policy/solar-leases-help-nc-farm-owners-up-revenues-keep-homestead/a89658-1# [https://perma.cc/F5J9-2CC2].

119. Leah Adelman, *Comparing Solar and Wind Proposals, Shiawassee County, Michigan*, UNIV. OF MICH. (Apr. 2020), https://graham.umich.edu/media/pubs/Comparing-Solar-and-Wind-Proposals-Shiawasee-MI-46933.pdf [https://perma.cc/LH7G-DAJL].

120. *Id.*

121. *Id.*

For many of these projects, the solar development occupies only one part of the farm, allowing owners to continue to farm the remaining areas of their land.[122] For wind projects, the towers that support the turbines only require a small direct footprint, so farming, ranching, and other existing farm activities can continue normally—even often in the spaces between the towers. In general, leases of marginal, less-productive lands for clean energy are particularly beneficial, as they do not displace prime agricultural soils, allow farming to continue on a portion of the land, and provide supplemental income.[123]

b. Direct Benefits to Communities or Residents

Beyond formal lease and tax payments, many clean energy developers voluntarily support communities through contracts with community groups or local governments.[124] These contracts come in a variety of forms and carry a variety of labels, such as community benefits agreements or host community agreements, but their general aims are the same. Within these agreements, clean energy developers commit to provide benefits to the community, such as hiring a certain percentage of the workforce from the community; donating money or goods, such as fire trucks; and supporting local educational programs to train clean

122. *See, e.g.*, Walton, *supra* note 118 (discussing examples of solar development coinciding with farmland in North Carolina).

123. *See* Anuj Krishnamurthy, *Can Renewable Energy Benefit American Agriculture?*, KLEINMAN CTR. FOR ENERGY POL'Y (Dec. 11, 2020), https://kleinmanenergy.upenn.edu/news-insights/can-renewable-energy-benefit-american-agriculture [https://perma.cc/BWU3-Y6WQ] (concluding that renewable energy can provide important supplemental support for farming costs); Justin Jacobs, *Texas Farmers Reap Benefits of Boom in Solar and Wind Power*, FIN. TIMES (Nov. 29, 2021), https://www.ft.com/content/76f5c81d-7533-414a-94c8-841521212c04 [https://perma.cc/6NWD-ETSW] (describing the proliferation of wind and solar development on cattle ranches in Texas to supplement agricultural income and self-generate electricity).

124. *See, e.g.*, Charles Harper & Daniela Schulman, *Warp Speed Clean Energy*, EVERGREEN COLLABORATIVE 17–18, 28 (Dec. 2023), https://collaborative.evergreenaction.com/policy-hub/Warp-Speed-Clean-Energy-December-2023.pdf [https://perma.cc/N88D-2QA5] (proposing best practices for community benefits agreements); Shelley Welton, *The Public-Private Blur in Clean Energy Siting*, 35 KING'S L.J. (forthcoming 2024) (manuscript at 8–15) (on file with Minnesota Law Review) (observing that CBAs can play an important role in moving clean energy projects forward, while acknowledging the governance challenges posed by central reliance on private mechanisms in this space).

energy workers.[125] Some states, such as Maine, incentivize community benefits payments by expediting wind energy projects that include such payments.[126] Michigan legislation enacted in 2023 requires wind and solar developers that obtain siting certificates from the state to enter into host community agreements with affected local governments.[127] These agreements include payments of $2,000 per MW of capacity of the energy facility to the local government to fund police, fire, public safety, or other infrastructure agreed to by the local government and the applicant.[128]

In other cases, community benefits flow directly to residents rather than local governments. For example, New York's Legislature requires benefits payments for renewable energy projects that are twenty-five MW or more, and the agency implementing the legislation requires the payments to be made in the form of direct credits on consumers' energy bills.[129] The first phase of New York's Mill Point Solar Project will pay $125,000 annually into a fund for credits to consumers' annual electricity bills.[130]

---

125. *See, e.g.*, *Community Benefits Agreement, Castle Wind Morro Bay Offshore Wind Farm Project*, SABIN CTR. FOR CLIMATE CHANGE L. (Nov. 29, 2018), https://climate.law.columbia.edu/sites/default/files/content/CBAs/08.%20Morro%20Bay%20Executed.pdf [https://perma.cc/GHD2-7SJT] (requiring local hiring and renewable energy training); *Community Benefits Agreements Database*, SABIN CTR. FOR CLIMATE L., https://climate.law.columbia.edu/content/community-benefits-agreements-database [https://perma.cc/9UPC-L9JG] (offering access to a compilation of various Community Benefits Agreements); *see also infra* note 203 and accompanying text (describing U.S. DOE's use of community benefits plans and community benefits agreements in IIJA and IRA federal financial assistance programs).

126. MAINE REV. STAT. ANN. tit. 35-A, § 3454 (West 2023).

127. MICH. COMP. LAWS § 460.1227 (2024).

128. § 460.1227(1). This number is based on "nameplate" capacity—the maximum megawatts of electricity that a generating facility can produce under ideal conditions. *See* MICH. COMP. LAWS § 460.1221(p) (2024).

129. *See supra* note 31. Energy bill reductions associated with new renewable energy facilities are particularly important for low-income residents for whom a higher percentage of their income is devoted to their energy bill. *See* Madeleine Ngo & Ivan Penn, *As Utility Bills Rise, Low-Income Americans Struggle for Access to Clean Energy*, N.Y. TIMES (Jan. 11, 2023), https://www.nytimes.com/2024/01/11/us/politics/utility-bills-clean-energy.html [https://perma.cc/D4D7-K556].

130. *Harvesting the Sun to Power an Economic Boon to the Town of Glen and Montgomery County*, MILL POINT SOLAR I PROJECT, https://www.millpointsolari.com [https://perma.cc/97WR-9G9Z].

c. Clean-Up, Remediation, and Jobs

Beyond the imperative of filling the services and infrastructure gap through new revenue sources, rural and post-industrial communities also need money to clean up and remediate the sites that formerly hosted revenue-generating extraction or industry. These sites are polluted and pose environmental and health problems, and abandonment of such sites is expanding as fossil fuel production and use in power plants declines.[131] As we explore in Part III.A, these abandoned sites often even repel needed economic investment in communities, as U.S. environmental laws create liability for any entities associated with contaminated sites—even entities who did not contribute to the pollution.[132]

Cleaning up contaminated sites and remediating them to support new development, including energy development, can create high-quality (albeit temporary) jobs that often match the skill set of former workers—particularly at abandoned fossil fuel sites. For example, many workers at coal mines are trained in operating the heavy equipment needed for grading sites and removing contaminated soil.[133]

Repurposed energy also creates jobs beyond remediation, although there is ongoing debate as to whether the jobs are consistently as abundant or well-paying as the fossil fuel jobs that they replace.[134] In many cases, rural communities that have lost

131. *See, e.g.*, Press Release, U.S. Env't Prot. Agency, EPA Announces Federal Enforcement Priorities to Protect Communities from Pollution (Aug. 17, 2023), https://www.epa.gov/newsreleases/epa-announces-federal-enforcement-priorities-protect-communities-pollution [https://perma.cc/LF9J-4CXZ] (noting "hundreds of millions of pounds of coal ash, also known as coal combustion residuals (CCR), found throughout our country in on-site landfills, settling ponds, and other coal plant surface impoundments" and an initiative that focuses on cleaning up "775 coal ash units"); Daniel Propp, *How Shadowy Corporations, Secret Deals and False Promises Keep Retired Coal Plants From Being Redeveloped*, INSIDE CLIMATE NEWS (May 9, 2024), https://insideclimatenews.org/news/09052024/great-lakes-retired-coal-plants-redevelopment/?utm_medium=email [https://perma.cc/3YN8-5CY3] (discussing difficulty of redeveloping closed fossil fuel plants and associated waste disposal sites).

132. *See infra* Part III.A.

133. Baka et al., *supra* note 101, at 8.

134. *See*, *e.g.*, Ben Gilbert et al., *Distributional Equity in the Employment and Wage Impacts of Energy Transitions*, J. ASS'N ENV'T & RES. ECONOMISTS (forthcoming Nov. 2024) (manuscript at 31–32) (on file with Minnesota Law

fossil fuel-related jobs are replacing those with non-energy jobs.[135] But some repurposed sites, such as abandoned fossil fuel-fired power plants, produce ready sites for direct redevelopment for clean energy or manufacturing. Indeed, some studies suggest that former coal-fired power plants replaced with solar plants produce equal numbers of jobs and equal pay quality to the abandoned power plant.[136]

d. Energy for Residents and Communities

In some cases, clean energy projects in rural and post-industrial communities also provide an important source of direct energy to the municipality or residents. For example, some municipalities that put solar panels on former landfills or wastewater treatment plants use the electricity to power government buildings, thus realizing energy savings.[137]

The areas that perhaps benefit the most from energy provision, as well as lease payments, job creation, and other benefits

---

Review) (finding a "significant" impact on long-term employment and income in communities within twenty miles of wind energy projects and proposing that county-based data used for past studies had routinely underestimated the positive economic and employment effects of these projects).

135. Baka et al., *supra* note 101, at 9–10 (providing examples from Wyoming and Colorado, in which former coal-mining communities are seeking to attract new industries, including many non-energy industries).

136. *E.g.*, Max Vanatta et al., *The Costs of Replacing Coal Plant Jobs with Local Instead of Distant Wind and Solar Jobs Across the United States*, ISCIENCE, Aug. 19, 2022, at 1, 2–3; Gilbert et al., *supra* note 134; *see also* Jim Erickson, *U-M Study: Local Renewable Energy Employment Can Fully Replace U.S. Coal Jobs Nationwide*, UNIV. OF MICH. NEWS (Aug. 10, 2022), https://news.umich.edu/u-m-study-local-renewable-energy-employment-can-fully-replace-u-s-coal-jobs-nationwide [https://perma.cc/N8ZN-DWNB] (summarizing the Vanatta et al. study and highlighting the technical feasibility of replacing lost coal jobs with local wind and solar employment).

137. *See, e.g.*, Veronique M. Arguello, Sandia Nat'l Lab'ys, *Design Consideration for Solar Powered Wastewater Treatment Facility for Agriculture and Potable Usage on Acoma Pueblo Reservation*, OFF. OF SCI. & TECH. INFO. 8 (May 1, 2020), https://www.osti.gov/servlets/purl/1630484 [https://perma.cc/X6CW-GDUS] (describing a solar installation that provides fifty percent of the energy needed to power a wastewater treatment plant); *Md. Approves $3.7 M for Water, Wastewater Facility Upgrades*, WATERWORLD (Nov. 5, 2021), https://www.waterworld.com/water-utility-management/smart-water-utility/press-release/14213521/md-approves-37m-for-water-wastewater-facility-upgrades [https://perma.cc/27LV-K34Y] (noting a grant for "construction of a solar panel system to generate renewable energy for the operation of the Federalsburg Wastewater Treatment Plant" in a town in Maryland).

noted above, are American Indian reservations. Some reservations have inadequate (or no) access to electricity and have stagnant or non-existing economic growth.[138] Clean energy projects are already starting to help revitalize these communities, providing electrification and jobs, among other benefits.[139] The U.S. Department of Agriculture, using IRA funds, is helping to support the expansion of clean energy electrification and more

138. *See* ENERGY INFO. ADMIN., SR/CNEAF/2000-01, ENERGY CONSUMPTION AND RENEWABLE ENERGY DEVELOPMENT POTENTIAL ON INDIAN LANDS 45–46 (2000) (showing that 36.7 percent of households on Navajo Reservation and Trust Lands and 28.6 percent of households on Hopi Reservation and Trust lands lacked electricity access in 1990). More recent data suggest that access has improved, but it is unclear why US. Department of Housing and Urban Development (HUD) numbers differ so substantially from the Energy Information Administration numbers. *See* Nancy Pindus et al., *Housing Needs of American Indians and Alaska Natives in Tribal Areas: A Report from the Assessment of American Indian, Alaska Native, and Native Hawaiian Housing Needs*, U.S. DEP'T OF HOUS. & URB. DEV. 66 (Jan. 2017), https://www.huduser.gov/portal/sites/default/files/pdf/HNAIHousingNeeds.pdf [https://perma.cc/LYF2-RKTQ] (showing 1.1 percent of tribal households have inadequate electricity access based on survey results, as compared to 1.4 percent in the total United States—2013 survey); *Tribal Electricity Access and Reliability: Report to Congress*, U.S. DEP'T OF ENERGY 6 (Aug. 2023), https://www.energy.gov/sites/default/files/2024-01/EXEC-2023-000952%20-%20Tribal%20Electricity%20Access%20Reliability%20Report%20to%20Congress%20%28Final%20Draft%20-%20Clean%29-signed%20by%20S1.pdf [https://perma.cc/KJU2-BBJ7] ("The causality of the wide disparity between HUD findings and the findings from the 2000 EIA report are unknown and needs further review.").

139. *See* Lucy Sherriff, *Native Americans Are Building Their Own Solar Farms*, BBC (Dec. 4, 2023), https://www.bbc.com/future/article/20231204-native-americans-are-building-their-own-solar-farms [https://perma.cc/LU9K-ZHW8] (discussing efforts by tribes to develop renewable energy sources on reservation lands); *Tribal Energy Projects Database*, OFF. OF INDIAN ENERGY POL'Y & PROGRAMS, https://www.energy.gov/indianenergy/tribal-energy-projects-database [https://perma.cc/J8NQ-FPXU] (listing implemented clean energy projects under the "Deployment" assistance type); GOV'T ACCOUNTABILITY OFF., GAO-22-103514, INDIAN ENERGY SERVICE CENTER: SUPPORT ACTIVITIES HAVE BEEN PROVIDED, BUT GOALS AND PERFORMANCE MEASURES SHOULD BE DEFINED 7–20 (Mar. 10, 2022), https://www.gao.gov/assets/gao-22-103514.pdf [https://perma.cc/AKV9-PUG6] (noting some progress in federal involvement in assisting tribes with harnessing energy potential but also identifying places for improvement); Arguello, *supra* note 137, at 9–11 (outlining a design for a solar powered wastewater treatment facility on the Acoma Pueblo Reservation). *But see* Andrew Curley, *A Failed Green Future: Navajo Green Jobs and Energy "Transition" in the Navajo Nation*, 88 GEOFORUM 57 (2018) (discussing problems with the Navajo Green Jobs program, which was ultimately rejected by the Navajo Nation and followed by a return to coal power).

affordable clean energy in tribal areas and other rural communities. More than half of the requests for funding under the Empowering Rural America ("New ERA") Program came from these communities, and the resulting grants will help expand energy access and reduce energy bills.[140]

Likewise, Grand Rapids, Michigan, which operates a municipal electric utility, received a three-million-dollar grant to install solar panels on a 190-acre municipal landfill that shut down in the 1970s. This landfill was subject to EPA remediation and has remained vacant in part because the only uses that will not damage the landfill cap are an open field, parking, or solar.[141] The solar facility will be used to power city buildings as well as traffic signals and streetlights.[142]

In summary, repurposed energy poses important opportunities to improve rural and other communities by increasing individual income and municipal revenue, encouraging the clean-up and use of abandoned lands, and enhancing access to revenue. And although renewable energy installations may not always be a major producer of long-term jobs, in some cases—particularly when built on abandoned lands—they add some jobs where before there were none. These can serve as major benefits, since rural communities have suffered decades of underinvestment and lagging growth.[143]

2. Rural Politics and NIMBYism

While rural and post-industrial communities stand to gain critical economic and social benefits from repurposed energy, it is perhaps unsurprising that a transition slated to place massive

---

140. Press Release, U.S. Dep't of Agric., USDA Sees Record Demand to Advance Clean Energy in Rural America Through President Biden's Investing in America Agenda (Sept. 27, 2023) [hereinafter USDA Sees Record Demand], https://www.usda.gov/media/press-releases/2023/09/27/usda-sees-record-demand-advance-clean-energy-rural-america-through [https://perma.cc/C9T2-QXJ4] (providing an example of one grant application that indicated an expected $700 in annual energy savings for residents).

141. Melissa Frick, *Plan to Build Solar Array at Former Grand Rapids Landfill One Step Closer to Reality*, MLIVE (Oct. 6, 2024), https://www.mlive.com/news/grand-rapids/2024/10/plan-to-build-solar-array-at-former-grand-rapids-landfill-one-step-closer-to-reality.html [https://perma.cc/9B99-YNSU].

142. *Id.*

143. *See* sources cited *supra* note 26 (discussing underinvestment in rural communities).

amounts of new industrial zero-carbon infrastructure in these communities has met stiff opposition. Achieving approximately 100 percent zero-carbon U.S. energy by 2035, with no capture and storage of carbon, would require approximately 9,000 square kilometers of direct land use for wind energy and 25,000 square kilometers of land for utility-scale solar.[144] Although this is less land than is used, for example, for buildings, roads, and corn ethanol production, it is still substantial.[145] Such extensive land use change inevitably generates concern.

Most new clean energy generation projects will need to go in the sunniest and windiest areas of the United States, or on accessible land in other areas with moderate renewable resource potential. These areas happen to be very rural and, particularly in the Midwest, consist largely of depopulating post-industrial cities.[146] To pile on to the rural theme of the energy transition, electricity generated in the (rural) sunny and windy areas of the United States will need to flow to cities, through new electric transmission lines built, once again, primarily in rural and post-industrial communities.[147]

---

144. Denholm et al., *supra* note 11, at 53.

145. *Id.* at 52.

146. The exception is the offshore area of the United States, which is more proximate to major population centers on the east coast but has been slow to develop due to permitting hurdles, cost overruns, and other barriers. Heather Richards, *Offshore Wind is Stumbling. Can Biden Save the Industry?*, E&E NEWS: ENERGYWIRE (Nov. 2, 2023), https://www.eenews.net/articles/offshore-wind-is-stumbling-can-biden-save-the-industry [https://perma.cc/G5GN-ELYU] (discussing problems in the industry); Benjamin Storrow, *Offshore Wind Powers US in Climate Milestone*, E&E NEWS: CLIMATEWIRE (Jan. 4, 2024), https://www.eenews.net/articles/offshore-wind-powers-us-in-climate-milestone [https://perma.cc/B62L-9LD7] (reporting on the first major offshore wind project off the coast of Massachusetts becoming operational).

147. We focus primarily on electric generation plants in this Article because the problem of building interstate electric transmission lines in rural "pass through" states that receive little benefit from those lines is already well documented in the literature. *See, e.g.*, Alexandra Klass et al., *Grid Reliability Through Clean Energy*, 74 STAN. L. REV. 969, 1038–43 (2022) (noting the challenges of relying on state cooperation to create a clean energy grid and considering solutions based on expanding federal authority); Alexandra B. Klass, *The Electric Grid at a Crossroads: A Regional Approach to Siting Transmission Lines*, 48 UC DAVIS L. REV. 1895, 1924–25 (2015) (describing the importance of interstate transmission lines and the regulatory challenges they present); Zachary Zimmerman et al., *Ready-to-Go Transmission Projects 2023*, AMS. FOR A

Rural communities have regularly blocked clean energy projects proposed on greenfield properties within their boundaries.[148] Opposition to renewable energy is particularly strong in rural areas as a matter of distrust, politics, misinformation, and perceived lack of benefits.[149] Preferences within rural communities are of course heterogenous, but opposition is also, to a large degree, cultural.[150] External groups funded by the fossil fuel industry who pose as local interests or operate quietly to support them further fuel the fire.[151] Clean energy previously enjoyed some degree of bipartisan support for its promise of economic benefits and domestic energy "security." But renewable energy has become a dirty word in politically conservative areas—nearly all of them rural—in an increasingly partisan country. In

---

CLEAN ENERGY GRID (2023), https://cleanenergygrid.org/wp-content/uploads/2023/09/ACEG_Transmission-Projects-Ready-To-Go_September-2023.pdf [https://perma.cc/4SHY-R6AU] (reporting on thirty-six regional and interregional transmission lines); *National Transmission Needs Study*, U.S. DEP'T OF ENERGY (Oct. 30. 2023), https://www.energy.gov/gdo/national-transmission-needs-study [https://perma.cc/NU8T-8DLU] (highlighting the "pressing need" for more transmission infrastructure and promoting development of more interregional transmission).

148. *See*, *e.g.*, Elizabeth Weise & Suhail Bhat, *Across America, Clean Energy Plants Are Being Banned Faster Than They're Being Built*, USA TODAY (Feb. 4, 2024), https://www.usatoday.com/story/news/investigations/2024/02/04/us-counties-ban-renewable-energy-plants/71841063007 [https://perma.cc/VM4T-WV6S] ("At least 15% of counties in the U.S. have effectively halted new utility-scale wind, solar, or both . . . . [Including] 'the most highly productive areas to develop wind and solar.'" (quoting Jeff Danielson, Clean Grid All.)); Eisenson, *supra* note 5 (documenting the increase in local bans on wind and solar energy across the country); Lauren Bauer et al., *Eight Facts About Permitting and the Clean Energy Transition*, THE HAMILTON PROJECT 5–7 (May 2024), https://www.hamiltonproject.org/wp-content/uploads/2024/05/20240522_THP_Climate_PermittingFacts.pdf [https://perma.cc/CR6C-AHSL] (summarizing data showing that local zoning restrictions governing clean energy projects are a major impediment to a clean energy transition).

149. *See* Matthew J. Burke & Jennie C. Stephens, *Political Power and Renewable Energy Futures: A Critical Review*, ENERGY RSCH. & SOC. SCI., Jan. 2018, at 78, 78 ("[L]ocal conflicts around renewables energy installations, especially wind power but also solar facilities, have delayed or even halted the uptake of renewables . . . ."); Bednarikova et al., *supra* note 19, at 73–78 (describing rural opposition to wind energy in Indiana).

150. *See, e.g.*, David B. Spence, *The Political Economy of Local Vetoes*, 93 TEX. L. REV. 351, 390–92 (2014) (discussing cultural and psychological factors in community debates about fracking).

151. *See* sources cited *supra* note 19 (highlighting the influence of externally-funded front groups on local opposition to renewable resource development).

Ohio, the counties along the electric transmission corridor most conducive to solar energy development have largely banned solar energy development.[152] Similar stories are playing out in many other states, with small towns regularly denying land use permits for large solar energy projects on greenfield properties.[153] This tale follows the story of wind energy a decade ago, with few deviations. Wind developers ultimately found some successful strategies to move forward, but wind energy still only represents 10.2 percent of U.S. generation capacity.[154]

Rural opposition to clean energy moves well beyond politics, however. The predominant concern expressed by rural opponents of clean energy is aesthetics.[155] Many residents dislike the sight of solar panels, wind turbines, or electric transmission lines in their once-pristine neighborhoods. They object to pastoral agricultural fields being transformed into energy farms, or to landscapes with rolling hills being marred by spinning turbines or acres of solar panels. And they worry that their property values will decline, although the empirical literature does not support this concern for the most part.[156] Similar opposition exists

---

152. Jake Zuckerman, *Ten Ohio Counties Ban Wind, Solar Projects Under New State Law*, OHIO CAP. J. (Aug. 23, 2022), https://ohiocapitaljournal.com/2022/08/23/nine-ohio-counties-ban-wind-solar-projects-under-new-state-law [https://perma.cc/HG92-5PER]; Interview with Anonymous Expert, in Ohio (Dec. 2023).

153. *See*, *e.g.*, Robert Zullo, *Across the Country, a Big Backlash to New Renewables is Mounting*, IDAHO CAP. SUN (Feb. 16, 2023), https://idahocapitalsun.com/2023/02/16/across-the-country-a-big-backlash-to-new-renewables-is-mounting [https://perma.cc/SVJ5-HUY6] (providing examples of local debates over renewable energy developments).

154. *Wind Explained*, U.S. ENERGY INFO. ADMIN. (Dec. 27, 2023), https://www.eia.gov/energyexplained/wind [https://perma.cc/SVJ5-HUY6]. For successful strategies, see, for example, Clara Houghteling et al., *Expanding the Baseline: Community Perspectives on Equity in Land-Based Wind Energy Development and Operations*, NAT'L RENEWABLE ENERGY LAB'Y (Mar. 2024), https://www.nrel.gov/docs/fy24osti/88903.pdf [https://perma.cc/M4LP-4XQF].

155. Zachary Goldberg et al., *Understanding and Addressing the Impact of Solar Development on Pennsylvania Farmland*, CTR. FOR RURAL PA. 4 (Aug. 2024), https://www.rural.pa.gov/getfile.cfm?file=Resources/reports/assets/262/Impact%20of%20Solar%20Development%20on%20Pennsylvania%20Farmland%20Report%20Web.pdf&view=true [https://perma.cc/VT88-HV64].

156. *E.g.*, Eric J. Brunner et al., *Commercial Wind Turbines and Residential Home Values: New Evidence from the Universe of Land-Based Wind Projects in the United States*, ENERGY POL'Y, Feb. 2024, at 1, 5–7; Salma Elmallah et al.,

in urban, post-industrial cities, like Detroit, which could see significant benefits from re-use of underused land, but where communities are understandably concerned about changing urban landscapes and potentially empty promises by city officials and developers.[157]

As economist William Fischel observes, many U.S. residents' largest investment is their home, and any threat to that investment is a threat to their savings, their lifeline, and their retirement.[158] From a political economic perspective, these "homevoters" will therefore predictably and rationally oppose any change in their community that poses even a mild threat of declining property values. They are motivated to aggressively and persistently participate in the political processes in which changes to their neighborhood are decided. In contrast, the large but dispersed populace that will benefit from clean energy lacks such commitment or motivation to overcome the transaction costs of organizing and effectively participating in decision-making processes.

Other factors beyond concerns about aesthetics contribute to wars against clean energy development on greenfields. For example, many left-leaning environmental groups, while supporting clean energy in theory, oppose specific clean energy projects for their impacts on wildlife habitat, expressing concerns about projects directly displacing species, fragmenting habitat, and interfering with migration patterns.[159] Those from the left and

---

Shedding Light on Large-Scale Solar Impacts: An Analysis of Property Values and Proximity to Photovoltaics Across Six U.S. States, ENERGY POL'Y, Apr. 2023, at 1, 9.

157. Brian Allnutt, *Three Detroit Neighborhoods Selected to Host Solar Fields*, PLANET DETROIT (June 24, 2024), https://planetdetroit.org/2024/06/solar-power-dte [https://perma.cc/KLB7-R55A] (discussing community disagreement over the benefits and drawbacks from Detroit Mayor Duggan's Neighborhood Solar Initiative, which offers solar projects as a solution to repurpose mostly vacant lots in decaying neighborhoods to address illegal dumping and blight in exchange for incentive payments to communities and buyouts to home owners and renters for land within the project footprints at prices at least double the market value of the properties).

158. FISCHEL, *supra* note 20.

159. *See* David B. Spence, *Regulation and the New Politics of (Energy) Market Entry*, 95 NOTRE DAME L. REV. 327, 330–31, 356 (2019) (presenting concerns for wildlife); K.K. DuVivier & Thomas Witt, *NIMBY to NOPE—Or YESS?*, 38 CARDOZO L. REV. 1453, 1461 (2017) (describing the relationship between wind turbines and bat and avian species).

right also voice concerns that solar energy will displace valuable farmland and interfere with the food supply.[160]

In sum, the quantity of clean energy infrastructure built in the United States must expand rapidly, and rural and post-industrial communities impacted by the energy transition and other economic forces are in need of revitalization—even transformation. These two urgent U.S. policy needs are beneficially intertwined, as the energy transition will require open land, and much of that land is in the areas most in need of economic growth. But attempts to build renewable energy in open fields and on mountaintops in these areas have understandably faced opposition. We argue that there is a better path forward—one that would create a beneficial connection between clean energy and rural and post-industrial communities. The following Part explores the benefits of locating large amounts of new clean energy infrastructure on contaminated, abandoned, underutilized, and marginal lands in these communities.

II. THE PROMISE OF REPURPOSED ENERGY: CLEAN ENERGY ON UNDERUTILIZED LAND

Part I documented the urgent need for two major projects in the United States: (1) a rapid infrastructural transformation of the energy grid, which will take place primarily in rural America and some post-industrial communities, and (2) the revitalization of the very areas targeted for this transformation. Repurposed energy melds these two endeavors and, in so doing, helps overcome some of the many barriers to the energy transition that

160. While the impacts of solar energy development to the U.S. food supply are overblown, solar energy does take farmland out of production. This farmland can once again be used for crops or livestock at the end of the life of solar energy project, but it might not be, as those who might have farmed the land will have moved elsewhere, and the site has now become a valuable energy site with an interconnection to transmission lines. In the context of other displacement of farmland by residential, commercial, and industrial development such as warehouses, solar energy is not the major culprit with respect to farmland displacement. But solar energy does contribute to the cumulative trend of displacement. For assessments of the impacts of solar development on farmland, see, for example, Jacob T. Stid et al., *Solar Array Placement, Electricity Generation, and Cropland Displacement Across California's Central Valley*, SCI. TOTAL ENV'T, Aug. 20, 2022, at 1, 11 (presenting a study on the agricultural impact of using solar panels on low-use farmland); Elnaz H. Adeh et al., *Solar PV Power Potential is Greatest Over Croplands*, 9 SCI. REPS., 2019, at 1, 3 (finding cropland the most suitable land for solar in an empirical study).

have thus far substantially slowed it down. This Part explores how achieving these two goals—building new energy infrastructure and revitalizing communities—can help overcome the major barriers to clean energy development. These barriers include political and political economic barriers to clean energy development,[161] state and local governance that blocks clean energy projects,[162] permitting and other procedural hurdles to these projects,[163] and environmental justice concerns.[164]

A. OVERCOMING PARTISANSHIP AND POLITICAL ECONOMIC BARRIERS TO THE ENERGY TRANSITION

Repurposed energy can be an important tool for turning around the growing partisan split in the energy space. Rural and post-industrial communities often oppose clean energy projects despite their ability to support "energy independence," provide lucrative lease payments for landowners, offer significant tax revenues for local communities, and otherwise revitalize rural and post-industrial communities suffering loss from the closure of manufacturing or fossil fuel industrial facilities.[165] Repurposed energy does not displace productive farmland—a common objection to clean energy raised by rural residents. Additionally, under the IRA's focus on funding clean energy projects that use domestic labor and meet prevailing wage requirements, repurposed energy could attract more positive attention to such projects in post-industrial communities. Repurposed energy is also a critical antidote to the extensive clean energy NIMBYism analyzed in Part I. Building land-intensive clean energy on disturbed and underutilized lands avoids disturbance of wildlife

161. *See infra* Part II.A.

162. *See infra* Part II.B.

163. *See infra* Part II.C.

164. *See infra* Part II.D.

165. *See* Slattery et al., *supra* note 96 at 7939–40 (estimating the economic impacts of wind energy development on rural communities in Texas); *Energy*, SWEETWATER ECON. DEV., https://sweetwatertexas.net/strategic-advantages/key-industries/energy [https://perma.cc/XF6M-NZBH] ("The recent surge of wind turbines ha[s] fit very well into a market where the landowners understand that their lands can be used for more than just grazing, growing cotton, or drilling for oil . . . . By mid 2008, Nolan County had over 1000 people working on wind projects within the county. Sweetwater/ Nolan County became the hot bed of wind development in North America."). For a discussion of tax revenues, *see supra* Part I.D.1.a.

habitats, productive farmland, and other greenfields. It also focuses clean energy development on sites that are often conducive to that development and, importantly, are not likely to be good candidates for other types of development communities may desire.[166]

EPA, state and local governments, developers, and other experts recognized early that closed landfills were a particularly good fit for solar energy. Closed landfill sites offer numerous benefits: they generally have ample sun exposure due to lack of vegetation; contain large, flat areas; have limited alternative development opportunities for schools, shopping, or housing because of the continuing existence of subsurface hazardous substances; have pre-existing connections to electric distribution infrastructure; and are eligible for federal and state financial incentives.[167]

The same is true for clean energy development on former mine lands. These lands are already disturbed; often contaminated, and thus unsuitable for other types of development; have good access to roads, electric substations, and electric transmission lines built for the land's prior use; and are eligible for existing financial incentives.[168] Just as important, the usual NIMBY

166. *See* Interview by Solar Power World with Chris Ichter, Exec. Vice President, CEP Renewables (Oct. 26, 2023), https://www.solarpowerworldonline.com/2023/10/the-rise-of-landfill-solar-project-development-qa-with-cep-renewables [https://perma.cc/8YPV-X2KW] (describing the economic benefits of transforming unsuitable land into landfill solar projects).

167. Matthew Popkin & Akshay Krishnan, *The Future of Landfills is Bright*, RMI 5, 7, 8 (Oct. 2021), https://rmi.org/insight/the-future-of-landfills-is-bright [https://perma.cc/J9PV-9ZAY]; *RE-Powering: How to Develop Sites*, U.S. ENV'T PROT. AGENCY (Aug. 28, 2024), https://www.epa.gov/re-powering/re-powering-how-develop-sites#solar [https://perma.cc/LWC8-65E9]; Kathiann M. Kowalski, *Inflation Reduction Act Grant Gives Landfill Solar a Boost in Ohio*, ENERGY NEWS NETWORK (Aug. 1, 2024), https://energynews.us/2024/08/01/inflation-reduction-act-grant-gives-landfill-solar-a-boost-in-ohio [https://perma.cc/MPG7-H6T3]; *see* U.S. ENV'T PROT. AGENCY & NAT'L RENEWABLE ENERGY LAB'Y, 540-R-22-003, BEST PRACTICES FOR SITING SOLAR PHOTOVOLTAICS ON MUNICIPAL SOLID WASTE LANDFILLS 25, 30, 61 (2022), https://www.epa.gov/system/files/documents/2022-05/best-practices-siting-solar-photovoltaics-municipal-solid-waste-landfills_051722-pub.pdf [https://perma.cc/E8ZR-E493] (referring only to flat land and lack of vegetation).

168. *See Biden-Harris Administration Announces $475 Million Investment to Support Clean Energy Solutions on Current and Former Mine Land*, U.S. DEP'T OF ENERGY (Mar. 21, 2024) [hereinafter *Biden-Harris Administration Announces $475 Million*], https://www.energy.gov/articles/biden-harris

opposition to clean energy projects generally does not apply to landfills—the land is already host to a locally undesirable land use (or "LULU"), and adding solar to the site provides benefits to the community.[169]

Retiring coal plants and other fossil generation sites are similarly attractive for clean energy projects for their access to existing electric grid interconnections.[170] When a utility retires a coal or gas plant but retains its ownership of the connecting transmission line, it often has priority rights to use the capacity of that line for new projects on the same site.[171] Federal and state regulators, developers, and other experts agree that years-long "interconnection queues" in regional transmission organizations (RTOs) are one of the biggest impediments to integrating new clean energy plants into the electric grid.[172] However, locating new clean energy generation and battery storage projects on and adjacent to existing fossil fuel generation sites that already have

---

-administration-announces-475-million-investment-support-clean-energy [https://perma.cc/34ZS-YLMM] (discussing benefits of building new solar plants on former coal mines).

169. Taylor Kate Brown, *Why Aren't More Solar Farms Built on Municipal Landfills?*, GOVERNING (Mar. 2, 2023), https://www.governing.com/now/why-arent-more-solar-farms-built-on-municipal-landfills [https://perma.cc/69SV-MEHL] (describing the IRA's beneficial impact on expanding solar farms on landfills, including tax credits, lower electricity costs, and greater use of space).

170. *See generally* Waypoints Wyo., *Coal Infrastructure Reuse Report Study*, THE NATURE CONSERVANCY 93–118 (Mar. 15, 2023), https://www.nature.org/media/wyoming/coal-infrastructure-reuse-report-study-with-appendix.pdf?vu=wycoalreusefull [https://perma.cc/X5QA-MN26] (detailing the availability of interstate and intrastate transmission lines and local distribution lines at Wyoming former coal-fired power plants and the opportunities to reuse these plants for renewable energy).

171. *See*, *e.g.*, Siegner & Engel, *supra* note 37 (discussing RTOs that allow the transfer of interconnection rights from retiring plants to new clean energy plants ("generator replacement requests") or allowing unutilized interconnection space to be used for a new clean energy plant located on the site of an existing plant ("surplus interconnection service requests")).

172. *See* Miranda Willson, *How Old Coal Plants Could Help Fuel a Renewable Boom*, E&E NEWS ENERGYWIRE (June 30, 2023), https://subscriber.politicopro.com/article/eenews/2023/06/30/how-old-coal-plants-could-help-fuel-a-renewable-boom-00103152?source=email [https://perma.cc/Q99V-HR2K] (sharing anecdotal frustrations about the current interconnection delay times); *see also* Bauer et al., *supra* note 148, at 8–10 (discussing and providing diagrams showing how multi-year interconnection queue delays are slowing the clean energy transition); *supra* notes 38, 92 and accompanying text (discussing impact of interconnection queue delays).

access to transmission interconnection rights allows those new projects to "skip the line" and access the electricity grid within a matter of months.[173]

In a 2023 Order, the Federal Energy Regulatory Commission (FERC) took initial steps to reform RTO processes involving interconnections to expedite this process, but it is well-recognized that more needs to be done.[174] In the interim, the ability of utilities to convert their retiring coal plants to solar and battery farms through development agreements provides a short-term solution to this problem, making these brownfield sites even more attractive for renewable energy development.[175]

B. GOVERNANCE: THE CHALLENGE AND OPPORTUNITY OF LOCAL CONTROL

With respect to governance, state and local governments hold almost all the power over the siting of renewable energy facilities and the transmission lines needed to support them, except for those located on federal lands. As explored in Part I, due to NIMBYism, the list of blocked projects grows ever longer as developers work to rush forward with clean energy projects. Many experts and scholars have proposed preempting or partially preempting this local control in favor of state or even

173. *See supra* note 37 and accompanying text (discussing the interconnection benefits of locating new clean energy generation and storage projects on existing fossil fuel generation sites, often called "clean repowering"). Changes in the generation capacity and fuel type at the site with the existing interconnection sometimes do, however, trigger the need for new system impact studies and other time-consuming interconnection review steps.

174. *See generally* Improvements to Generator Interconnection Procedures and Agreements, 88 Fed. Reg. 61,014 (Sept. 6, 2023) (codified at 18 C.F.R. pt. 35).

175. *See* Midcontinent Indep. Sys. Operator, Inc., 167 FERC ¶ 61,146 (2019) (approving MISO proposal to allow transfer of interconnection rights to new on-site generation facility). See *id.* at paragraphs 27–28 for a discussion of replacing coal plants with renewables on the same site and describing claims of discrimination against new entrants. *See also* Xcel Energy Servs. v. Fed. Energy Regul. Comm'n, 41 F.4th 548, 551 (D.C. Cir. 2022) (affirming FERC rejection of utility interconnection fast-track requests for new generation built on utility site where utility is not part of an RTO and thus impact on competition is more significant than in an RTO region).

federal authority.[176] And some states, including New York, California, Florida, and Michigan, have adopted this approach, placing renewable energy siting for certain wind or solar projects in the hands of one state agency, as discussed in detail in Part III.[177] Indeed, these reforms naturally build upon state policies that have long preempted local control over the siting of non-renewable power plants. Yet preemption is sometimes politically unpopular and can make it more difficult for those concerned about the potential adverse impacts of clean energy to participate in decision-making processes.[178]

Beyond the political difficulties of preemption, there are practical and theoretical reasons—many based in federalism or diffusion of governance power—for leaving some governance power at the local level. Many states have long preempted local control over non-renewable large-scale energy development, in part because such development was viewed as critical. Yet local governments may have more knowledge of the land-based

176. *See, e.g.*, Michael B. Gerrard & Edward McTiernan, *State Authority to Preempt Local Laws Regulating Renewable Energy Projects*, 259 N.Y. L.J., no. 90, May 10, 2018 (reviewing an example of a local attempt at preemption); Uma Outka, *Renewable Energy Siting for the Critical Decade*, 69 KAN. L. REV. 857, 865–66 (2021) (arguing for a revisitation of the patchwork of state and local siting laws for renewable energy); *see also infra* Part IV.B (discussing potential siting and permitting reforms).

177. FLA. STAT. § 163.3205(3) (2024) ("A solar facility shall be a permitted use in all agricultural land use categories in a local government comprehensive plan and all agricultural zoning districts within an unincorporated area . . . ."); MICH. COMP. LAWS § 460.1223 (2024) (allowing an entity proposing the construction of a solar energy facility, for which a local government has denied an application, to seek Michigan Public Service Commission review if the facility complies with state-level setback, fencing, sound, and other standards); N.Y. PUB. SERV. LAW § 144(3) (McKinney 2024) (prohibiting municipalities from requiring any "approval, consent, permit, certificate, contract, agreement, or other condition for the development, design, construction, operation, or decommissioning of a major renewable energy facility" and instead vesting approval authority in a state agency). *See generally* Shawn Enterline & Andrew Valainis, Regul. Assistance Project, *Laws in Order: An Inventory of State Renewable Energy Siting Policies*, LAWRENCE BERKELEY NAT'L LAB'Y (June 2024), https://live-lbl-eta-publications.pantheonsite.io/sites/default/files/rap-enterline-valainis-laws-order-inventory-state-renewable-energy-siting-policies-2024-june.pdf [https://perma.cc/PH46-FWVM] (surveying laws in all fifty states).

178. *See, e.g.*, Michael B. Gerrard, *Who Decides Where the Renewables Should Go?: A Response to Danielle Stokes*' Renewable Energy Federalism, 106 MINN. L. REV. HEADNOTES 400, 411 (2022) ("[G]overnment designation of sites for unpopular facilities has been shown to lead to ferocious local opposition.").

resources within their jurisdiction than federal and state officials.[179] They may be more likely to experiment with creative repurposing solutions, particularly if incentivized to do so through funding. Local governments also have more accountability to the individuals impacted by renewable infrastructure siting.[180] Furthermore, due to their historic dominion over land use, local government officials already have much of the permitting experience needed for these projects, although state officials that implement federal and state site clean-up laws will also have to be involved.[181]

Repurposed energy harnesses these beneficial governance forces, largely leaving power in the hands of state and local governments and focusing federal efforts on funding and informational support, albeit with the potential for limited state preemption of local authority for repurposed energy sites, as discussed in Part IV. Although local governments have been a primary impediment to renewable energy projects, the list of successful RE-Powering America projects shows that these governments may welcome repurposed energy projects for their economic revitalization and efficient reuse of underutilized infrastructure and land.[182]

Retaining local control over repurposed energy empowers communities to become energy leaders guiding their own destiny. Repurposing gives states and communities the opportunity to identify which abandoned or underused spaces are best for which types of energy and will generate the types of revenue most needed to revitalize communities.[183] Indeed, as we explore here, states are beginning to take divergent, creative paths toward different forms of repurposed energy. For example, as discussed in more detail in Part III, states such as Pennsylvania

179. Outka, *supra* note 176, at 872–73.

180. *See id.* at 868 (emphasizing the ability for localities to host public hearings to more directly respond to the needs of communities).

181. *See generally* Gerrard & McTiernan, *supra* note 176 (reviewing the impact of state preemption of local siting authority).

182. *See infra* notes 346–351 and accompanying text (discussing RE-Powering sites).

183. *See* Shalanda H. Baker, *Anti-Resilience: A Roadmap for Transformational Justice Within the Energy System*, 54 HARV. C.R.-C.L. L. REV. 1, 40 (2019) (describing a California state policy to distribute revenues from the state's cap and trade program to help front-line communities develop their own energy programs).

and Kentucky are mapping a solar future for former mine lands, while New York is partnering with communities to create "build ready" solar sites on former commercial and industrial sites, landfills, and other underutilized lands.[184]

C. ADDRESSING PROCEDURAL AND PERMITTING HURDLES

Beyond overcoming local government opposition, repurposed energy promises to cut through some of the excessive red tape largely created by the environmental community now pushing for a rapid energy transition. A growing literature on the energy transition bemoans the fact that environmental laws and cumbersome permitting processes are slowing down the very forms of energy development necessary to address climate change impacts, including, for example, mass extinctions. Renewable energy projects can be delayed for years by federal policy measures such as: federal requirements for reviewing the social and environmental impacts of every federally funded or approved project under the National Environmental Policy Act (NEPA); strict measures to reduce impacts to the habitats of endangered species under the Endangered Species Act (ESA); and permitting requirements under statutes such as the Clean Water Act.[185]

Repurposed energy avoids some of these hurdles by eschewing the types of development that tend to trigger the most extensive review. For example, by locating renewable energy facilities on contaminated or disturbed lands rather than greenfields, repurposed energy avoids most ESA review and permitting. The ESA has proven to be a formidable hurdle to solar development in the West and Southwest, which can, for example, impact the

184. *Build-Ready Program*, *supra* note 77.

185. *See* Bagley, *supra* note 21, at 354 (describing the judicial implementation of NEPA); Ruhl & Salzman, *The Greens' Dilemma*, *supra* note 21, at 28, 30 (explaining specific laws); Ruhl & Salzman, *What Happens When the Green New Deal Meets the Old Green Laws?*, *supra* note 21, at 717 (noting Texas has fewer regulations); Michael B. Gerrard, *A Time for Triage*, ENV'T F., Nov.–Dec. 2022, at 38, 40 (arguing that NEPA needs to be faster); *Ezra Klein Interviews Nick Bagley*, N.Y. TIMES (Feb. 7, 2023), https://www.nytimes.com/2023/02/07/podcasts/ezra-klein-show-transcript-nicholas-bagley.html [https://perma.cc/5WFZ-3NUY] (discussing the problem of longstanding environmental protection laws acting as barriers to building new U.S. infrastructure).

desert tortoise, and Midwestern wind development that impacts prairie-dwelling species such as prairie grouse.[186]

Even repurposed energy development will continue to encounter some regulations because, for example, wind energy development can harm migrating birds simply by being located within the migratory path—regardless of whether the facilities are grounded on a brownfield or a farm field.[187] And this is where additional measures to support and hasten repurposed energy projects will be essential, we argue, and are already being implemented in some circumstances. As we explore in Part III, because repurposed energy projects can substantially reduce environmental and social impacts by building on sites badly in need of clean-up and/or redevelopment, these projects merit reduced or streamlined regulatory and permitting requirements, as some states are already providing.

D. ENHANCING ENERGY JUSTICE

A central challenge of the energy transition is that any massive industrial change risks burdening communities that already endure disproportionate effects of harmful infrastructure. The environmental justice literature has historically documented how wealthier, well-organized, and well-resourced communities have successfully opposed the siting of unwanted infrastructure within or near their boundaries, pushing development to lower-income and often predominately minority communities.[188] More recent work in the energy justice and just energy transition

186. BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, DOI-BLM-HQ-3000-2023-0001-RMP-EIS, DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT FOR UTILITY-SCALE SOLAR ENERGY DEVELOPMENT 5–78 (2023) ("[Solar] [p]roject developers should avoid to the extent practicable all solar energy development activities in Priority 1 and 2 desert tortoise habitat . . . ."); John D. Lloyd et al., *Prairie Grouse and Wind Energy: The State of the Science and Implications for Risk Assessment*, WILDLIFE SOC'Y BULL., July 2022, at 1, 5–9 (noting some impacts of wind energy development on the prairie grouse).

187. *See* John D. Lloyd et al., *Seasonal Patterns of Bird and Bat Collision Fatalities at Wind Turbines*, 18 PLOS ONE, May 10, 2023, at 1, 2 (finding temporal patterns in bird collisions into wind turbines).

188. *See, e.g.*, Comm'n for Racial Just., *Toxic Wastes and Race in the United States*, UNITED CHURCH OF CHRIST 23 (1987), https://www.ucc.org/wp-content/uploads/2020/12/ToxicWastesRace.pdf [https://perma.cc/AJ49-C3LX] (identifying clear patterns of locating commercial hazardous waste facilities in communities of color). *See generally* STEPHEN D. LERNER, SACRIFICE ZONES: THE FRONT LINES OF TOXIC CHEMICAL EXPOSURE IN THE UNITED STATES (2010).

space expands these types of principles to energy development, specifically. This literature explores how both the benefits and burdens of *energy* infrastructure and operations tend to be disproportionately distributed.[189] This literature documents the need for energy justice in the form of recognition, procedures, and the distribution of impacts. Recognition involves understanding and acknowledging the disproportionate impacts of energy decisions. Procedures focus on decision-making fora that give more people a meaningful seat at the table. The distribution of impacts aims for more equitable distribution of both energy burdens and benefits.[190]

The energy transition represents a large opportunity and threat in the context of energy justice. With respect to opportunities, the billions of dollars in government funding flowing to clean energy projects could provide revenue, construction and other jobs, lower electricity costs, reduced air pollution, and other benefits to communities that have historically suffered from illness and premature deaths associated with polluting fossil fuel-fired infrastructure. Yet the transition could also place more burdens on these communities—heaping on more unwanted infrastructure, for example.[191]

We argue, however, that if designed properly, repurposed energy could provide the type of energy renaissance envisioned by scholars such as Shalanda Baker. Professor Baker persuasively argues against traditional notions of "resilience," in which communities that lose infrastructure as a result of, say, a disaster or a transition are told to focus on "bouncing back" and rebuilding that infrastructure.[192] This, argues Baker, perpetuates historic injustices, in which America's fossil-based energy

189. For literature reviews summarizing this vast field, see generally Nadia Ahmad et al., *Synthesizing Energy Transitions*, 39 GA. ST. L. REV. 1087, 1118 (2023) and Ann M. Eisenberg, *Just Transitions*, 92 S. CAL. L. REV. 273, 275–76 (2019).

190. *See* Sanya Carley & David M. Konisky, *The Justice and Equity Implications of the Clean Energy Transition*, 5 NATURE ENERGY 569, 575 (2020) (recommending a comprehensive evaluation of distributional impacts); Kirsten Jenkins et al., *Energy Justice: A Conceptual Review*, 11 ENERGY RES. & SOC. SCI. 174, 175–76 (2016) (describing case studies of distributive justice).

191. *See* O'Shaughnessy et al., *supra* note 22, at 259–60 (discussing literature on the socio-economic benefits of clean energy projects as well as the potential negative impacts).

192. Baker, *supra* note 183, at 2–3.

economy is built on the backs of Black and Brown communities and creates climate impacts that disproportionately burden these communities.[193]

Repurposed energy at first blush sounds like the type of bouncing back that Baker eschews—losing a coal-fired power plant and replacing it with a solar plant. But with proper design of decision-making and planning processes, repurposed energy involves the *reinvention* and *transformation* of communities. With better engagement processes, communities have a strong voice in deciding what types of new energy will produce the most benefits for them, and where this energy should be located.[194] A focus on contaminated sites such as landfills has the potential to promote environmental justice and energy justice goals because many of these lands were originally sited in lower-income urban and rural areas.[195] If rebuilt with clean energy infrastructure in accordance with a community's vision, the sites will provide revenue and redevelopment, rather than ongoing pollution and an eyesore.

As discussed in more detail in Part III, the IIJA and IRA have provisions to help facilitate this type of reinvention in the context of the clean energy transition. These include the IRA clean energy tax bonus provisions for wind and solar projects located in "energy communities" such as communities with brownfield sites, retired coal plants, and closed coal mines (10% bonus); clean energy projects built using steel, iron and other products manufactured domestically and that meet prevailing wage and apprenticeship requirements (10% bonus); and clean energy projects located in low-income communities or on Tribal Lands (10% bonus) or part of a low-income residential project or economic benefit project (20% bonus).[196] These credit bonuses can be

193. *Id.* at 4–5.

194. Johanna Bozuwa & Dustin Mulvaney, *A Progressive Take on Permitting Reform: Principles and Policies to Unleash a Faster, More Equitable Green Transition*, ROOSEVELT INST. 23 (Aug. 2023), https://rooseveltinstitute.org/wp-content/uploads/2023/08/RI_Progressive_Permitting_Report_202308.pdf [https://perma.cc/55X6-QGJD].

195. Popkin & Krishnan, *supra* note 167, at 8.

196. *Charting a Clean Energy Future*, THE NATURE CONSERVANCY 10–11 (Oct. 2023), https://www.nature.org/content/dam/tnc/nature/en/documents/ChartingaCleanEnergyFuture2023.pdf [https://perma.cc/9W9G-HBV7]; *see also Clean Energy Tax Provisions in the Inflation Reduction Act*, THE WHITE HOUSE

"stacked" on top of the base 30% clean energy tax credit in the IRA, resulting in credits that can cover up to 70% of the total project costs.[197]

While these IRA clean energy tax credits and bonuses are directed primarily at *developers* to encourage them to locate projects in energy justice communities and provide benefits to those communities (through clean energy jobs, tax benefits, and paying prevailing wages), other provisions in the IRA and IIJA focus on direct engagement with *communities* themselves. For instance, with IRA funds, the EPA issued its $7 billion "Solar for All" competitive grant program to "award up to 60 grants to states, territories, Tribal governments, municipalities, and nonprofits to expand the number of low-income and disadvantaged communities primed for residential solar investment—enabling millions of low-income households to access affordable, resilient, and clean solar energy."[198] Likewise, DOE's $1 billion grant program for "Energy Improvements in Rural or Remote Areas" funded by the IIJA was divided into different application tiers in order to provide a set of "prizes" and smaller grants to communities that did not require the usual level of detail and analysis in the grant application, lowering barriers to entry.[199] DOE also provided additional technical assistance and community outreach for these grants, recognizing that these communities do not have the same types of staff and experience as traditional DOE grantees like larger cities, states, academic institutions,

(last updated Sept. 21, 2023), https://www.whitehouse.gov/cleanenergy/clean-energy-tax-provisions [https://perma.cc/947H-QYBS] (explaining the IRA benefits in depth).

197. *Charting A Clean Energy Future, supra* note 196, at 11.

198. *Solar for All*, U.S. ENV'T PROT. AGENCY (last updated Aug. 16, 2024), https://www.epa.gov/greenhouse-gas-reduction-fund/solar-all [https://perma.cc/J7DJ-HD6H]; *see also* David Montgomery, *Solar Energy and its Cheaper Bills are Coming to More Disadvantaged Communities*, NEWS FROM THE STATES (Dec. 14, 2023), https://www.newsfromthestates.com/article/solar-energy-and-its-cheaper-bills-are-coming-more-disadvantaged-communities?utm_medium=email [https://perma.cc/G7VB-E7QJ] (covering stories from individuals looking to benefit from the application of this policy).

199. Off. of Clean Energy Demonstrations, *Energy Improvements in Rural or Remote Areas*, U.S. DEP'T OF ENERGY, https://www.energy.gov/oced/era [https://perma.cc/X8LX-S53U]; *see also infra* Part III.B (providing additional detail on other aspects of this DOE grant program).

and corporations.[200] A growing number of nonprofits, community engagement experts, developers, and DOE itself are building capacity to develop best practices for community benefit plans and other tools to ensure projects provide tangible and durable benefits to residents and communities.[201]

Finally, President Biden's Justice40 Initiative[202] and the DOE's Community Benefits Plan component of IIJA and IRA funding applications,[203] which apply to hundreds of billions of dollars in financial support for clean energy projects, are both focused on engaging with and benefitting disadvantaged and underserved communities, the majority of which are in rural areas.[204] We believe these federal efforts, coupled with supporting state and local efforts to engage rural communities in the clean energy transition, are important steps. However, an even more targeted focus on repurposed energy sites through additional

200. Off. of Clean Energy Demonstrations, *supra* note 199; *see also* Pipa & Pietro, *supra* note 97, at 3 (discussing challenges and opportunities associated with IRA and IIJA programs directed at rural and disadvantaged communities); Natalie Fitzpatrick et al., *Michigan Local Governments' Ability to Find, Get, and Manage State and Federal Grants,* MICH. PUB. POL'Y SURV. 2 (Oct. 2023), https://closup.umich.edu/michigan-public-policy-survey/117/mpps-policy-brief-michigan-local-governments-ability-find-get-and-manage-state-federal-grants [https://perma.cc/N4XT-BQ46] (survey showing lower confidence in rural areas and smaller cities in Michigan regarding ability to obtain IRA and IIJA grant funding).

201. *See, e.g.*, *Leveraging Community Benefit Frameworks: Empowering Communities to Benefit from Federally Funded Energy Projects*, NAT'L ACADS. OF SCIS., ENG'G, & MED., https://www.nationalacademies.org/event/42465_05-2024_leveraging-community-benefit-frameworks-empowering-communities-to-benefit-from-federally-funded-energy-projects [https://perma.cc/J7DJ-HD6H] (two-day conference at National Academies of Sciences with speakers from community leaders, DOE personnel, developers, and advocates to discuss developing frameworks for community benefits components of federally funded clean energy projects).

202. *What Is The Justice40 Initiative?*, THE WHITE HOUSE, https://www.whitehouse.gov/environmentaljustice/justice40 [https://perma.cc/Y4MU-3AQU].

203. *About Community Benefit Plans*, U.S. DEP'T OF ENERGY, https://www.energy.gov/infrastructure/about-community-benefits-plans [https://perma.cc/VB73-935R] (DOE requires grant applicants for all IIJA and IRA funding to prepare Community Benefits Plans based on four policy priorities: investing in America's workforce; engaging communities and labor; advancing diversity, equity, inclusion, and accessibility; and implementing Justice40).

204. Pipa & Pietro, *supra* note 97, at 21 ("Just over half of rural census tracts in the U.S. (as defined by the Office of Management and Budget's non-metropolitan designation) are disadvantaged by Justice40 standards.").

measures, as set forth in the remainder of this Article, can enhance the impact and benefits of clean energy in the communities that today are often most resistant to it.

E. PRACTICAL, LEGAL, AND ECONOMIC CHALLENGES FOR REPURPOSED ENERGY PROJECTS

In arguing for a wholesale rethinking of the energy transition—one that develops a large amount of new energy infrastructure on already-disturbed lands—we recognize that there are many practical hurdles to address. If building on abandoned mine lands, coal plants, former industrial sites, and similarly contaminated or disturbed areas were the cheapest and easiest option, developers already would have flocked to this solution. But they have not. This is because building renewable energy projects on contaminated or otherwise disturbed sites is typically quite difficult—financially, legally, and practically speaking.

U.S. environmental law is notorious for discouraging the redevelopment of the very lands that policymakers would hope to be cleaned up and re-used. This is because, as originally enacted in 1980, CERCLA potentially subjects anyone who touches a site subject to any release of a hazardous substance to strict, joint and several liability for all costs of clean-up.[205] This was true even of current site owners who did not place any of the polluting substances on the site.[206] Although later amendments to CERCLA created limited exceptions to these rules, as we explore in Part III, they still tend to cause potential owners to shun rather than seek out contaminated lands.

Even lands not subject to CERCLA liability can be accompanied by onerous legal requirements. For example, the Surface Mining Control and Reclamation Act (SMCRA) requires mine lands other than strip mines to be reclaimed to their pre-mining condition or similar condition.[207] Yet, SMCRA bonds—money provided up-front in the event of later site abandonment—are too low, and many companies fail to meet their reclamation

205. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Pub. L. 96-510, § 107, 94 Stat. 2767, 2781–85.

206. *Id.* § 107(a)(2).

207. 30 U.S.C. §§ 1258, 1269(c)(2).

obligations when they abandon mine sites.[208] Furthermore, many pre-SMCRA sites are largely un-reclaimed and are subject to a host of clean-up requirements for anyone who touches the site. While grants and other financial support are available for such clean-up, they are often not enough to, alone, incentivize development of abandoned mine sites.[209]

Beyond legal concerns, contaminated and other former industrial lands often pose direct physical and financial barriers to development. Open, flat farmland—which also tends to be productive farmland—is attractive to both farmers and renewable energy developers because it offers a readily-available, large, uninterrupted area for development. There are substantial economies of scale in building large renewable energy projects, and those constructed on a patchwork of smaller repurposed sites will lack some of these economies of scale.[210] Repurposed sites, particularly in urban areas, are also often too small to benefit from the economies of scale of larger sites. Building several small solar farms on brownfields within one urban area is more expensive than building one large solar facility on, say, an open farm field.[211]

---

208. *See* Joshua Macey & Jackson Salovaara, *Bankruptcy as Bailout: Coal Company Insolvency and the Erosion of Federal Law*, 71 STAN. L. REV. 879, 884 (2019) (finding that taxpayers and retired miners end up covering reclamation costs).

209. *See Assessment of Solar Development on Previously Impacted Mine Lands in Pennsylvania*, PA. DEP'T OF ENV'T PROT. 9 (May 7, 2024) [hereinafter *Pennsylvania Assessment*], https://greenport.pa.gov/elibrary/GetDocument?docId=8421405&DocName=assessment%20of%20solar%20development%20on%20previously%20impacted%20mine%20lands%20in%20pennsylvania.pdf [https://perma.cc/AK5Y-8RCE] ("[S]olar development on previously mined sites is more expensive than greenfield development, even with the availability of current public funding for site reclamation and preparation.").

210. *Id.* at 5 (noting that in one county analyzed for solar development opportunities on abandoned mine lands (AMLs), "38% of AML features are less than 30 surface acres," that the "average area feature is comprised of 8.7 parcels," and land ownership is unknown); *id.* ("Limitations on the size of AML surface areas, as well as the fragmented ownership of these areas indicate that it may be difficult to develop grid-scale solar projects that generally require large, contiguous parcels of flat land.").

211. Mark Bolinger et al., *Utility-Scale Solar, 2023 Edition: Empirical Trends in Deployment, Technology, Cost, Performance, PPA Pricing, and Value in the United States*, LAWRENCE BERKELEY NAT'L LAB'Y 22 (2023), https://emp.lbl.gov/sites/default/files/utility_scale_solar_2023_edition_slides.pdf [https://

These scale-based factors make repurposed energy sites particularly conducive to community solar—smaller projects in which individuals in a community can subscribe and get a portion of the energy from the projects "virtually metered" to their home or business.[212] But for the scale-based hurdles associated with larger projects, communities and states wishing to steer developers towards already disturbed lands rather than greenfields will likely need to provide developers with additional incentives.

Many repurposed sites are financially inferior (at face value) to greenfield sites because of higher development costs. Marginal farmlands are often unproductive for crops because they are steep and can therefore easily erode or are hard to till.[213] Alternatively, these lands are sometimes too wet for productive crop growth, may host wildlife populations, or may require the removal of trees for use of the land—a carbon-generating activity.[214] These types of land characteristics are also impediments to renewable energy development—not just farming.

Other repurposed sites, such as former extraction sites or landfills, pose similar physical hurdles. For example, developers of renewable energy on some former mine lands worry about ongoing subsidence (collapse) of the site.[215] Solar developers may have difficulty sinking the posts to support solar panels or burying electricity wires on lands with abandoned mine elevator shafts and drainage tunnels—lands that are also subject to

---

perma.cc/Y3SX-AFZ2] ("Larger utility-scale solar projects cost 26% less than smaller projects (5-20 MW) per MW of installed capacity in 2022."). Cost savings include, for example, lower permitting and maintenance costs with fewer sites. *See id.* at 23.

212. Solar Energy Techs. Off., *Community Solar Basics*, U.S. DEP'T OF ENERGY, https://www.energy.gov/eere/solar/community-solar-basics [https://perma.cc/49V9-BJJZ]; *Pennsylvania Assessment*, *supra* note 209, at 5 ("[S]olar facilities in the 3 to 5 MW range (15 to 30 acres) are more likely to be able to be sited on previously mined lands.").

213. *See* Milbrandt, *supra* note 16, at 475 ("Each renewable energy technology is limited by technology-specific criteria including minimum resource intensity, broadly suitable site characteristics (e.g. slope, land cover), and compatible land use (e.g. excluding protected areas like parks and wildlife refuges).").

214. *See id.*; *see also supra* note 71 (discussing "under-utilized lands").

215. *See Pennsylvania Assessment*, *supra* note 209, at 7, 38–40 (noting geotechnical concerns relating to solar installations on former mines, including subsidence risk).

settling and tend to have uneven surfaces.[216] As compared to pregraded, flat farmlands, these are substantial hurdles. Solar projects on landfills can face similar construction challenges, although federal and state financial incentives and supportive state permitting processes can help overcome those hurdles.[217]

Beyond developer-based hurdles, repurposed energy development can also pose financial concerns for communities. Although we highlight the benefits of higher tax revenues, other types of development on repurposed sites—such as manufacturing facilities—could in theory generate greater economic returns for communities in the form of long-term jobs in addition to higher tax revenues.

These and other factors can make many repurposed energy sites seem more trouble than they are worth for prospective developers. But in light of the many benefits of repurposed energy, we argue that the permit streamlining, informational, and financial incentives that governments are already providing to renewable energy should focus more on repurposed energy sites to help developers overcome these challenges and spur developers toward use of these sites. In Part III, we explore the form that this support must take and, happily, already is occurring in a growing number of energy policy arenas.

III. IMPLEMENTING REPURPOSED ENERGY

The story of successfully channeling new renewable energy development toward repurposed energy sites begins with the development of state brownfields programs after the enactment of CERCLA in 1980. The United States has a long and storied history of managing and mismanaging contaminated sites for redevelopment, as we discuss here with a focus on state brownfields law and renewable energy. Despite improvements, brownfields law in its current form proves decidedly inadequate for the sea change in clean energy infrastructure development slated to unfold over the next several decades, and we therefore explore a more comprehensive regime in this Part. Section A explores state brownfields programs and their limitations, and Section B

216. *Id.* at 40.

217. *See* Interview by Solar Power World with Chris Ichter, *supra* note 166; Propp, *supra* note 131 (discussing challenges and opportunities with redeveloping fossil fuel power plant sites).

provides a path forward, proposing a comprehensive legal approach to repurposed energy involving governmental financial support, permitting and siting reform and associated streamlining, and informational and planning support for developers.

A. THE ROLE OF STATE BROWNFIELDS PROGRAMS IN PROMOTING REPURPOSED ENERGY

Enhancing the use of brownfield sites for renewable energy projects is central to the concept of repurposed energy, but not sufficient. However, the development of state brownfields law provides many important lessons for a broader repurposed energy approach—both positive and negative—as explored in this Section.

A "brownfield site" is defined in CERCLA as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant."[218] Despite the definitional focus on easing reuse of contaminated sites, one of the unintended consequences of CERCLA's original enactment in 1980 was to exacerbate and accelerate a massive increase in underutilized and abandoned properties across the country, now known as brownfields, that contain some level of hazardous substance contamination from prior industrial, mining, energy, and disposal activities.[219] There are over 450,000 brownfield sites in the United States.[220] How Congress, EPA, and states addressed this problem, and can transform existing brownfields programs to promote repurposed energy, is set forth in this Section.

---

218. 42 U.S.C. § 9601(39)(A). This definition was added to CERCLA in The Small Business Liability Relief and Brownfields Revitalization Act, Pub. L. No. 107-118, 115 Stat. 2356 (2002). For further discussion of the term and a brief history of federal and state brownfields actions, see *Brownfields and Land Revitalization Program History*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/brownfields/brownfields-and-land-revitalization-program-history [https://perma.cc/7RXG-SQ5R].

219. *See Brownfields Basics*, ENV'T L. INST., https://www.eli.org/brownfields-program/brownfields-basics [https://perma.cc/H933-XBX5] (describing the basics of brownfields); TODD S. DAVIS & SCOTT A. SHERMAN, BROWNFIELDS: A COMPREHENSIVE GUIDE TO REDEVELOPING CONTAMINATED PROPERTY 40 (3d ed. 2010) ("The 'brownfields' issue originated as an unintended consequence of Congress' enactment of [CERCLA] in 1980.").

220. *Brownfields, About*, U.S. ENV'T PROTECTION AGENCY (last updated Aug. 2, 2024), https://www.epa.gov/brownfields/about [https://perma.cc/5AZD-Q26N].

1. The Brownfields Crisis, CERCLA, and Other Attempted Fixes

The United States hosted thousands of abandoned and contaminated industrial plants, hazardous and municipal waste landfills, mining sites, energy extraction and production sites, chemical plants, disposal sites, and the like before CERCLA's enactment in 1980.[221] This extensive abandonment arose from deindustrialization trends in the 1960s and 1970s, particularly in the Midwest and northeast, and economic trends in other parts of the country.[222] Many of these properties contained significant toxic and hazardous wastes due to decades of operations under lax or nonexistent environmental protection standards.[223] Notably, brownfields are not limited to urban areas; many rural communities and tribal communities have struggled for decades with the legacy of contamination and abandoned lands associated with agricultural chemical plants, mill sites, landfills and other disposal sites, mining sites, and the like.[224]

To address these concerns, in 1980, CERCLA—often called the "Superfund Law"—created a statutory mechanism that allowed governments and private parties to recover the costs associated with remediating hazardous substance contamination from virtually any party connected to the property at any time,

---

221. *See* BROWNFIELDS LAW AND PRACTICE: THE CLEANUP AND REDEVELOPMENT OF CONTAMINATED LAND § 1.03(1)(c) (Michael B. Gerrard ed., 2024) [hereinafter BROWNFIELDS LAW AND PRACTICE] (describing reasons for abandonment).

222. *Id.* § 1.03(1)(b); DEINDUSTRIALIZATION AND REGIONAL ECONOMIC TRANSFORMATION: THE EXPERIENCE OF THE UNITED STATES 17 (Lloyd Rodwin & Hidehiko Sazanami eds. 1989) (describing the trends of deindustrialization).

223. *See* Joel B. Eisen, *"Brownfields of Dreams?": Challenges and Limits of Voluntary Cleanup Programs and Incentives*, 1996 U. ILL. L. REV. 883, 890–98, 891 n.24 (1996) (discussing the proliferation of brownfields sites in the Midwest and Northeast).

224. *See, e.g.*, U.S. ENV'T PROT. AGENCY, EPA 560-F-19-178, BROWNFIELDS AND LAND REVITALIZATION IN SMALL, RURAL AND TRIBAL COMMUNITIES (2019) (describing specific programs implemented in rural and tribal environments); Joseph Navrátil et al., *Variation in Brownfield Reuse of Derelict Agricultural Premises in Diverse Rural Spaces*, 87 J. RURAL STUD. 124, 125 (2021) (sharing challenges in establishing brownfield usages in rural communities); Charles Bartsch & Barbara Wells, *Financing Brownfield Redevelopment in Small Towns and Rural Areas: Helpful Hints and Examples*, NE.-MIDWEST INST. 2 (Apr. 2006), https://www.epa.gov/sites/default/files/2015-05/documents/brownfield_rural_financing.pdf [https://perma.cc/B3TF-DKTS] (listing specific implementation strategies).

including current owners whose actions did not cause the contamination.[225] The law also directed EPA to create a National Priorities List (NPL) of "Superfund" sites, based on the high level of hazard posed by the site for priority cleanup.[226] Many states enacted their own state Superfund laws following CERCLA's enactment, with provisions similar to the federal law.[227]

CERCLA, as administered by EPA, succeeded in casting a wide net to hold potentially responsible parties legally accountable for past contamination.[228] But these Superfund laws, particularly CERCLA, had unintended, adverse consequences as well. Tens of thousands of contaminated properties were not placed on the NPL, and thus not a priority for EPA cleanup, but were still subject to CERCLA.[229] The liability risks associated with contaminated property encouraged developers to seek greenfield properties outside of urban centers for new

225. *See* 42 U.S.C. § 9601 (definitions); Alexandra B. Klass, *From Reservoirs to Remediation: The Impact of CERCLA on Common Law Strict Liability Environmental Claims*, 39 WAKE FOREST L. REV. 903, 920–22 (2004) (discussing terms and statutory definitions). "Superfund" refers to the provision of CERCLA that imposed a tax on chemical and petroleum companies to create a trust fund for EPA to use to clean up properties contaminated by hazardous substances. *Id.* at 920–21, 921 n.68. Under CERCLA, responsible parties are strictly, jointly, and severally liable for reimbursing governmental entities or private parties for cleanup costs. *Id.* at 921–22.

226. *See Superfund: National Priorities List (NPL)*, U.S. ENV'T PROT. AGENCY (last updated Oct. 30, 2023), https://www.epa.gov/superfund/superfund-national-priorities-list-npl [https://perma.cc/B4QZ-L5WZ]. The NPL is Appendix B of CERCLA's National Contingency Plan (NCP). 40 C.F.R. § 300 app.B (2023). CERCLA Section 105(a)(8)(B) defines the NPL as a list of "releases" and the highest priority "facilities" and requires that the NPL be revised at least annually. 42 U.S.C. § 9605(a)(8)(B).

227. Kevin R. Murray & Elizabeth A. Rudolf, *State Environmental Programs and Statutory Frameworks for Consideration in Real Estate Transactions*, *in* ENVIRONMENTAL ASPECTS OF REAL ESTATE AND COMMERCIAL TRANSACTIONS 69–78 (Kevin R. Murray ed., 2021).

228. *See* Justin R. Pidot & Dale Ratliff, *The Common Law of Liable Party CERCLA Claims*, 70 STAN. L. REV. 191, 194 (2018) (stating that CERCLA "transformed environmental law by imposing joint and several strict liability on those responsible for contaminating the environment" with the twin goals of "(1) ensuring the effective and efficient cleanup of contaminated sites; and (2) shifting the cost of cleaning up those sites to the parties responsible" resulting in the remediation of many thousands of properties nationwide).

229. *Id.* at 203–04.

development, resulting in significantly reduced investment, taxes, and employment in urban core areas.[230]

Moreover, current owners of contaminated, underutilized properties knew that posting the property for sale would trigger the need for a pre-sale assessment that would either require a cleanup or reporting contamination to state or federal authorities.[231] To avoid this, property owners often continued to maintain ownership of unused industrial properties rather than sell or lease the property. This prevented the property from being redeveloped in a way that would result in construction or other jobs, increased property taxes, and other neighborhood benefits.[232]

By the early 1990s, the term "brownfields" described the hundreds of thousands of properties with the potential for remediation and productive use but where fear of CERCLA liability and cleanup burdens impeded sale, investment, and redevelopment. As noted earlier, the EPA estimates that there are more than 450,000 brownfields properties in the United States, consisting primarily of closed landfills, former industrial sites, and abandoned mines.[233] The number could be as high as one million, with as much as $2 trillion in undervalued real estate due to the impacts of real or perceived contamination and the cost of cleanup at $650 billion as of 2010.[234] Much of this real estate, in addition to other disturbed or underutilized land described in this Article, could benefit from repurposed energy development.

---

230. *See* Eisen, *supra* note 223, at 898–913 (discussing impact of fear of CERCLA liability on prospective developers and lenders, exacerbating the pre-existing proliferation of brownfields due to regional economic trends); DAVIS & SHERMAN, *supra* note 219, at 40 ("Because of the uncertainty about whether U.S. EPA or a state agency might decide in the future to require [a] cleanup, many developers or industrial users simply avoided acquiring [brownfields] properties" and turned to "greenfields" instead).

231. DAVIS & SHERMAN, *supra* note 219, at 5; BROWNFIELDS LAW AND PRACTICE, *supra* note 221, § 1.03[4].

232. BROWNFIELDS LAW AND PRACTICE, *supra* note 221, § 1.03[4]; DAVIS & SHERMAN, *supra* note 219, at 5.

233. *See Brownfields, About*, *supra* note 220; *see also* DAVIS & SHERMAN, *supra* note 219, at 5; Popkin & Krishnan, *supra* note 167, at 7 n.i; JAMES T. O'REILLY, SUPERFUND AND BROWNFIELDS CLEANUP § 2:1 (Thomson Reuters 2024).

234. DAVIS & SHERMAN, *supra* note 219, at 5.

2. Initial Solutions: State Voluntary Cleanup Programs and Federal Reform

In light of obstacles to redeveloping brownfields throughout the United States, city planners, state officials, communities, and developers have long searched for solutions. In the late 1980s, states began to create what are now called Voluntary Cleanup Programs (VCPs), where developers can work cooperatively with state environmental agency officials to proactively investigate and partially or fully remediate brownfield properties in exchange for liability assurances.[235]

As these programs developed, states worked with EPA officials to provide developers with at least limited assurances that EPA would not seek to impose CERCLA liability on developers who negotiated cleanups with state officials in approved VCPs.[236]

---

235. *Id.*; *see also* Soji Adelaja et al., *Renewable Energy Potential on Brownfield Sites: A Case Study of Michigan*, 38 ENERGY POL'Y 7021, 7028–29 (2010), (evaluating the potential for significant renewable energy development on brownfields in Michigan). By the year 2000, fifteen states had adopted VCPs and as many as forty-five states had some form of program funding, or otherwise targeting, brownfields cleanup or development. *See* Joel B. Eisen, *Brownfields Policies for Sustainable Cities*, 9 DUKE ENV'T L. & POL'Y F. 187, 193 (1999) (discussing the proliferation of state VCPs and other brownfields programs); O'REILLY, *supra* note 233, § 2.1 (noting the success of redevelopment programs); *State and Tribal Brownfields Response Programs*, U.S. ENV'T PROT. AGENCY (last updated Apr. 10, 2024), https://www.epa.gov/brownfields/state-and-tribal-brownfields-response-programs [https://perma.cc/LG3A-4LZ2] (describing programs); OFF. OF BROWNFIELDS & LAND REVITALIZATION, U.S. ENV'T PROT. AGENCY, EPA 560-K-16-002, CLEANING UP BROWNFIELDS UNDER STATE RESPONSE PROGRAMS—GETTING TO "NO FURTHER ACTION" (2016) (surveying response programs across the country).

236. *See* BROWNFIELDS LAW AND PRACTICE, *supra* note 221, § 1.05 (explaining that the EPA has reached Memoranda of Agreements with several states establishing deference to those states' voluntary cleanup schemes); O'REILLY, *supra* note 233, § 2:3 (describing memoranda, created cooperatively between states and the EPA, which recognized that sites cleaned through state VCPs "are not of interest to Superfund"). EPA and states across the country have websites and annual reports highlighting successful developments under EPA or state VCP supervision that transformed these formerly contaminated and abandoned lands into new commercial and industrial developments, parks and recreation areas, mixed-use residential developments, and more. *See*, *e.g.*, *Brownfield Success Stories*, U.S. ENV'T PROT. AGENCY (Sept. 17, 2024), https://www.epa.gov/brownfields/success-stories [https://perma.cc/7XBL-N2SG] (documenting the accomplishments of EPA Brownfield grant recipients).

Ultimately, Congress built on this work in the states and amended CERCLA in 2002 to provide liability protection for certain landowners and a range of liability assurances for existing and prospective property owners.[237] Congress also enhanced the ability of EPA to assist with brownfield redevelopment efforts by authorizing additional funding and support for technical assistance.[238]

The current state of affairs with regard to encouraging brownfields redevelopment is far from perfect. For instance, there remains opportunity for more specific liability exemptions for renewable energy development projects on brownfields sites.[239] Moreover, on the flip side, there are certainly cases

237. Small Business Liability Relief and Brownfields Revitalization Act, Pub. L. No. 107-118, 115 Stat. 2356 (2002); O'REILLY, *supra* note 233, § 2.3; *see* BROWNFIELDS LAW AND PRACTICE, *supra* note 221, § 27.04 (referencing liability protections available to certain landowners); *Summary of the Small Business Liability Relief and Brownfields Revitalization Act*, U.S. ENV'T PROT. AGENCY (Nov. 9, 2023), https://www.epa.gov/brownfields/summary-small-business-liability-relief-and-brownfields-revitalization-act [https://perma.cc/98SV-C3A5] (describing how the Act exempts certain parties from CERCLA liability). For a detailed discussion of the 2002 CERCLA amendments, see DAVIS & SHERMAN, *supra* note 219, at 41–64.

238. *See* BROWNFIELDS LAW AND PRACTICE, *supra* note 221, § 27.04 ("The 2002 Brownfields Amendments authorize EPA to provide, or fund eligible governmental entities or non-profit organizations to provide, training, research, and technical assistance to individuals and organizations to facilitate assessment, remediation, or preparation of brownfield sites."); O'REILLY, *supra* note 233, § 2.1 (explaining that the EPA provides technical assistance, training, and research grants to assist communities in brownfields challenges). Congress has reauthorized that funding on multiple occasions, including most recently in the IIJA and the IRA. *See Bipartisan Infrastructure Law: A Historic Investment in Brownfields*, U.S. ENV'T PROT. AGENCY (last updated Aug. 22, 2024), https://www.epa.gov/brownfields/bipartisan-infrastructure-law-historic-investment-brownfields [https://perma.cc/E6YY-84MK] (discussing how the IIJA provided $1.2 billion in brownfield cleanup project grants and $300 million to state and tribal response programs); *see also Types of EPA Grant Funding*, U.S. ENV'T PROT. AGENCY (last updated July 30, 2024), https://www.epa.gov/brownfields/types-funding [https://perma.cc/DZX3-KFZB] (detailing types of EPA grant funding for brownfields redevelopment). For a summary of IRA funding for "energy communities," which include brownfield sites as defined in CERCLA's 2002 amendments, see *infra* notes 251–253 and accompanying text.

239. *See* Mary Capdeville, *LPDD Model Law: Exempting Renewables on Brownfields from CERCLA Liability*, LPDD, https://lpdd.org/resources/lpdd-model-law-exempting-renewables-on-brownfields-from-cercla-liability [https://perma.cc/9363-SLDK] (proposing model legislation with liability exemptions for wind and solar energy developers).

where regulators allow developers to leave contamination on properties in exchange for use restrictions, or where development occurs without community buy-in.[240] But the fact remains that EPA, states, and local governments worked cooperatively over decades with the private sector and communities to combine funding, technical expertise, and community vision to address a nationwide crisis through programs tailored to local conditions. A repurposed energy strategy can build on this foundation, as set forth below.

B. MOVING BEYOND BROWNFIELDS: FORMING A COMPREHENSIVE REPURPOSED ENERGY POLICY

Reforming brownfields law to specifically encourage repurposed energy projects will be an essential mechanism to push new renewable energy development away from greenfield sites. But the United States must move well beyond traditional, and even revised, brownfields law, toward repurposed energy to enable a massive change in how we think about and site new energy infrastructure. A law of repurposed energy must include more creative and ambitious mechanisms for using traditionally-defined brownfields for renewable energy, and it must be broader, encompassing the more disturbed sites included within our definition of repurposed energy.[241]

---

240. *See* Joel B. Eisen, *Brownfields at 20: A Critical Reevaluation*, 34 FORDHAM URB. L.J. 721, 736 (2007) (explaining that VCPs often allow developers to use "institutional controls," such as fencing, zoning controls, deed, or covenant restrictions that do not involve actual cleanup of contamination at the site); *see also id.* at 751 ("The brownfields process, like any urban land use development process, is subject to capture by well-heeled, politically savvy developers and a resulting distrust by local residents."); DAVIS & SHERMAN, *supra* note 219, at 53–54 (discussing controversies over provisions in the 2002 CERCLA amendments creating a limited bar on federal CERCLA enforcement against owners of brownfield sites that have successfully completed the requirements of eligible state VCPs).

241. Our approach can also address some of the challenges facing new long-distance electric transmission lines, which, like new wind and solar projects, are critical to the nation's decarbonization efforts and must be located primarily in rural areas. For instance, one of the priority interregional electric transmission lines designed to transport renewable energy between the two largest regional transmission organizations—MISO and PJM—is proposed to be built on and under existing railroad corridors to disturb as little land surface as possible. This strategy avoids aesthetic impacts and interference with lands that can be used for farming or other purposes. *See generally* SOO GREEN, https://

A variety of programs are beginning to create a new law of repurposed energy, both for traditional brownfields and other types of previously-used land, but only in a piecemeal and non-comprehensive way. Here we argue for a comprehensive policy of repurposed energy, which includes three vital policy components: (1) financing, (2) regulatory reform and streamlined permitting, and (3) information and data support. We explore existing programs that contain these elements, including brownfields programs and others that cover more types of previously-used lands, and argue for more extensive, ambitious, coordinated policy in these areas. Table 1 summarizes the tools that we discuss in this Section.

soogreen.com [https://perma.cc/PL4W-LN5H] (documenting details of the SOO Green project, including the benefits of building along an existing railroad corridor).

Table 1. Summary of Policy Tools to Support Repurposed Energy

Funding/ Financing	• Federal, state, and local grants and loans for building on disturbed lands • Federal, state, and local cleanup of contaminated sites
Regulatory reform and streamlined permitting	• State centralization of siting authority for renewable energy (or for repurposed energy only) • More uniform standards/permits by rule • Offsets for environmental impacts at renewable energy sites • Expedited permitting/clear review and approval or rejection deadlines • "Build-ready" sites • FERC interconnection queue reform to expedite new renewable energy and battery projects on existing fossil fuel generation sites with interconnection rights • CERCLA liability protections for renewable energy developments on brownfields
Information and data support	• Logistical support—mapping of energy resources and repurposed sites • Identification of priority sites for repurposed energy development • Legal and permitting navigation and support • State provision of technical and regulatory support to local governments

1. New Government Support for Repurposed Energy: IIJA, IRA, and Beyond

Largely due to funding from the IIJA and IRA,[242] the United States is in the midst of a historic moment for our economy and energy mix. This moment has the potential to involve nearly as much change as the build-out of the electric grid and pipeline network in the early twentieth century. The full extent of the IIJA and IRA provisions are beyond the scope of this Article, but early estimates suggest that the laws are already having a major impact on reducing U.S. greenhouse gas (GHG) emissions and spurring a domestic clean energy revolution.[243]

A central component of federal support is the technology-neutral, clean-energy production and investment tax credits for zero-emission generation facilities and storage that have direct pay provisions to benefit non-profit and governmental entities.[244] In this Subsection, we focus on IIJA and IRA programs expressly designed to support repurposed energy projects and the funding associated with these programs. As introduced in

242. *See* OFF. OF POL'Y, U.S. DEP'T OF ENERGY, DOE/OP-0022, INVESTING IN AMERICAN ENERGY: SIGNIFICANT IMPACTS OF THE INFLATION REDUCTION ACT AND BIPARTISAN INFRASTRUCTURE LAW ON THE U.S. ENERGY ECONOMY AND EMISSIONS REDUCTIONS 2 (2023) ("The Inflation Reduction Act of 2022 (IRA) and Bipartisan Infrastructure Law of 2021 (BIL) together represent a historic investment of more than $430 billion toward modernizing the American energy system."); DANIEL C. STEINBERG ET AL., NAT'L RENEWABLE ENERGY LAB'Y, NREL/TP-6A20-85242, EVALUATING IMPACTS OF THE INFLATION REDUCTION ACT AND BIPARTISAN INFRASTRUCTURE LAW ON THE U.S. POWER SYSTEM, at iv (2023), https://www.nrel.gov/docs/fy23osti/85242.pdf [https://perma.cc/E64V-YB4E] (characterizing the IIJA and IRA as significant federal investments in the modernization of United States energy infrastructure).

243. *See* Kuykendall et al., *supra* note 35 (noting that IRA funding is accelerating the closure of coal plants); *see also* Jesse D. Jenkins et al., *Climate Progress and the 117th Congress: The Impacts of the Inflation Reduction Act and Infrastructure Investment and Jobs Act*, REPEAT PROJECT 1, 6 (July 14, 2023), https://repeatproject.org/docs/REPEAT_Climate_Progress_and_the_117th_Congress.pdf [https://perma.cc/GXQ3-E7LJ] (projecting that current energy policies, including the IRA, will reduce GHG emissions from approximately 5.6 billion in 2021 to around 4.1 billion by 2030).

244. These do not phase out until 2035. *See generally Charting a Clean Energy Future*, *supra* note 196, at 2 ("Federal tax credits available under the Inflation Reduction Act allow companies to offset up to 60%–70% of the cost of building their own renewable projects."); *Clean Energy Tax Provisions in the Inflation Reduction Act*, *supra* note 196 (detailing the IRA's numerous tax provisions).

Part II.D, many of the programs detailed below that focus on repurposed energy sites provide bonus credits or additional funding mechanisms that applicants can add to the existing IRA clean energy tax credits. Specific provisions include:

DOE Energy Infrastructure and Reinvestment (EIR) Program: Administered by DOE's Loan Programs Office, the EIR program provides $250 billion in IRA funding for DOE to finance "the remediation, repurposing, and redevelopment of eligible energy infrastructure sites."[245] These eligible sites include both retired and operating energy infrastructure sites, such as power plants and mine sites.[246] The loan guarantees can be used "[t]o retool, repower, repurpose, or replace energy infrastructure, including remediation of environmental damage" in the case of retired energy infrastructure and "[t]o avoid, reduce, utilize, or sequester air pollutants or greenhouse gases" in the case of existing energy infrastructure.[247] Eligible projects include electric utilities "replacing retired energy infrastructure with clean energy infrastructure" and "building new facilities for clean energy purposes that utilize legacy energy infrastructure."[248] Since many of these sites are also brownfields sites, the loan guarantee funds can be combined with EPA Brownfields grants and the energy community bonus credit associated with IRA clean energy tax credits.[249] Finally, electric utilities applying for EIR loan

245. Off. of Pol'y, *Federal Support Opportunities to Remediate and Redevelop Energy Assets: Wide-Ranging Initiatives to Drive Investment Opportunities in Energy Communities*, U.S. DEP'T OF ENERGY (May 18, 2023), https://www.energy.gov/policy/articles/federal-support-opportunities-remediate-and-redevelop-energy-assets-wide-ranging [https://perma.cc/8E5Q-V95T].

246. *See PNNL Report*, *supra* note 88, at 4 (explaining that EIR loans enable the cleanup and modernization of retired and operating energy sites).

247. *Id.* at 7; Loan Programs Off., *Title 17 Clean Energy Financing – Energy Infrastructure Reinvestment*, U.S. DEP'T OF ENERGY, https://www.energy.gov/lpo/energy-infrastructure-reinvestment [https://perma.cc/QR2Y-V53W] ("Through the Energy Infrastructure Reinvestment (EIR) category of the Title 17 Clean Energy Financing Program, LPO can finance projects that retool, repower, repurpose, or replace energy infrastructure that has ceased operations or enable operating energy infrastructure to avoid, reduce, utilize or sequester air pollutants or greenhouse gas emissions.").

248. Loan Programs Off., *supra* note 247.

249. *See PNNL Report*, *supra* note 88, at 4 (explaining that clean energy tax credits and energy communities tax credits can support development at brownfield sites); Off. of Pol'y, *New Report on Redevelopment and Reinvestment in*

guarantees must show that "the financial benefits received from the guarantee will be passed on to the customers of, or associated communities served by, that utility."[250]

Energy Community Tax Credit Bonus: This IRA tax credit bonus adds ten percent to new, direct-pay, clean energy tax credits for wind, solar, energy storage, and other qualifying clean energy and clean manufacturing projects located in "energy communities."[251] These energy communities consist of brownfields as defined in CERCLA; metropolitan statistical areas with a minimum percentage of direct employment relating to fossil fuel activities and a minimum unemployment rate; or a census tract (or directly adjoining census tract) in which a coal mine has closed after 1999, or in which a coal-fired power plant has retired after 2009.[252] Based on these definitions, much of the United States, including large portions of the states of Wyoming, Nevada, West Virginia, Ohio, and other states with a history of coal mining and other types of fossil fuel extraction, are "energy communities" eligible for the tax credit bonus.[253]

Fossil Energy Communities, U.S. DEP'T OF ENERGY (June 29, 2023), https://www.energy.gov/policy/articles/new-report-redevelopment-and-reinvestment-opportunities-fossil-energy-communities [https://perma.cc/3UQQ-CK2H] (describing how existing brownfield grants can be combined with new IRA tax credits to support the development of brownfields).

250. Loan Programs Off., *supra* note 247.

251. *Energy Community Tax Credit Bonus*, *supra* note 79. The base credit is thirty percent for the investment tax credit and up to 2.75 cents/kWh for the production tax credit for qualifying projects if they also meet designated labor requirements. Press Release, U.S. Dep't of Treasury, Fact Sheet: How the Inflation Reduction Act's Tax Incentives Are Ensuring All Americans Benefit from the Growth of the Clean Energy Economy (Oct. 20, 2023), https://home.treasury.gov/news/press-releases/jy1830 [https://perma.cc/8QRR-U6KB]; *Summary of Inflation Reduction Act Provisions Related to Renewable Energy*, U.S. ENV'T PROT. AGENCY (last updated Oct. 3, 2024), https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy [https://perma.cc/Z6MN-EDRV].

252. *Energy Community Tax Credit Bonus*, *supra* note 79.

253. *See Section 48C Tax Credits – Designated Energy Communities*, U.S. DEP'T OF ENERGY (2023), https://arcgis.netl.doe.gov/portal/apps/experiencebuilder/experience/?id=a44704679a4f44a5aac122324eb00914&page=home [https://perma.cc/BA63-YSMV] (illustrating that large swaths of the United States, particularly states with histories of coal mining, are "energy communities" eligible for tax credit bonuses); *see also supra* Part I.B (comparing the scope of IRA energy communities with the scope of our definition of repurposed energy sites).

DOE Energy Improvements in Rural and Remote Areas (ERA) Grant Program: Congress provided $1 billion in the IIJA to DOE to issue grants to advance the resilience, reliability, and affordability of energy in rural and remote areas (defined as communities with 10,000 or less persons) and improve economic opportunities in those areas.[254] DOE announced three separate funding opportunities for large, medium, and small prize grants.[255] The smaller grants are geared toward communities that may not have the technical and staff capabilities to prepare the more complex grant applications generally required for DOE funding, while the larger grants are designed for either single projects or multi-site demonstration projects that benefit multiple communities.[256] DOE also engaged in significant outreach to create additional technical support opportunities for community applicants.[257]

---

254. Off. of Clean Energy Demonstrations, *Energy Improvements in Rural and Remote Areas*, U.S. DEP'T OF ENERGY, https://www.energy.gov/oced/era [https://perma.cc/N63Z-Q44R].

255. *Id.* (listing Office of Clean Energy Demonstrations (OCED) announcements for grants of various sizes).

256. *See Biden-Harris Administration Invests $315 Million to Advance Reliable Clean Energy in Rural and Remote Communities*, U.S. DEP'T OF ENERGY (Mar. 1, 2023), https://www.energy.gov/articles/biden-harris-administration-invests-315-million-advance-reliable-clean-energy-rural-and [https://perma.cc/N592-2SLA] ("[F]unding is flexible to meet various project types with $5 to $10 million for a single site demonstration project and up to $100 million for a single or multi-site demonstration project that benefits multiple communities."); Off. of Clean Energy Demonstrations, *Energy Improvements in Rural or Remote Areas Grant Funding Opportunity Pre-Application Notification*, U.S. DEP'T OF ENERGY, https://www.energy.gov/oced/energy-improvements-rural-or-remote-areas-grant-funding-opportunity-pre-application [https://perma.cc/2LFJ-YVXH] (explaining that, in order to make federal funding more accessible to small, community-driven projects, OCED simplified application processes, removed cost-share requirements, offered technical assistance, and reduced financial reporting requirements); Off. of Clean Energy Demonstrations, *supra* note 254 (describing program and funding generally).

257. Off. of Clean Energy Demonstrations, *supra* note 254 (offering technical support resources to prospective grant applicants); *see also* Off. of Clean Energy Demonstrations, *Energy Improvements in Rural or Remote Areas (ERA) Program Technical Assistance Overview*, U.S. DEP'T OF ENERGY, https://www.energy.gov/sites/default/files/2023-06/ERA_TA%20Overview_2023.06.22.pdf [https://perma.cc/TJ8R-CE48] (detailing technical assistance opportunities); OFF. OF CLEAN ENERGY DEMONSTRATIONS, U.S. DEP'T OF ENERGY, FEDERAL ENERGY FUNDING FOR RURAL AND REMOTE AREAS: A GUIDE FOR COMMUNITIES

DOE Clean Energy on Mine Land Program: The IIJA and IRA provided $500 million to DOE for competitive grants to "demonstrate the technical and economic viability of deploying clean energy on current (operating) and former (abandoned or inactive) mine land."[258] Eligible projects include a broad range of clean energy projects, including solar, storage, advanced nuclear, and microgrids.[259] Studies show that there are over 100,000 acres of former mine lands and other brownfields suitable for solar development in West Virginia and over one million acres of former mine lands suitable for solar development in Nevada.[260] Like other repurposed energy sites, these former mine lands have easy access to electric transmission lines, substations, roads, and other transportation corridors built to support energy-intensive mining on these lands.[261] In 2024, DOE issued funding awards "to repurpose nearly 2,700 acres of former coal mining land to support the largest solar project in Pennsylvania" and a similar solar project on two former coal mines in West Virginia.[262] As these and other projects continue to develop, they can provide a template for other repurposed energy developments throughout the country.

USDA Empowering Rural America (New ERA) Program: The IRA provides $9.7 billion to the U.S. Department of Agriculture to issue grants and low-interest loans to rural

---

1, 9 (2023), ://www.energy.gov/sites/default/files/2023-10/OCED_Rural-Remote%20Fed%20Overview.pdf [https://perma.cc/8GYS-7AMX] (summarizing technical assistance programs).

258. Off. of Clean Energy Demonstrations, *Clean Energy Demonstration Program on Current and Former Mine Land*, U.S. DEP'T OF ENERGY, https://www.energy.gov/oced/CEML [https://perma.cc/D9QD-YGJL].

259. *Id.*

260. Beth Wheatley & Jaina Moan, *Mining the Sun: How Nevada and West Virginia are Reclaiming Former Mine Lands with Solar Panels*, THE NATURE CONSERVANCY (Apr. 9, 2020), https://www.nature.org/en-us/what-we-do/our-priorities/tackle-climate-change/climate-change-stories/nevada-west-virginia-solar-energy-former-mines [https://perma.cc/FP5C-ZE7X]; *see also* Joey James et al., *A Roadmap for Solar on Mine Lands in West Virginia*, THE NATURE CONSERVANCY, https://www.nature.org/content/dam/tnc/nature/en/documents/WV-roadmap-solar-on-minelands.pdf [https://perma.cc/WBH4-6TV7] (proposing strategies for the development of solar energy on former mine lands in West Virginia).

261. James et al., *supra* note 260, at 10 (describing how existing infrastructure—originally built for mines, but now unused—can be repurposed by solar energy projects).

262. *Biden-Harris Administration Announces $475 Million*, *supra* note 168.

electric cooperatives to be used only in "predominantly rural areas" for projects designed to "make energy efficiency improvements to eligible generation and transmission systems, to purchase, build, or deploy renewable energy, zero-emission systems, carbon capture storage systems, or to purchase renewable energy."[263] Rural electric cooperatives, like other utilities, are rapidly closing coal plants and investing in wind, solar, and batteries.[264] Unlike other utilities, however, this transition is occurring almost exclusively in rural areas served by electric cooperatives.[265] IRA funding can help accelerate the retirement of fossil fuel plants and transition to clean energy, in general, including repurposed energy sites in rural communities, and particularly low-income rural communities.[266]

EPA Greenhouse Gas Reduction Grant Program: The IRA provides $27 billion to EPA to issue grants to states, tribes,

---

263. *Empowering Rural America New ERA Program*, U.S. DEP'T OF AGRIC. RURAL DEV., https://www.rd.usda.gov/node/28986 [https://perma.cc/CT7B-6FVJ]. The USDA reported strong interest in the New ERA program, receiving 157 proposals from rural electric cooperatives across nearly every state. USDA Sees Record Demand, *supra* note 140. The requested amount from rural electric cooperatives totaled more than two times the $9.7 billion that Congress allocated for the program. *Id.*

264. Alexandra B. Klass & Gabriel Chan, *Cooperative Clean Energy*, 100 N.C. L. REV. 1, 4 n.7 (2021) (explaining that three of the largest rural electric cooperatives have drastically reduced their reliance on coal in the past ten years); *see also* Jason Plautz, *Climate Law Cash Speeds Up Western Coal Plant Closures*, ENERGYWIRE (Dec. 5, 2023), https://subscriber.politicopro.com/article/eenews/2023/12/05/climate-law-funds-speed-up-western-coal-plant-closures-00129904 [https://perma.cc/4SGR-9JTY] (describing an application by a rural electric cooperative, Tri-State, to retire coal plants early and replace them primarily with wind, solar, and storage).

265. *See* Klass & Chan, *supra* note 264, at 6 ("The consumers served by cooperatives are demographically distinct from those served by other utilities, reflecting their history as providers of initial electricity access to rural farmers.").

266. *See Next Generation Rural Electrification: How Rural Electric Co-ops Can Repower America with the Inflation Reduction Act*, EVERGREEN COLLABORATIVE 1–2 (Aug. 2023), https://collaborative.evergreenaction.com/policy-hub/How-Rural-Electric-Co-ops-Can-Repower-America-with-the-Inflation-Reduction-Act-August-2023.pdf [https://perma.cc/N2G4-THXL] (describing the clean energy transition potential for rural cooperatives in combining New ERA funding with other BIL and IRA funding); Frank Jossi, *Minnesota Electric Co-ops Seek $970M in Federal Clean Energy Funds*, ENERGY NEWS NETWORK (Aug. 9, 2023), https://energynews.us/2023/08/09/minnesota-electric-co-ops-seek-970m-in-federal-clean-energy-funds [https://perma.cc/8EFR-A4WL] (describing joint cooperative application for nearly $1 billion to retire coal plants, build clean energy generation, and invest in low-income rural communities).

cities, and air pollution control agencies to reduce GHG emissions.[267] This includes the $7 billion "Solar for All" program consisting of competitive funding for up to sixty grants to "states, territories, Tribal governments, municipalities, and nonprofits to expand the number of low-income and disadvantaged communities primed for residential solar investment—enabling millions of low-income households to access affordable, resilient, and clean solar energy."[268] The Greenhouse Gas Reduction Fund also includes a $14 billion National Clean Investment Fund (NCIF) and a $6 billion Clean Communities Investment Accelerator (CCIA) competition.[269] These federal offerings provide grants to "hub nonprofits" to deliver technical assistance and funds to local community lenders working in low-income and disadvantaged communities to increase clean energy financing in underinvested communities.[270]

The IIJA and IRA provisions detailed above can accelerate investment in repurposed energy sites, demonstrating a path that can cut through the current politicization of clean energy projects. This is particularly true in light of President Biden's Justice40 initiative and the DOE Community Benefits Plan requirements for grant funding discussed in Part II.D. Notably, the *Washington Post* reported in 2023 that a relatively large share of federal IIJA and IRA investments for new renewable energy projects were flowing to energy communities—former coal plant sites, coal mines, and other former fossil fuel sites—in

267. *See Greenhouse Gas Reduction Fund*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/system/files/documents/2023-02/Greenhouse%20Gas%20Reduction%20Fund%20Factsheet.pdf [https://perma.cc/BKC2-CATA] (explaining that, through the Greenhouse Gas Reduction Fund (GGRF), the EPA will provide nearly $27 billion in competitive grants to states, municipalities, and tribes, and those grantees will then provide financial assistance to communities for emissions and air pollution reduction projects).

268. *Solar for All - Public Information from State Applicants*, CLEAN ENERGY STATES ALL., https://www.cesa.org/projects/scaling-up-solar-for-under-resourced-communities/solar-for-all-public-information-from-state-applicants/#:~:text=EPA%20will%20award%20up%20to,resilient%2C%20and%20clean%20solar%20energy [https://perma.cc/8VE9-JEC2].

269. *About the U.S. Greenhouse Gas Reduction Fund*, U.S. ENV'T PROT. AGENCY (Aug. 16, 2024), https://www.epa.gov/greenhouse-gas-reduction-fund/about-greenhouse-gas-reduction-fund [https://perma.cc/E8HA-4TFQ].

270. *See id.* (describing how the NCIF and CCIA provide grants to hub nonprofits that in turn offer funding and technical assistance to local community lenders).

states like Wyoming, Texas, West Virginia, Kentucky, Ohio, and Pennsylvania.[271] Figure 2 shows how some of the programs detailed above can be combined for maximum impact and be part of creating a national industrial policy built on clean energy development.

Figure 2. Stacking Federal Clean Energy Incentives[272]

271. *See* Shannon Osaka, *Wind and Solar Energy are Booming in Surprising Places*, WASH. POST (Nov. 15, 2023), https://www.washingtonpost.com/climate-solutions/2023/11/15/clean-energy-investment-coal-communities [https://perma.cc/Y25G-55VN] ("While communities that once hosted coal, oil, or gas infrastructure make up only 18.6 percent of the population, they received 36.8 percent of the clean energy investment in the year after the Inflation Reduction Act's passage."); *see also* Jennifer Granholm, Secretary, Dep't of Energy, Remarks on "A New Industrial Revolution for Clean Energy" at the National Press Club, Washington, D.C. (Feb. 21, 2024), https://www.energy.gov/articles/remarks-delivered-secretary-jennifer-granholm-new-industrial-revolution-clean-energy [https://perma.cc/DV49-5ZMY] (depicting and transcribing February 21, 2024 remarks by U.S. Secretary of Energy, Jennifer Granholm, regarding the Biden-Harris administration's clean energy industrial policy through IIJA and IRA designed to revitalize communities that have been left behind).

272. *PNNL Report*, *supra* note 88, at 5 fig.1; *see also* Matthew Popkin, *The Time is Ripe for Communities to Embrace Clean Energy on Brownfields*, RMI (Sept. 26, 2022), https://rmi.org/time-for-communities-to-embrace-clean-energy-on-brownfields [https://perma.cc/U69G-9RL4] (illustrating stacking of tax credits and grants for clean energy projects on brownfields); *Power of Place-National: Executive Summary*, THE NATURE CONSERVANCY 7 (May 2023), https://www.nature.org/content/dam/tnc/nature/en/documents/FINAL_TNC_Power_of_Place_National_Executive_Summary_5_2_2023.pdf [https://perma.cc/DT2B-VX33] (defining the "energy communities" studied which receive the IRA tax credit).

In addition to significant new IIJA and IRA funding for clean energy development on some repurposed energy sites, in 2023, the U.S. Department of Energy (DOE) began a new initiative called "Cleanup to Clean Energy" to lease DOE-owned lands—previously used to produce nuclear weapons—to developers of utility-scale wind and solar projects.[273] This initiative has the potential to make available large tracts of public lands for clean energy development that cannot be used for other purposes due to significant legacy contamination.[274]

States and local governments have also provided or obtained additional funding, priority, and technical support for the use of brownfields for renewable energy. For instance, Connecticut, Illinois, Maine, and West Virginia have procurement preferences for renewable energy projects on former mine sites, landfills, or other brownfields.[275] Massachusetts, Minnesota, New Jersey, New York, and Rhode Island, among others, have direct financial incentives for renewable energy projects on landfills and other brownfields through state tax credits, debt relief, or cleanup grants.[276] Likewise, Illinois, as part of its Climate &

273. *DOE Launches First-Ever 'Cleanup to Clean Energy' Initiative to Explore Generating Clean Energy on DOE-Owned Lands*, U.S. DEP'T OF ENERGY (July 28, 2023), https://www.energy.gov/articles/doe-launches-first-ever-cleanup-clean-energy-initiative-explore-generating-clean-energy [https://perma.cc/3XJX-4J4P] (describing the "Cleanup to Clean Energy" initiative).

274. *Id.* (depicting remarks by United States Energy Secretary Granholm on the program's aims to transform thousands of acres of land previously used to build nuclear weapons into clean energy sites).

275. *Examples of State Policies Supporting Renewable Energy Development on Landfills, Formerly Contaminated Lands, and Mines*, U.S. ENV'T PROT. AGENCY (Oct. 2023) [hereinafter *Examples*], https://www.epa.gov/system/files/documents/2022-06/epa-re-powering_examples_of_state_policies%20508.pdf [https://perma.cc/J86W-5T4P] (summarizing state policies supporting the development of clean energy on landfills, formerly contaminated lands, and mines); *see also* ME. STAT. tit. 35-A, § 3210-J (2023) (providing for renewable energy procurement of contaminated lands in Maine); Press Release, Maine Senate Democrats, Governor Signs Brenner, Vitelli Proposal to Help Build Solar Energy Project on Contaminated Farmland (July 19, 2023), https://www.mainesenate.org/governor-signs-brenner-vitelli-proposal-to-help-build-solar-energy-project-on-contaminated-farmland [https://perma.cc/BVS7-2L4E] (discussing legislation promoting use of PFAS-contaminated farmland for solar projects).

276. *See Examples*, *supra* note 275 (describing direct financial incentive policies for renewable energy projects on landfills and other brownfields in Massachusetts, Minnesota, New Jersey, and New York); *see also* Popkin & Krishnan,

Equitable Jobs Act legislation, created a Coal-to-Solar Energy Storage Grant Program.[277] The state selected five coal plant sites that were already closed or in the process of closing to receive $280.5 million over a ten-year period to install energy storage facilities to support better integration of solar energy into the grid.[278]

Despite these many initiatives, funding on its own, even in the billions of dollars, cannot overcome permitting barriers and community opposition fueled by both NIMBYism and external campaigns. This is why a growing number of academic and policy researchers are engaged in empirical research to evaluate these barriers and provide data to legislatures, permitting authorities, and experts to help craft solutions. As documented in other parts of this Article, EPA and DOE mapping of mine lands, landfills, and other brownfields sites shows a vast acreage of such lands available for repurposed energy projects.[279] The demand for

---

supra note 167, at 15 (summarizing state policies favoring renewable energy development on landfills); *Renewable Energy Fund*, R.I. COM. CORP., https://commerceri.com/financing/renewable-energy-fund [https://perma.cc/YFH5-U2E7] (describing Rhode Island's Brownfields Solar PV Program, which provides grants); Press Release, R.I. Off. of Energy Res., State Renews Initiative to Expand Solar Energy on Brownfields, (June 3, 2021), https://energy.ri.gov/press-releases/state-renews-initiative-expand-solar-energy-brownfields [https://perma.cc/R9XT-QHD4] (describing renewal of Rhode Island's Brownfields Solar PV Program and listing solar brownfield projects funded through the program from 2019 to 2020). In an example of a local effort, Islip, New York received Department of Energy grant funds to install a fifty-kilowatt solar array at its town landfill. *See NYSERDA's Build-Ready Community Benefits Package*, NYSERDA, at 12 (Dec. 2020), https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/Clean-Energy-Standard/Build-Ready-Community-Benefits-Package---Dec2020.pdf [https://perma.cc/N8RX-E88T] (describing $475,000 in grant funding from the U.S. Department of Energy for the project).

277. Press Release, Illinois Dep't of Com. & Econ. Opportunity, Pritzker Administration Announces Recipients of Coal-to-Solar Program as Part of Landmark Climate Initiative (June 1, 2022), https://dceo.illinois.gov/news/press-release.24987.html [https://perma.cc/K87V-R6JQ] (characterizing the Coal-to-Solar Energy Storage Grant Program as a key component of the Climate & Equitable Jobs Act).

278. *Id.*

279. *See supra* Part I; *Mining the Sun: Benefits of Solar Energy on Former Mine Sites*, THE NATURE CONSERVANCY (Aug. 4, 2023), https://www.nature.org/content/dam/tnc/nature/en/documents/Mining_the_Sun_Report_Final_5.23.24.pdf [https://perma.cc/Q5CE-ZBDT] ("While brownfields and mine lands cannot account for all renewable energy needs to reach net zero by 2050, siting on these

development exists and the funding for such development is in place, but a comprehensive, streamlined, expedited, and centralized permitting process for such projects remains elusive. The next Subsection takes up this important issue.

2. Permitting Reform

In this Subsection, we focus on permitting reform, particularly at the state level, which we believe is critical to a repurposed energy future. A review of existing permitting reform efforts provides some insights into options for further action. As scholars, federal agencies, and other experts have documented, local permitting barriers have become a major impediment to realizing a clean energy transition.[280]

Importantly, because of the variety of geographies and politics of different states and local communities, there may not be one, single model of permitting reform that will be feasible or effective across the country. Thus, below, we highlight a variety of recent reform measures. Time and additional empirical research will show which measures or combination of measures provide an optimal mix of cost-effective and time-appropriate project review with provisions that ensure engagement and benefits for local communities.

---

degraded lands can significantly reduce the need to site on natural and working lands."); *see also* Off. of Energy Efficiency & Renewable Energy, *Solar Futures Study*, U.S. DEP'T OF ENERGY, at x (Sept. 2021), https://www.energy.gov/sites/default/files/2021-09/Solar%20Futures%20Study.pdf [https://perma.cc/9CTP-NYXX] ("The maximum [modeled] solar land area required [for net-zero carbon emissions by 2050] is equivalent to less than 10% of potentially suitable disturbed lands, thus avoiding conflicts with high-value lands in current use.").

280. *See, e.g.*, Madeline Geocaris, *NREL Releases Comprehensive Databases of Local Ordinances for Siting Wind, Solar Energy Projects*, NAT'L RENEWABLE ENERGY LAB'Y (Aug. 9, 2022), https://www.nrel.gov/news/program/2022/nrel-releases-comprehensive-databases-of-local-ordinances-for-siting-wind-solar-energy-projects.html [https://perma.cc/M5SH-3A53] ("State and local zoning laws and ordinances influence how and where wind and solar energy projects can be sited and deployed—which can have a measurable impact on U.S. renewable energy resource potential."); Anthony Lopez et al., *Impact of Siting Ordinances on Land Availability for Wind and Solar Development*, 8 NATURE ENERGY 1034, 1034 (2023) (finding that setback ordinances—which restrict construction within certain distances of roads or buildings—could cut wind resource capacity by 87% and solar resource capacity by 38%); Eisenson et al., *supra* note 5 (documenting local and state restrictions that create barriers for renewable energy projects).

This Subsection starts with a short discussion of the National Environmental Policy Act of 1970 (NEPA) and state environmental review laws, and then turns to the important issue of state and local review, siting, and permitting for renewable energy projects. As shown below, some of these recent permitting reforms apply to all renewable energy projects and others apply solely to renewable energy projects on brownfields or other repurposed energy sites.

a. A Note on NEPA Reform

Before focusing on permit reform for clean energy projects, we start with a note about NEPA and its impact on clean energy projects. NEPA has long been held up simultaneously as both the nation's most foundational environmental law and the most significant barrier to constructing needed transit, clean energy, and housing infrastructure in the United States.[281] The law

281. *Compare* Sam Schipani, *NEPA Is Under Threat—Here's Why That Matters*, SIERRA (May 21, 2018), https://www.sierraclub.org/sierra/national-environmental-policy-act-nepa [https://perma.cc/43PG-FPWH] (defending NEPA as an important democratic mechanism for ensuring that local communities have input regarding projects that will affect them, and contesting the claim that NEPA causes significant delays in all projects), *and* Kevin DeGood, *Debunking the False Claims of Environmental Review Opponents*, CTR. FOR AM. PROGRESS (May 3, 2017), https://www.americanprogress.org/article/debunking-false-claims-environmental-review-opponents [https://perma.cc/5EPT-LYLE] (characterizing NEPA as a statute that ensures public participation, coordinates compliance with other environmental laws, and imposes less significant financial and time burdens than opponents claim), *with* Ezra Klein, Opinion, *There Has to Be a Better Way to Run the Government*, N.Y. TIMES (June 12, 2022), https://www.nytimes.com/2022/06/12/opinion/traffic-congestion-new-york-climate-policy.html [https://perma.cc/4YP7-FQLG] (reporting that NEPA is sometimes employed to delay or prevent environmentally beneficial projects), *and* Foday Turay, *NEPA: The Barrier to Developing America*, AM. CONSUMER INST. CTR. FOR CITIZEN RSCH. (July 19, 2021), https://www.theamericanconsumer.org/2021/07/nepa-the-barrier-to-developing-america [https://perma.cc/35JR-9TMZ] ("Since its inception in 1970, NEPA has impeded America's infrastructure improvements by significantly increasing costs, time, and red tape. It's time for Congress to reform NEPA to ensure regulatory barriers don't continue to impede critical infrastructure projects."), *and* James W. Coleman, *Pipelines & Power-Lines: Building the Energy Transport Future*, 80 OHIO ST. L.J. 263, 299 (2019) ("[A]ggressive judicial expansion of environmental reviews is a unique danger to energy transport investment."), *and* James W. Coleman, *Permitting the Energy Transition*, 75 CASE W. RSRV. L. REV. (forthcoming) (manuscript at 14) (on file with Minnesota Law Review) [hereinafter Coleman, *Permitting the Energy Transition*] ("[E]nvironmental impact statements [under NEPA] are a substantial barrier to a variety of new infrastructure.").

requires federal agencies to evaluate the potential adverse environmental effects of any projects receiving federal funding or federal approvals.[282] The review process can be expensive and take years to complete.[283] Moreover, project opponents can challenge review documents in federal court on grounds that they failed to evaluate all the potential significant environmental impacts of the project, appropriately address public comments, or adequately evaluate alternatives to the project.[284] States like California, Minnesota, New York, and others have enacted their own "mini-NEPA" laws that apply similar environmental review requirements to projects that require state approvals or funding.[285]

Although NEPA and state environmental review laws can in some instances result in increased costs and delay to clean energy projects, state and local permitting barriers can pose far more significant hurdles to the clean energy transition.[286] Indeed, many solar and wind projects do not trigger NEPA in the first place because they do not require federal permits or receive

282. *See* Coleman, *Permitting the Energy Transition*, *supra* note 281 (explaining that NEPA requires environmental review for projects that require federal funding or permitting).

283. *See* Turay, *supra* note 281 (discussing the cost and length of NEPA review).

284. *See* DeGood, *supra* note 281 ("NEPA is a procedural statute. And when a state or local government does not follow basic procedural requirements, including conducting a substantive alternatives analysis or appropriately scoping the environmental review, then it has violated the law.").

285. *States and Local Jurisdictions with NEPA-like Environmental Planning Requirements*, NAT'L ENV'T POL'Y ACT, https://ceq.doe.gov/laws-regulations/states.html [https://perma.cc/FHM3-N34C] (listing states with NEPA-like environmental planning requirements). These state laws have been subject to similar criticism. *See, e.g.*, Ezra Klein, Opinion, *Government is Flailing, in Part Because Liberals Hobbled It*, N.Y. TIMES (Mar. 13, 2022), https://www.nytimes.com/2022/03/13/opinion/berkeley-enrollment-climate-crisis.html [https://perma.cc/E6DR-RCD6] (discussing California's environmental review law, known as CEQA).

286. *See* Geocaris, *supra* note 280 (characterizing state and local zoning ordinances as a barrier to the clean energy transition); Ruhl & Salzman, *supra* note 21, at 10 ("There have been many articles on . . . specific statutes such as the National Environmental Policy Act (NEPA), but surprisingly little written on the larger challenge of how the vast regime of environmental and land use law permitting and litigation hinders climate infrastructure, much less what to do about it.").

federal funding.[287] Accordingly, we believe an excessive focus on NEPA reform can be counterproductive and serves as a distraction from more impactful reform opportunities in the clean energy context.

Moreover, in 2023, Congress enacted the most substantive amendments to NEPA since its enactment in 1970 in the Fiscal Responsibility Act of 2023, as part of the compromise in Congress to lift the debt ceiling.[288] These amendments included limiting the scope of effects evaluated to those that are "reasonable," facilitating inter-agency use of "categorical exclusions" to streamline NEPA review for classes of projects without significant effects on the environment,[289] imposing time limits and page limits for review documents (with extensions for cause), creating lead agency designations to minimize duplicative

287. While the IIJA and IRA grant funding for clean energy projects described in Part III.B may create NEPA obligations for projects awarded those funds, this will still be a very small percentage of new clean energy projects over the next decade and will become smaller still as IIJA and IRA grant funds are issued. While NEPA will continue to apply to clean energy projects on federal lands because they require federal permits, the bulk of wind and solar projects have been built and will continue to be built on private lands. *See* KRISTEN HITE, CONG. RSCH. SERV., IF12560, NATIONAL ENVIRONMENTAL POLICY ACT: AN OVERVIEW (2023) (noting that only a "small percentage" of agency actions require an EIS under NEPA); David E. Adelman, Permitting Reform's False Choice 5 (Aug. 14, 2023) (unpublished manuscript) (on file with Minnesota Law Review) (conducting national study of energy infrastructure requiring federal permits and environmental review and finding that only five percent of wind and solar projects required a comprehensive environmental review or project-specific permit).

288. *See* Fiscal Responsibility Act of 2023, Pub. L. No. 118-5, 137 Stat. 10 (introducing amendments to NEPA); *see also* Owen Minott et al., *How Does the Fiscal Responsibility Act Reform Permitting and Environmental Review?*, BIPARTISAN POL'Y CTR. (June 2, 2023), https://bipartisanpolicy.org/blog/fiscal-responsibility-act-permit-reform [https://perma.cc/FV49-EEKH] (summarizing NEPA reform provisions); Edward Boling et al., *Substantive Amendments in the Debt Ceiling Bill*, PERKINS COIE (June 8, 2023), https://www.perkinscoie.com/en/news-insights/substantive-nepa-amendments-in-the-debt-ceiling-bill.html [https://perma.cc/42G5-ED88] (summarizing changes to NEPA in the Fiscal Responsibility Act of 2023).

289. A "categorial exclusion" is "a class of actions that a Federal agency has determined, after review by CEQ, do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an environmental assessment nor an environmental impact statement is normally required." *Categorical Exclusions*, NAT'L ENV'T POL'Y ACT, https://ceq.doe.gov/nepa-practice/categorical-exclusions.html [https://perma.cc/35XN-6NTN].

agency review, and imposing judicial review and enforcement of deadlines.[290]

The Subsections that follow turn to what we believe are potentially more impactful clean energy siting and permitting reform measures. As noted in Part II, the central practical impediment to repurposed energy is that disturbed lands pose higher regulatory barriers to developers in addition to physical challenges, such as potential subsidence at former coal mines. These barriers and the ready availability of open, flat land tend to disincentivize repurposed energy development unless a government or other external entity fills in the gaps, providing the resources necessary to make repurposed energy projects economically and practically feasible.

One important way of filling in these gaps is to streamline clean energy developers' processes for remediating and building on underutilized lands. Streamlining comes in several forms, as explored here. It includes consolidating regulation at one level of government and within one agency—typically through preemption of local control. This reduces the number of "veto points" that can delay or kill a project.[291] Other streamlining approaches include expediting approval processes by placing deadlines on agency approval of proposed clean energy projects on repurposed lands, issuing "permits by rule" or similar uniform standards and reducing individualized review of projects, allowing for offsets for environmental impacts on sites, and creating "build-ready" sites for developers.[292]

---

290. *See* KRISTEN HITE, CONG. RSCH. SERV., IF12417, ENVIRONMENTAL REVIEWS AND THE 118TH CONGRESS (2023) (describing page and time limits, lead agency designations, and judicial review and enforcement of deadlines under the 2023 NEPA amendments); *Amendments to NEPA from the Fiscal Responsibility Act of 2023*, NAT'L ENV'T POL'Y ACT, https://ceq.doe.gov/laws-regulations/fra.html [https://perma.cc/6838-P4E4] (summarizing amendments to NEPA from the Fiscal Responsibility Act of 2023); *see also* National Environmental Policy Act Implementing Regulations, 40 C.F.R. §§ 1500–08 (2024) (implementing NEPA amendments and making other revisions to CEQ rules).

291. *See* Michael Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621, 625, 666 (1998) (explaining that when multiple entities have decision-making power over an activity, any one entity serves as an individual veto point that can nullify the decisions of all other entities).

292. *See* Lakshmi Alagappan et al., *Assessment of Renewable Energy Siting and Permitting Policies*, ENERGY ENV'T ECON. 11 (Apr. 11, 2024), https://www

We first address siting laws that apply to all renewable energy projects over a certain size, proposing the broad remedy of preempting local control, and then turn to less cudgel-like permitting reforms, many of which are specific to disturbed lands.

b. Siting Reforms—Preemption

Many states have long had centralized, state-level siting authority for both thermal energy plants, like coal and gas generation facilities, and renewable energy plants, like wind and solar facilities.[293] Other states historically left all power plant siting authority to local governments, like counties or townships, with statewide siting solely for linear energy projects (like electric transmission lines and oil and gas pipelines).[294]

As renewable energy projects have grown in size and number across the country over the past twenty years, an increasing number of states—particularly those that have adopted ambitious clean energy mandates—have shifted to more centralized, state-wide siting authority for at least some wind and solar plants to address the proliferation of local laws curbing those projects through restrictive zoning ordinances and outright bans.[295] To date, there remains a significant split among states over whether siting authority is concentrated at the state level or at the local level for renewable energy plants.

.ethree.com/wp-content/uploads/2024/04/Renewable-Siting-and-Permitting-Policies-E3-04.16.2024.pdf [https://perma.cc/VX6N-244D]; *infra* Part III.B.2.c.

293. *See generally* Eisenson et al., *supra* note 5 (describing laws by state).

294. *See generally id.*

295. *Id.* at 7 (explaining that as local governments impose restrictions on renewable energy projects, some state legislatures have adopted laws preempting those restrictions); *see also supra* Part I.

As of 2023, several states—including California,[296] Connecticut,[297] Florida,[298] Illinois,[299] Maryland,[300] Massachusetts,[301] Michigan,[302] Minnesota,[303] New York,[304] Rhode Island,[305] South Dakota,[306] and Wisconsin[307]—have created or enhanced statewide siting authority for certain wind and/or solar plants over a certain size with the authority to preempt more restrictive local requirements.[308] Many of those states provide for either joint state-local authority over smaller wind and solar plants or exclusive local authority over smaller plants.[309]

---

296. Act of June 30, 2022, ch. 61, 2022 Cal. Stat. 3034; Laura G. Zagar et al., *California Expands Energy Commission's Jurisdiction to Bolster Clean Energy Development*, PERKINS COIE (July 18, 2022), https://www.perkinscoie.com/en/news-insights/california-expands-energy-commissions-jurisdiction-to-bolster-clean-energy-development.html [https://perma.cc/E46N-4XJP].

297. CONN. GEN. STAT. §§ 16-50i(a), 16-50x(a) (2023); *see also* Preston v. Conn. Siting Council, 568 A.2d 799, 805 (Conn. App. Ct. 1990) ("The council is empowered to review decisions from zoning commissions on a de novo basis, applying concerns that transcend those involved in local zoning decisions, and that review may, as it did in the instant case, result in the approval of a particular site although the facility failed to meet the requirements of local zoning regulations.").

298. *Power Plant Siting Act*, FLA. DEP'T OF ENV'T PROT. (July 8, 2024), https://floridadep.gov/water/siting-coordination-office/content/power-plant-siting-act [https://perma.cc/LV9M-SW9Z]; *see also* FLA. STAT. § 163.3204 (2024).

299. Illinois Public Act 102-1123, enacted in 2023, creates state-wide standards for wind and solar plants over a certain size and prevents local government siting authorities from imposing standards stricter than the state standards, or banning wind or solar plants in their jurisdiction. Public Act 102-1123, 2023 Ill. Laws 9221 (2023) (codified at 55 ILL. COMP. STAT. 5/5-12020 (2023)).

300. MD. CODE ANN., PUB. UTIL. §§ 7-207.1, 7-207.2 (LexisNexis 2024); *see also* Bd. of Cnty. Comm'rs v. Perennial Solar, LLC, 212 A.3d 868, 888 (Md. 2019) ("[L]ocal government is a significant participant in the process, and local planning and zoning concerns are important in the PSC approval process. However, the ultimate decision-maker is the [state commission] . . . .").

301. MASS. GEN. LAWS ch. 164 §§ 69G, 69K (2024).

302. MICH. COMP. LAWS § 460.1222 (2024).

303. MINN. STAT. §§ 216E.01(5), 216E.10(1) (2022).

304. Renewable Action Through Project Interconnection and Deployment (RAPID) Act, 2024 N.Y. Sess. Laws ch. 58, pt. O (McKinney), N.Y. PUB. SERV. LAW § 136 (McKinney 2024).

305. 42 R.I. GEN. LAWS § 42-98-7 (2024).

306. S.D. CODIFIED LAWS § 49-41B-28 (2024).

307. WIS. STAT. § 66.0401(1m) (2023); *see also* WIS. LEGIS. COUNCIL, IM-2021-10, REGULATION OF SOLAR GENERATION FACILITIES (2021), https://docs

By contrast, numerous other states continue to grant local governments exclusive siting authority over all renewable energy plants or require developers to obtain state siting approval and also comply with more stringent local requirements.[310] Notably, Texas has the most installed wind and solar capacity in the country despite the lack of statewide siting authority for any clean energy plants.[311] This is in large part because many local governments in Texas do not impose zoning requirements or

---

.legis.wisconsin.gov/misc/lc/information_memos/2024/im_2024_01 [https://perma.cc/D796-WBKV] (summarizing Wisconsin state law that limits local bodies from restricting solar development).

308. For a summary of laws in this category, see Off. of Energy Efficiency & Renewable Energy, *Siting of Large-Scale Renewable Energy Projects*, U.S. DEP'T OF ENERGY, https://www.energy.gov/eere/siting-large-scale-renewable-energy-projects [https://perma.cc/4DPZ-CJMW] (providing a map of states with state authority, hybrid authority, and local authority over siting of wind and solar plants); Eisenson et al., *supra* note 5, at 7 (describing state laws that preempt zoning authorities with respect to renewable energy siting and permitting); Enterline & Valainis, *supra* note 177, at 4 (documenting "the principal entity or entities that have jurisdiction over siting and permitting decisions" for renewable energy projects in each state). Illinois provides statewide standards that apply to local siting authority. *See supra* note 299.

309. *See* Enterline & Valainis, *supra* note 177 (showing a map of laws in all fifty states, including those with local or joint state-local authority); *see also* Off. of Energy Efficiency & Renewable Energy, *supra* note 308 (providing a map of states with state authority, hybrid authority, and local authority over siting of wind and solar plants); Eisenson et al., *supra* note 5, at 7 (describing state laws that preempt zoning authorities with respect to renewable energy siting and permitting); Jon Davis, *Wind, Solar and Siting: A Look at Recent Laws and Legislative Trends in the Midwest*, CSG MIDWEST (Feb. 29, 2024), https://csgmidwest.org/2024/02/29/wind-solar-and-siting [https://perma.cc/J3RC-VU7Q] (discussing state versus local authority over renewable energy projects in several Midwest states); Taubman Coll. of Architecture & Urb. Plan., *Power in Partnership: Insights for Siting Utility-Scale Renewables in Michigan*, UNIV. OF MICH. 9–25 (Apr. 2024), https://taubmancollege.umich.edu/student-work/power-in-partnership-insights-for-siting-utility-scale-renewables-in-michigan [https://perma.cc/H3NX-ZFZP] (summarizing laws and processes in California, New York, Minnesota, Wisconsin, Ohio, and Michigan).

310. See Enterline & Valainis, *supra* note 177, Eisenson et al., *supra* note 5, and Off. of Energy Efficiency & Renewable Energy, *supra* note 308, for surveys of state approaches to siting authority, including exclusively local authority.

311. *WeatherPower Year in Review: 2022*, CLIMATE CENTRAL, 6 (Feb. 2023), https://assets.ctfassets.net/cxgxgstp8r5d/6BuGVQSGXiYCzlY1JKPnuv/33f2b4be15e7464e9ed82479ae0ff32c/FINALWeatherPower_Year_in_Review_2022__EN_1.pdf [https://perma.cc/W9G4-CUPP] ("Texas took the lead again for the largest increase in MW of wind capacity from 2021 to 2022—an addition of 3,034 MW.").

require permits for wind and solar projects, instead allowing private property owners more control over how to use their land. However, in other states with a long history of local government control over land uses, legislatures with clean energy mandates have responded to increasing local restrictions on wind and solar plants with preemptive legislation.

For instance, since 2020, New York, California, and Michigan have all moved from local authority to forms of either statewide siting authority or state preemption of certain types of restrictive local zoning as part of their efforts to decarbonize energy generation in those states.[312] At least in New York, experts have indicated that the shift from local to state permitting authority has accelerated the construction of new clean energy plants.[313] Illinois took a different approach by retaining local siting authority but creating statewide siting requirements and preempting more stringent local requirements.[314] In 2021, Florida enacted a statute declaring that it was the "intent of the legislature to encourage renewable solar electrical generation throughout th[e] state," and making solar facilities "a permitted use in all agricultural land use categories in a local government comprehensive plan and all agricultural zoning districts within an unincorporated area."[315]

---

312. *See* Eisenson et al., *supra* note 5 (discussing states that have enacted preemption legislation as a response to local restrictions); Off. of Energy Efficiency & Renewable Energy, *supra* note 308 (same); *Power of Place-National: Executive Summary*, *supra* note 272, at 23 (same); Davis, *supra* note 309 (same); Associated Press, *States with Big Climate Goals Strip Local Power to Block Green Projects*, U.S. NEWS & WORLD REP. (Jan. 14, 2024), https://www.usnews.com/news/us/articles/2024-01-14/states-with-big-climate-goals-strip-local-power-to-block-green-projects [https://perma.cc/C5X4-3TQF] (same).

313. *See* Gerrard, *supra* note 185, at 40 ("Since the enactment of the new law, New York has approved 17 projects; few required going against local restrictions, but the hanging sword of that possibility no doubt sped up some of the projects, as did other expedited procedures under the law.").

314. 55 ILL. COMP. STAT. § 5/5-12020 (2023). This approach is similar to that taken by Congress in the Telecommunications Act of 1996, which retained local siting authority for cell phone towers but imposed federal standards and a cause of action in federal court for violation of those standards. *See* Alexandra B. Klass & Elizabeth J. Wilson, *Interstate Transmission Challenges for Renewable Energy: A Federalism Mismatch*, 65 VAND. L. REV. 1801, 1865–67 (2012) (describing "process preemption," whereby local siting authority is retained, but limited by state and/or federal authority).

315. FLA. STAT. §§ 163.3205(1), (3) (2024).

A notable counterexample to these preemption efforts for renewable energy is Ohio, where the state legislature has been protective of fossil fuel energy resources and hostile to renewable energy development.[316] Historically, Ohio had centralized state siting authority for both fossil fuel thermal and renewable energy power plants over a certain size.[317] However, in 2021, the legislature granted counties the authority to veto specific renewable energy projects and to ban such projects in part or all of their jurisdictions.[318] Ohio retained exclusive statewide siting authority for thermal energy projects like coal plants and gas plants to favor those resources and disfavor competing renewable energy projects.[319] Reports indicate this legislative change

316. *See* Thomas Kemmet, *Ohio's Powerful Blow to Clean Energy: The Paradoxical Legislation Between Fossil Fuels and Wind and Solar Resources*, U. CIN. L. REV. BLOG (Dec. 15, 2022), https://uclawreview.org/2022/12/15/ohios-powerful-blow-to-clean-energy [https://perma.cc/STL3-B99N] (documenting legislation that hinders renewable energy development and promotes the use of fossil fuels); sources cited *infra* note 317–319.

317. *Cf. Senate Bill 52 Resources*, OHIO POWER SITING BD., https://opsb.ohio.gov/processes/senate-bill-52-resources [https://perma.cc/8XGZ-L2KJ] (noting that, in contrast to the prior regime, "SB 52 gives local elected officials the ability to impact new wind and solar projects before they come to the Ohio Power Siting Board (OPSB)").

318. S.B. 52, § 303.58(A), 134th Gen. Assemb. (Ohio 2021).

319. *See* Eisenson et al., *supra* note 5, at 224–35 (documenting local and state restrictions that create barriers for renewable energy projects in Ohio as well as how certain project proposals fared); Enterline & Valainis, *supra* note 177, at 59 (discussing Ohio's structure of approval for energy sites); Peggy Kirk Hall, *When Can a County or Township Prohibit Renewable Energy Facilities from Locating in the Community?*, OHIO STATE UNIV. EXTENSION (Sept. 9, 2022), https://farmoffice.osu.edu/blog/fri-09092022-900am/when-can-county-or-township-prohibit-renewable-energy-facilities-locating [https://perma.cc/S2CP-Q95S] ("Found in the 'agricultural exemption from zoning' statute, Ohio Revised Code Sections 303.21(C) (counties) and 519.21(C) (townships) states that county and township zoning cannot prohibit the use of any land for biodiesel production, biomass energy production, electric or heat energy production, or biologically derived methane gas production . . . ."); *see also* Kathiann M. Kowalski, *As Ohio Clamps Down on Clean Energy, Recent Changes Make It Easier to Force Landowners to Allow Oil and Gas Drilling*, ENERGY NEWS NETWORK (May 15, 2024), https://energynews.us/2024/05/15/as-ohio-clamps-down-on-clean-energy-recent-changes-make-it-easier-to-force-landowners-to-allow-oil-and-gas-drilling/?utm_medium=email [https://perma.cc/X8WE-4FDA] (discussing how Ohio has made it more difficult for landowners to host clean energy projects on their land while at the same time modifying the state's unitization laws to make it more difficult for landowners to resist fossil fuel development on their land).

has created significant uncertainty for investment around new and in-progress wind and solar projects, eliminated any potential for regulatory standardization, and stalled clean energy development in the state.[320]

This contrast between Ohio and the other states illustrates how state legislatures are attuned to the issue of state preemption of local zoning and permitting and are using preemption to support favored projects and eliminate preemption for disfavored projects. Battles in state legislatures over state authority, local control, preemption, and community engagement are likely to continue to be difficult and contested in future years. We believe that as state legislatures continue to grapple with these issues, setting statewide standards for clean energy projects with preemption of overly restrictive local zoning (but not necessarily full preemption of local authority) is needed to accelerate clean energy development while still allowing for local input. Doing so will require a combination of community and local government engagement, clear and streamlined state and/or local permitting requirements, and enhanced informational tools, as set forth below.[321]

Moreover, we suggest that there may be less controversy over such permitting reform efforts for projects on repurposed energy sites, which have the potential to garner more widespread support at both the state and local levels of government. Accordingly, the next Subsection discusses permitting reform measures that can support both clean energy projects in general as well as repurposed energy projects, in particular.

---

320. *See, e.g.*, Dan Gearino, *Ohio Solar Mounts a Comeback in the Face of a Campaign Whose Alleged Villains Include China and Bill Gates*, INSIDE CLIMATE NEWS (May 18, 2024), https://insideclimatenews.org/news/18052024/ohio-solar-projects-politics [https://perma.cc/P7QA-VA52] (discussing the delays and uncertainty for in-progress and new solar projects in Ohio after the enactment of Senate Bill 52 in 2021).

321. A 2024 Energy and Environmental Economics (E3) report commissioned by the Clean Energy Task Force, the Natural Resources Defense Council, and The Nature Conservancy to evaluate barriers to renewable energy development reached a similar conclusion that the most effective policy interventions to accelerate renewables development consist of a combination of: centralized "one-stop" permitting rather than multiple agencies, increased standardization of site-specific requirements and evaluation methods for all projects, time limits on permitting processes, statewide standards with preemption of "unreasonably burdensome local ordinances," and "clearly defined" periods of local engagement in siting and project design. Alagappan et al., *supra* note 292, at 11.

c. Streamlined Permitting for Clean Energy

All levels of government are engaged in a range of permitting reforms for renewable energy that, in lieu of or in addition to preemption, help ease the approval process for these projects. Many of these reforms specifically encourage renewable energy development on brownfields sites and other repurposed energy lands.[322] These reforms include faster permitting, more uniform regulations or "permits by rule," environmental offsets, and "build-ready" sites to encourage developers to locate their projects on brownfields properties.[323] All of these are perhaps most feasible, politically and practically, in the repurposed energy context, as renewable energy development on underutilized lands tends to have fewer environmental and social impacts.

With respect to expedited permitting for repurposed energy sites, New York accelerates renewable energy projects on disturbed sites by requiring permits to be issued or denied within six months of a siting permit application being deemed complete.[324] If the state fails to complete its review within six months and does not negotiate an extension, the project is deemed automatically approved.[325] New York also provides centralized and expedited environmental review and permitting for qualifying clean energy projects on disturbed lands through its "build-ready" program.[326] This program prioritizes "abandoned" sites such as "brownfields, landfills, or other disused or underutilized sites" where development could provide benefits to host communities.[327] The state does most of the work on these sites that

322. See Popkin & Krishnan, *supra* note 167, at 7, for a survey of different states' installation of solar fields on brownfields sites.

323. *See Examples*, *supra* note 275 ("This non-comprehensive document is a work in progress and summarizes a subset of state policies supporting renewable energy development on landfills, formerly contaminated lands, and/or mine sites for selected states. The summarized policies are direct financial incentives, procurement preferences, and streamlined permitting and environmental reviews.").

324. N.Y. PUB. SERV. LAW § 142(5) (McKinney 2024).

325. *Id.*

326. *See Build-Ready Program*, *supra* note 77 (describing how the Build-Ready Program operates to increase clean energy projects).

327. *Clean Energy Resource Development and Incentives: The Build-Ready Annual Progress Report 2022*, N.Y. STATE ENERGY RSCH. & DEV. AUTH. 1 (Apr. 2023), https://www.nyserda.ny.gov/All-Programs/Build-Ready-Program

developers otherwise would do, including, for example, environmental review, community engagement, initial steps toward interconnecting with the electric grid, and obtaining needed permits.[328] It then auctions off the sites to developers.[329]

New Jersey has similarly prioritized renewable energy development on "RE-Powering" sites (disturbed sites prioritized by the EPA for renewable energy development).[330] It did this by "establishing a state-managed process . . . for landfill and brownfield projects" to generate profitable solar renewable energy credits and, when such credits were phased out, offering other incentives.[331] It also enabled procurement of renewable energy from these sites by New Jersey's "largest electric utility" and provided a large percentage of community solar funding to solar installations on brownfields and landfills.[332] Additionally, New Jersey's three agencies responsible for regulating and permitting renewable energy development have coordinated with each other well, reducing duplicative paperwork and other obstacles for developers at Re-Powering sites in the state.[333] For example, they "meet monthly to discuss the progress of all renewable projects on RE-Powering sites that are known to be in development."[334]

Even the federal government has made initial efforts to streamline some of their review processes for renewable energy projects on brownfields and other repurposed energy sites. For instance, in 2023, DOE proposed "categorical exclusions" from NEPA review for certain small scale solar and energy storage

---

[https://perma.cc/HL4J-DMJD] (follow "Clean Energy Resources Development and Incentives: The Build-Ready Program Annual Progress Report 2022" hyperlink under "Program Documents").

328. N.Y. PUB. AUTH. LAW § 1902 (McKinney 2024) (describing how the state will "[u]ndertake all work and secure such permits as the authority deems necessary or convenient to facilitate the process of establishing build-ready sites").

329. *Id.*

330. *Profiles of State Programs for Renewable Energy Development on Landfills, Mines, and Formerly Contaminated Sites*, U.S. ENV'T PROT. AGENCY 23 (May 2022), https://www.epa.gov/system/files/documents/2022-06/epa-re-powering-profiles-state-programs-may-2022%20508.pdf [https://perma.cc/F96V-876Y].

331. *Id.* at 23.

332. *Id.*

333. *Id.* at 34.

334. *Id.*

projects on "previously disturbed or developed" lands, which would expedite the NEPA process for such projects.[335]

Some state reforms, such as uniform regulation and streamlined review, apply to all clean energy developments, not just repurposed energy sites. For example, New York's legislature directed a newly formed Office of Renewable Energy Siting to "establish a set of uniform standards and conditions for the siting, design, construction, and operation" of renewable facilities.[336] Likewise, Virginia allows for "permits by rule" for renewable energy projects under 150 MW consisting of expedited permits in exchange for agreement to operating and construction requirements as well as centralized interagency coordination of review requirements.[337] In 2024, the Minnesota legislature enacted the Minnesota Energy Infrastructure Permitting Act, which streamlines the existing permitting process for renewable energy and transmission line projects; eliminates the statutory "certificate of need" requirement for wind, solar, and battery projects so long as the state commission determines they are a reasonable approach to meeting the state's carbon-free standards;[338] and enacts other reforms designed to lower the cost and

335. National Environmental Policy Act Implementing Procedures, 88 Fed. Reg. 78,681–82 (Nov. 16, 2023) (codified at 10 C.F.R. pt. 1021) (proposing categorical exclusions for energy storage and revised categorical exclusions for transmission upgrades and rebuilds). Notably, under Congress's most recent amendments to NEPA in 2023 discussed in Part III.B, any federal agency can adopt a categorical exclusion enacted by another federal agency, and thus any federal agency with permitting authority over a qualifying solar or energy storage project, such as the Bureau of Land Management, could use this exclusion to accelerate permitting of solar or storage projects on federal lands, creating positive ripple effects across the federal government.

336. N.Y. PUB. SERV. LAW § 139 (McKinney 2024).

337. *Examples*, *supra* note 275; *Renewable Energy*, VA. DEP'T OF ENV'T QUALITY, https://www.deq.virginia.gov/permits/renewable-energy [https://perma.cc/9DWG-HJP2].

338. Minnesota's certificate of need requirement for "large energy facilities" requires the applicant to show that "demand for electricity cannot be met more cost effectively through energy conservation and load-management measures" and requires the Minnesota Public Utilities Commission to consider a range of factors including long range energy demand forecasts, the effect of energy conservation and energy efficiency programs on those demand forecasts, and benefits of and alternatives to the proposed facility before approving it. *See* MINN. STAT. § 216B.243 (2023).

shorten the timeline for clean energy infrastructure projects.[339] Finally, recognizing that even uniform regulations or permits by rule can result in delays when administered by multiple state agencies, New Jersey addresses this type of challenge through an Office of Permitting and Project Navigation.[340]

Where more uniform standards or permits by rule fail to address site-specific impacts, another approach to ease regulatory approval of repurposed energy is to allow developers to offset impacts at an offsite location. New York does this for all renewable energy projects twenty-five MW or above, allowing applicants to pay a fee to achieve "off-site mitigation."[341]

Beyond state and federal permitting and siting reforms, local governments themselves can be part of the solution. This may, in turn, reduce the need for state preemption in the first place. On the land use side, through zoning and local ordinances that specifically address renewable energy, some local governments have been innovative as opposed to obstructive. For example, some municipalities have listed solar or wind energy as a permitted or accessory use (allowed as of right alongside a primary use on the lot) in specific zoning districts.[342] This is a key form of "ministerial" regulation, meaning that as long as a project meets pre-determined criteria, it will be automatically approved.[343]

---

339. 2024 Minn. Laws ch. 126, arts. 7–8 (to be codified in MINN. STAT. § 216I and scattered sections of MINN. STAT. § 216B); *see also* Zev Simpser & Brian Bell, *Minnesota Energy Infrastructure Permitting Reform*, DORSEY & WHITNEY LLP (June 5, 2024), https://www.dorsey.com/newsresources/publications/client-alerts/2024/6/mn-permitting-reform [https://perma.cc/D9VB-87BT] (discussing how the act will ease the process for approving renewable energy projects).

340. *Office of Permitting and Project Navigation,* N.J. DEP'T OF ENV'T PROT., https://dep.nj.gov/oppn [https://perma.cc/2E34-SQZ9] ("The mission of the Permit Coordination Unit is to insure that complex multi-media, high value projects receive proactive and facilitated communication and coordination in support of timely, predictable, and positive permit decisions.").

341. N.Y. PUB. SERV. LAW § 138 (McKinney 2024).

342. *See, e.g.*, DOUGLAS COUNTY, WA., CODE § 18.16.350 (2023) ("Wind energy generation systems shall be authorized as an accessory use to a permitted use in all rural and agricultural zoning districts.").

343. MOIRA O'NEILL-HUTSON ET AL., CAL. AIR & RES. BD., 3900-19STC005, EXAMINING ENTITLEMENT IN CALIFORNIA TO INFORM POLICY AND PROCESS: ADVANCING SOCIAL EQUITY IN HOUSING DEVELOPMENT PATTERNS 17 (2022). Many model zoning codes for solar energy recommend listing renewable energy as a

In summary, monetary support to address the difference in cost between building on greenfields versus disturbed lands is likely not enough to incentivize repurposed energy development. Repurposed energy development often involves more regulatory hurdles than greenfields development, such as the need to reclaim or at minimum investigate contamination of a site before building. Reducing the amount of regulation, making it easier for developers to navigate regulations, and coordinating the many entities responsible for approving sites and permits are therefore all critical components of repurposed energy support. The federal government, states, and local governments have begun this process, but all governments should build from the examples above to more comprehensively ease the siting and permitting process on repurposed energy sites.

3. Informational Support and Planning Tools

Beyond supplying money and streamlined permitting directly to clean energy projects and specifically repurposed energy projects, the federal government and states are also supporting repurposed energy projects by providing needed information to potential developers of such projects. Constructing and commencing operation of a new renewable energy generation plant is resource intensive from the perspective of financing, permitting, and information gathering. The more of this work that governments complete for developers, the faster and more cost-effectively repurposed energy projects can be built.

In a growing number of cases, governments are doing much of the information gathering that renewable energy developers would otherwise have to devote their own staff to. This support falls within two large categories, as we explore here: logistical project information—including the location of viable sites and transmission interconnections—and legal and permitting information.

---

permitted use in certain zones. *See, e.g.*, Model Ordinance for Large-Scale Solar Electric Energy in PA, PSATS ORDINANCES 2 (May 28, 2010), https://www.psats.org/resource-center-ordinances-1 [https://perma.cc/2UQ4-4W6T] (follow "Solar Large Scale Facility" hyperlink) (indicating preference for "permitted use" over "conditional use" or "special exception").

a. Logistical Project Information and Mapping Data

Developers of renewable energy projects need to gather extensive data before attracting investors, securing long-term revenue through contracts, and commencing construction and operation. Some of this data applies to all renewable energy projects; for example, developers need detailed information on the quantity and typical duration of sunlight or wind at a specific site. Developers also must identify the distance between the proposed site and the nearest substation, which is the equipment that connects the generation facility to the transmission grid so that electricity from the wires can have its voltage "stepped up" (increased) and be sent through the grid to customers.[344] The DOE provides this essential data and more than 150 other informational layers—such as demographics, proximity to substations that enable grid connection, and environmentally sensitive land—through its Geospatial Energy Mapper. This mapper supports all forms of renewable energy development—not just repurposed energy.[345]

Beyond government-provided information that supports all renewable energy projects, a growing subset of federal and state government information targets repurposed energy specifically. These government efforts provide potential developers with data that will ease the process of building on repurposed sites, including by identifying eligible sites and their quality for potential renewable energy generation. The EPA's "RE-Powering America's Land" initiative aims to encourage solar development on disturbed sites.[346] A major component of this initiative is a mapping tool developed by EPA, NREL, and twenty-two states, which includes more than 190,000 disturbed sites and data such as the

344. Large-scale solar energy developers need access to transmission, while community solar projects tend to need access to smaller distribution lines. *Pennsylvania Assessment, supra* note 209, at 88 ("Community solar projects are less reliant on transmission infrastructure [than larger projects] and can interconnect via local distribution grids.").

345. Marguerite Huber, *A New Tool Helps Map Out Where to Develop Clean Energy Infrastructure*, ARGONNE NAT'L LAB'Y (Jan. 10, 2023), https://www.anl.gov/article/a-new-tool-helps-map-out-where-to-develop-clean-energy-infrastructure [https://perma.cc/9K2D-N75Z] ("The Geospatial Energy Mapper (GEM) is a *comprehensive*, interactive online mapping tool . . . ." (emphasis added)).

346. *RE-Powering America's Land*, U.S. ENV'T PROT. AGENCY (Aug. 29, 2024), https://www.epa.gov/re-powering [https://perma.cc/23PL-7KH8].

nearest substation and amount of renewable energy available on the site.[347] The sites mapped by the agency could offer large amounts of acreage for the ambitious amounts of renewable energy required to achieve U.S. net-zero targets for greenhouse gas emissions.[348]

Results so far at RE-Powering sites demonstrate how informational support can concretely support repurposed energy. In 2023, EPA highlighted 502 renewable energy installations on brownfields in forty-seven states and territories, representing 2.4 GW of capacity.[349] These installations are primarily solar but also include some wind projects and smaller biomass and geothermal projects.[350] These projects are on brownfields in rural and urban areas around the United States, including wind and solar development at former military sites, refineries, landfills, steel plants, mine sites, and wastewater treatment facilities.[351]

At the state level, Pennsylvania's DEP, in collaboration with a nonprofit group that focuses on restoring mine lands and surrounding communities, has mapped all known previously mined lands and used GIS analysis to identify the previously mined

347. *Id.*; Off. of Commc'ns, P'ships, & Analysis, *RE-Powering America's Land Initiative: Program Overview*, U.S. ENV'T PROT. AGENCY 3 (May 2023), https://www.epa.gov/system/files/documents/2023-05/re_cl_program_overview_508_050223.pdf [https://perma.cc/S339-VEY7].

348. *Mining the Sun*, *supra* note 279.

349. *See* Off. of Commc'ns, P'ships, & Analysis, *supra* note 347, at 2–3.

350. *Id.* at 3 (visually indicating the different kinds of projects completed, including solar, wind, geothermal, and biomass).

351. *See RE-Powering Success Stories: Electricity Generation*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/re-powering/re-powering-success-stories-electricity-generation [https://perma.cc/AK3U-WLZU] (highlighting projects in Vermont, Colorado, Wyoming, Ohio, New York, Nevada, Massachusetts, California, and New Mexico). More recently, in 2023, DOE and the U.S. Geological Service released what they say is the most comprehensive database to date of U.S. large-scale (at least one MW) solar energy projects constructed through the end of 2021. These more than 3,600 projects across forty-seven states and the District of Columbia total almost fifty-five GW and provide valuable information in improving the siting of large-scale solar projects nationwide. DOE's goal with the database is to reduce costs and understand the impacts of these projects. *See U.S. Department of Energy and U.S. Geological Survey Release Online Public Database of Large-Scale Solar Facilities*, OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY (Nov. 8, 2023), https://www.energy.gov/eere/articles/us-department-energy-and-us-geological-survey-release-online-public-database-large [https://perma.cc/5YHW-U33H] (discussing how the database will inform decisions for the siting of these solar projects).

lands most suitable for solar development based on considerations such as whether the lands have other important uses such as farmland or forest and proximity to transmission infrastructure.[352] The DEP has identified thirteen commonwealth-owned abandoned mine lands as "clean energy campuses" for which applicants can potentially seek loan guarantees from the U.S. Department of Energy's Loan Programs Office.[353]

The Nature Conservancy in Wyoming has taken similar steps.[354] This includes the Wyoming Brightfields Energy Siting Initiative Map Tool designed to help project developers and government decision-makers identify potential conflicts at prospective sites through interactive mapping that can layer industrially disturbed areas, conservation value areas, and other site-specific data.[355] Colorado aggregated more than 100 datasets to map "marginalized" lands (initially 4,000 sites in ten counties) that will support solar and wind development.[356] Map users can filter for criteria such as wind speed, contours, and existing "utility infrastructure."[357] Hawai'i has a similar statewide map that can help to channel development toward marginalized land by

352. *See generally Pennsylvania Assessment*, *supra* note 209, at 25–29 (discussing the process behind Pennsylvania's mapping project).

353. Pa. Dep't of Env't Prot., Proposed Clean Energy Campus Projects on Commonwealth-Owned Abandoned Mine Lands; Request for Information, 54 Pa. Bull. 3098 (June 1, 2024), https://www.pacodeandbulletin.gov/Display/pabull?file=/secure/pabulletin/data/vol54/54-22/766.html [https://perma.cc/J9D3-WK9N] (identifying thirteen Commonwealth-owned "campus[es]" and seeking feedback on the "potential use of loan guarantees to support clean energy deployment and energy infrastructure reinvestment through the United States Department of Energy's (DOE) Loan Programs Office").

354. Waypoints Wyo., *supra* note 170.

355. *Wyoming Brightfields Energy Siting Initiative Map Tool,* THE NATURE CONSERVANCY, https://tnc.maps.arcgis.com/apps/webappviewer/index.html?id=1cf531c47ab841db9dc93614f1a6cdf3 [https://perma.cc/JFP7-3CUZ] (presenting an interactive map that allows data layering to give a comprehensive picture of potential sites).

356. *Colorado Brightfields*, CONVERGENCE ASSOCS., https://brightfields.colorado.gov [https://perma.cc/DJN4-XJCG].

357. *See Colorado Brightfields: Inventory and Analysis of Brightfields in Colorado*, UNIV. OF DENVER COLO. EVALUATION & ACTION LAB 4 (May 2021), https://coloradolab.org/wp-content/uploads/2021/05/Colorado-Brightfields-Report_Final.pdf [https://perma.cc/U75H-N3YT].

providing filters for high-quality greenfield lands such as reserves, critical habitats, and areas with high-quality soils.[358]

Other states are mapping and assessing contaminated lands more generally for all forms of development. This will support renewable energy development on these sites in addition to other projects. For example, Illinois has completed Targeted Brownfields Assessments for 140 sites in more than sixty communities and helps with environmental sampling of these sites.[359] States such as New Jersey, in turn, have evaluated all types of land for solar potential but identify lands where the permitting authority "encourages solar development" or discourages it.[360] Preferred lands are already-developed lands with impervious surfaces.[361]

More efforts of this type will be essential for easing developer selection of repurposed energy sites—allowing developers to not only identify abandoned or previously used sites but also to more quickly determine whether those sites are feasible based on the many other features necessary to support economic renewable energy development.

b. Legal and Permitting Information

Locating an optimal site for renewable energy development on land other than flat farmland—which is by far the preferred location for most new renewable energy development—is only one hurdle in a policy world that prioritizes repurposed energy. Of equal or greater importance are the legal and permitting obstacles to such development, which make repurposed energy more expensive and time intensive. For contaminated sites that have not yet been remediated, developers must contend with a

358. *Renewable EnergGIS Mapping Tool*, HAW. STATE ENERGY OFF., https://energy.hawaii.gov/information-center/project-development-center-tools/renewable-energis-mapping-tool [https://perma.cc/S9FL-8WP8] (presenting similar interactive map as above).

359. *From Brownfield to Brightfield: The Impact of Brownfield Redevelopment on Communities*, ILL. POWER AGENCY (May 26, 2023), https://ipa.illinois.gov/content/dam/soi/en/web/ipa/documents/20230526-ipa-power-hour-4-brownfields-final.pdf [https://perma.cc/72YN-QLJJ].

360. *Clean Energy*, N.J. DEP'T OF ENV'T PROT. (Sept. 16, 2024), https://dep.nj.gov/cleanenergy/technologies/solar/#1692796980215-8b4e616a-4bbf [https://perma.cc/PU2W-UH6A].

361. *New Jersey Department of Environmental Protection Solar Siting Analysis Update*, N.J. DEP'T OF ENV'T PROT. 13 (Dec. 2017), https://www.nj.gov/dep/aqes/SSAFINAL.pdf [https://perma.cc/4D74-9TL7].

range of requirements associated with permitting, construction, and ongoing monitoring of contamination not required for greenfield developments.[362] Developers are also concerned about ongoing liability for any newly discovered contamination or known contamination that moves underground or aboveground in unexpected ways. These obstacles—layered atop numerous other laws regarding interconnection, stormwater control, endangered species protection, aesthetic controls such as fencing or vegetative borders, and zoning codes—tend to disincentivize repurposed energy.

Governments are working to overcome these barriers by creating more uniform environmental review requirements for repurposed energy projects or by streamlining permitting processes for such projects, as discussed above. Even where they have not reduced regulatory barriers, several federal agencies and state governments are working to provide clear regulatory and permitting roadmaps or decision trees for developers that reduce the legal work of navigating repurposed energy sites. For instance, the EPA provides a "Brownfields Roadmap" that "breaks down Brownfields site investigation and cleanup into an easy to understand, step-by-step process" and provides links to technical resources.[363] The EPA similarly walks renewable energy developers who are considering building on former mine lands through all of the necessary steps in the decision-making and development process, although it does not provide

362. Developers must include concessions that enable ongoing monitoring of site contamination, for example. *See, e.g.*, Craig Beebe, *The Rundown: So You Want to Clean Up a Brownfield. Here's How*, METRO NEWS (Feb. 1, 2017), https://www.oregonmetro.gov/news/rundown-so-you-want-clean-brownfield-heres-what-do [https://perma.cc/W4H9-UVGL] ("Ongoing monitoring may be required for years [at remediated sites]."). *See generally* Brian Schapp et al., *Accelerating Solar Development on Michigan Brownfields: Challenges and Pathways Forward,* GRAHAM SUSTAINABILITY INST. UNIV. OF MICH. (2019), https://graham.umich.edu/media/files/dow/Dow-Masters-2019-Brownfields.pdf [https://perma.cc/S2HN-KT26] (discussing challenges associated with solar projects on brownfields); *Redeveloping Brownfields with Solar: Challenges and Opportunities*, AM. CLEAN POWER ASS'N (Aug. 30, 2022), https://cleanpower.org/wp-content/uploads/gateway/2022/08/ACP_FactSheet_Brownfields_220830.pdf [https://perma.cc/LYA4-862E] (broadly discussing challenges associated with solar projects on brownfields and potential pathways forward).

363. *Brownfields Roadmap*, U.S. ENV'T PROT. AGENCY (May 2, 2024), https://www.epa.gov/brownfields/brownfields-road-map [https://perma.cc/E3DM-DB6V].

information on all specific regulations and permitting requirements that apply within these steps.[364]

At the state level, in addition to mapping former mine lands and providing filters relevant to renewable energy projects, some states provide information that helps developers better understand and navigate regulatory requirements. For example, Pennsylvania created a regulatory roadmap detailing each legal and permitting action associated with environmental remediation and solar energy development; it also details related energy permitting steps such as interconnection requirements.[365] As noted in Subsection III.B.2, the New Jersey Office of Permitting and Project Navigation conducts centralized environmental permit coordination and review, and it makes EPA RE-Powering mapping data available to developers to facilitate brownfield sites for solar development.[366]

Beyond helping developers to navigate state and local legal processes, it is critical for states to support local governments so that they can write and implement more effective clean energy siting laws. These local laws should address legitimate local concerns while ensuring that clean energy projects move forward. Many local governments in rural communities lack the resources or technical information to fully achieve this goal, and state support through information, code options, and education of and engagement with local officials and communities is therefore critical. The DOE is funding states to support local governments

364. *See generally* Off. of Superfund Remediation & Tech. Innovation (OSRTI), *Shining Light on a Bright Opportunity: Developing Solar Energy on Abandoned Mine Lands*, U.S. ENV'T PROT. AGENCY (Dec. 2011), https://semspub.epa.gov/work/11/176032.pdf [https://perma.cc/4UCN-JQ8Q] ("The report describes the mechanics of solar energy, details the various solar technology options, explores solar energy's environmental, economic, and social impacts at mining sites, and provides case studies and next steps to help get projects in place.").

365. *Pennsylvania Assessment*, *supra* note 209, at 63–75.

366. *Profiles of State Programs for Renewable Energy Development on Landfills, Mines, and Formerly Contaminated Sites*, *supra* note 330, at 3–4; *see also* Brett Johnson, *Trash to Treasure: Capped Landfills Are Being Converted to Solar Arrays—And, Now, There's Tax Incentive to Do So*, ROI-NJ (May 17, 2023), https://www.roi-nj.com/2023/05/17/industry/energy-utilities/trash-to-treasure-capped-landfills-are-being-converted-to-solar-arrays-and-now-theres-tax-incentive-to-do-so [https://perma.cc/VYM3-YQQD] (discussing how New Jersey facilitates brownfields site development).

through Renewable Energy Siting Through Technical Engagement and Planning (R-STEP) grants.[367]

Targeted funding programs, permitting reform efforts, and governmental data support are already having an effect. As Part III.B.1 demonstrated, a substantial number of renewable energy projects have been successfully located on brownfields in states with this type of support. If the federal government and states adopt more comprehensive repurposed energy programs, they can capitalize on the growing number of developers across the country beginning to target brownfields for new renewable energy projects to take advantage of financial incentives in the IIJA and IRA. Such projects are also more likely to see greater community acceptance and less NIMBY resistance than projects proposed for greenfield sites.

IV. BUILDING NARRATIVES: CENTERING REPURPOSED ENERGY IN THE CLEAN ENERGY TRANSITION

As shown in the prior parts of this Article, there are a wealth of new federal and state programs and hundreds of billions of dollars of federal and other funding to build the new clean energy infrastructure needed to decarbonize the U.S. economy and energy systems. Likewise, the technology already exists to accomplish this goal, and the economics—in terms of highly competitive prices for new renewable energy plants—are favorable. However, policymakers and experts also fully realize that community opposition to the massive scale of new energy infrastructure needed for this transformation may block this transition. More likely, this opposition could cause the transition to progress too slowly to address the threats of climate change and to take full advantage of Congressionally authorized, time-limited funding.

---

367. *See Renewable Energy Siting Through Technical Engagement and Planning*, OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, https://www.energy.gov/eere/renewable-energy-siting-through-technical-engagement-and-planning [https://perma.cc/H4W3-LL6W] (discussing the R-STEP program); Patrick Cooley, *DOE to Invest $22M to Improve Planning, Permitting of Renewable Energy, Storage Projects*, UTIL. DIVE (Apr. 2, 2024), https://www.utilitydive.com/news/doe-planning-permitting-renewable-energy-storage/712047 [https://perma.cc/6KJJ-UXPC] (discussing which states/projects the grant money will support).

In this Part, we start by moving beyond economics, technology, and funding to more fully consider the importance of narrative and culture in supporting a clean energy transition. We then show how a cultural narrative that supports clean energy development has even greater salience in the context of repurposed energy projects.

A. BUILDING NARRATIVES FOR ALL CLEAN ENERGY PROJECTS

As an initial matter, it is important to recognize that within the climate movement, government actors, advocates, and others often focus on the dire consequences of the failure to address climate change. There are good reasons for this. Urgent action is necessary, and complacency is potentially catastrophic. However, while this message is necessary and effective to spur action by some members of society, it can be ineffective and even counterproductive for others. It can lead to despair, helplessness, depression, and denial that there is even a problem.[368] Accordingly, multiple messaging efforts are needed. And as Hannah Ritchie argues in her book *Not the End of the World*, one of those messages should be optimism.[369] We have the technology to engage in a clean energy transition. The economics are favorable and, in general, becoming even more so. As Saul Griffith argues persuasively in his book *Electrify*:

> To address climate change, we need a new narrative that is both more honest about the task at hand and more broadly engaging than a story about sacrifice. It can be a story about what we stand to win—a cleaner electrified future, with comfortable homes and zippy cars—which is better than nightmares about what we have to lose. We have a path to decarbonization that will requires changes, to be sure, but not deprivation.[370]

As part of the effort to focus on positive mechanisms for achieving change, a climate communications strategy designed to reach diverse political perspectives must demonstrate the

---

368. *See* Robert Gifford, *The Dragons of Inaction: Psychological Barriers That Limit Climate Change Mitigation and Adaptation*, AM. PSYCH., May–June 2011, at 290, 297 (describing how negative emotions can lead to inaction in the face of the climate crisis).

369. *See generally* HANNAH RITCHIE, NOT THE END OF THE WORLD: HOW WE CAN BE THE FIRST GENERATION TO BUILD A SUSTAINABLE PLANET (2024) (discussing the importance of not defaulting to hopelessness in the face of the climate crisis).

370. GRIFFITH, *supra* note 82, at 47.

economic benefits that can flow to individual people *now*.[371] Clean energy development will lead to new industrial development and reduced pollution-related disease and death associated with fossil fuel extraction, use, and disposal. Many in government and the clean energy industry are already attempting to promote this positive message.[372] The more difficult question is how to embed that message into contemporary culture, particularly in those communities that are most needed to host clean energy projects.[373]

Why do some rural areas support domestic mining for copper, nickel, and other critical minerals needed for electric vehicles, solar panels, wind turbines, and other clean energy infrastructure but not the infrastructure itself—even when the mining can cause pollution in their communities?[374] Part of the answer is the promise of high paying jobs (many of which are never realized), but part of it is culture. Mining is seen as patriotic, good paying work that is strongly engrained in rural culture.[375] The continuing focus on coal mining culture in areas of

371. Tim Sahay, *Liberal Blindspots,* PHENOMENAL WORLD (Mar. 14, 2024), https://www.phenomenalworld.org/analysis/liberal-blindspots [https://perma.cc/AG8Q-V78U] (interviewing Chris Shaw, a climate risk communications expert, about the importance of meeting individuals where they are in terms of communicating climate information).

372. *See, e.g.*, *Clean Energy Job Creation and Growth*, OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, https://www.energy.gov/eere/clean-energy-job-creation-and-growth [https://perma.cc/BKJ4-6KFT]; *Amazon Is the World's Largest Corporate Purchaser of Renewable Energy for the Fourth Year in a Row*, *supra* note 39 (touting an Amazon solar farm on a former coal mine site).

373. *See* Robert G. Boutilier et al., *Modeling and Measuring the Social License to Operate: Fruits of a Dialogue Between Theory and Practice*, SOCIALICENSE.COM (2011), https://socialicense.com/publications/Modelling%20and%20Measuring%20the%20SLO.pdf [https://perma.cc/5L5B-FRJS] (identifying "economic legitimacy," "socio-political legitimacy," "interactional trust," and "institutionalized trust" as four factors that inform different levels of a social license to operate).

374. Dionne Searcey, *Nebraskans Are Sitting on Strategic Metals. Is Mining a Patriotic Duty?*, N.Y. TIMES (June 20, 2023), https://www.nytimes.com/2023/02/02/climate/nebraska-mine-niobium-rare-earths.html [https://perma.cc/NF6X-454K]; *see also* Roberts, *supra* note 19.

375. *See, e.g.*, Neelam C. Poudyal et al., *Local Residents' Views of Surface Mining: Perceived Impacts, Subjective Well-Being, and Support for Regulations in Southern Appalachia*, 217 J. CLEANER PROD. 530, 538 (2019) ("[L]ocal residents have very favorable views of the mining industry, partly because they

the country where the coal industry has not provided more than a very small percentage of the region's employment in decades shows the enduring impact of history and narrative in creating a culture of either support or distrust for certain industries.

Clean energy developers and their supporters have not sufficiently invested in building a narrative and culture for their industries in rural or post-industrial areas. Supporters of clean energy, in particular, sometimes focus more on a combination of moral superiority, denigration of fossil fuels, and urgency of the climate crisis.[376] The central focus on climate is fraught, of course, because of how politically polarizing the issue has become in recent years, particularly in rural areas.[377] We need a more positive path forward—one that highlights shared values, rather than the climate crisis. The clean energy industry should therefore attempt to create a more robust economic engine around its projects in the form of ensuring living wage jobs in constructing and maintaining clean energy projects and in the supply chains associated with projects. Such an approach can provide more certain tax and other financial payments to landowners and communities, and other means of support.

Importantly, despite the cultural barriers to community support for clean energy projects, studies show that residents are

---

view mining as the only prospect for promoting long-term economic development."); Searcey, *supra* note 374 (quoting one community member's opinion that a Nebraskan mine would "be good for America").

376. This focus is understandable, since the science on climate impacts makes clear that one component of addressing the worst effects of climate change is eliminating carbon emissions from the energy sector. *Climate Change 2023 Synthesis Report*, *supra* note 6, at 60 ("Limiting human-caused global warming to a specific level requires limiting cumulative CO_2 emissions, reaching net zero or net negative CO_2 emissions, along with strong reductions in other [greenhouse gas emissions]."); *see also, e.g.*, *Renewable Energy—Powering a Safer Future*, UNITED NATIONS, https://www.un.org/en/climatechange/raising-ambition/renewable-energy [https://perma.cc/B6LM-7SL2] ("The science is clear: to avoid the worst impacts of climate change, emissions need to be reduced by almost half by 2030 and reach net-zero by 2050."). But as we argue here, this focus on "science" and negative impacts does not resonate with—and even alienates—a large sector of the U.S. population.

377. *See generally*, *e.g.*, Emily Pechar Diamond et al., *Rural Attitudes on Climate Change: Lessons from National and Midwest Polling and Focus Groups*, DUKE NICHOLAS INST. (2020), https://nicholasinstitute.duke.edu/sites/default/files/publications/Rural-Attitudes-on-Climate-Change-Midwest_1.pdf [https://perma.cc/F9FA-ETUC] (discussing the polarized attitudes towards climate change in rural communities and across party lines).

more open to embracing new views and information if they learn about them from trusted friends, neighbors, or community groups rather than outside experts, government officials, or project developers.[378] This means that clean energy developers, nongovernmental organizations, and governments must create "success stories" associated with renewable energy featuring local landowners and neighbors who have directly benefited from the placement of clean energy on their lands or in their communities. These stories can focus particularly on how income from solar and wind projects has allowed farmers to keep land in their families and how solar and wind developer payments to communities has funded local infrastructure like parks, community centers, and schools and lowered electricity bills.[379] Documenting and publicizing these transformative local benefits is particularly important in light of the significant increase in shadow campaigns by fossil fuel interests to inject misinformation into community debates over clean energy projects.[380]

To sharpen this focus, developers should establish wind and solar energy "learning centers" where residents and visitors can see how solar farms work, climb up a wind turbine, and meet with engineers and developers. These exhibits and centers could also show how crops are still being grown and cattle and sheep are still grazing between individual wind turbines and, for sheep, beneath solar panels. Other aspects of agrivoltaics and

---

378. *See* Jackie S. Getson et al., *Understanding Scientists' Communication Challenges At The Intersection of Climate and Agriculture*, 17 PLOS ONE, Aug. 2, 2022, at 1, 4 (discussing and citing literature regarding the importance of identifying and enlisting "trusted messengers" to convey information on matters of risk or uncertainty, including climate risk); Rand et al., *supra* note 28, at 81 ("Energy project neighbors, community and non-profit orgs, and university staff are most trusted sources of information; developers and government officials are the least trusted.").

379. Roberts, *supra* note 19 (discussing strategies for building support for clean energy development in rural areas); *see also* Jon Reed, *Renewable Energy is Reckoning with Its Perception in Rural America*, CNET (Sept. 29, 2023), https://www.cnet.com/home/energy-and-utilities/renewable-energy-is-reckoning-with-its-perception-in-rural-america [https://perma.cc/YXE7-SJR8] (discussing surveys done on rural attitudes towards renewable energy projects and strategies to build support).

380. *See supra* note 3 and accompanying text.

use of solar lands for pollinator habitat should be part of the learning experience.[381]

Many academics (ourselves included) have taken students to zero-carbon energy developments for a hands-on energy experience. These opportunities should be far more widespread and can model the exhibits and museums that have existed for decades to teach the public about the wonders and benefits of coal, natural gas, and oil historically sponsored by fossil fuel companies.[382] In addition to hands-on experiences and exhibits, clean energy developers and supporters should also invest in television advertising, work with influencers, and otherwise make use of social media for information and messaging, once again relying heavily on members of target communities as messengers.[383] Funding for these efforts should come from clean energy developers and potentially from supportive federal, state, and local government financial assistance programs.

Notably, climate change need not drive these new narratives around renewable energy, particularly in fossil fuel dependent communities where that message is far less effective. Instead, it can be far more impactful to discuss how embracing well-designed wind, solar, and battery projects can not only provide financial benefits but also be entirely consistent with a

---

381. Researchers in the nuclear energy industry are increasingly considering the socio-technical and community engagement aspects of siting nuclear generation along the same lines as presented here. *See* Aditi Verma & Todd Allen, *Public Comment: Creating New Community Engagement Infrastructure: Recommendations to DOE*, GOOD ENERGY COLLECTIVE (Aug. 23, 2023), https://www.goodenergycollective.org/policy/recommendations-to-doe-creating-new-community-engagement-infrastructure [https://perma.cc/7VFD-Q4GG] (discussing opportunities to do research "*with* communities, not on communities" and to facilitate citizen science and engineering as part of engaging with host communities, environmental justice communities, and the general public surrounding nuclear energy infrastructure).

382. *See, e.g.*, *Go Underground*, CHI. MUSEUM OF SCI. & INDUS., https://www.msichicago.org/explore/whats-here/exhibits/coal-mine [https://perma.cc/V936-LCRB]; *Visit Drake Well Museum and Park*, DRAKE WELL MUSEUM & PARK, https://www.drakewell.org [https://perma.cc/66PA-SEEZ]; LACKAWANNA COAL MINE TOUR, https://coalminetournepa.com [https://perma.cc/VSJ8-JVGQ]; PENN-BRAD OIL MUSEUM, https://penn-bradoilmuseum.org [https://perma.cc/6RWT-3UXD].

383. *See generally, e.g.*, Hugo Lucas et al., *Improving Public Attitude Towards Renewable Energy*, ENERGIES, Aug. 1, 2021, at 1 (highlighting the importance of available and accurate information about renewable energy in influencing consumers' attitudes).

community's longstanding pride in identifying as an energy production community.

Principles of energy justice—including recognitional justice, procedural justice, distributional justice, and restorative justice—can help with this effort.[384] By directing the benefits of clean energy projects directly to host communities, projects can build community support and enhance principles of energy justice at the same time. This includes local hiring, tax benefits, and reduced energy prices connected to new clean energy projects.[385] In this way, the benefits of clean energy projects are not just indirect through tax revenues but are rather direct benefits—clean and lower cost energy not for users somewhere else, but for host communities. For instance, local governments and states can request or require direct energy bill relief for impacted communities either through a community benefit agreement or separately, as New York now requires.[386] Communities would also benefit from state-created clearinghouses or programs providing best practices for harnessing the most benefits from local renewable energy.[387]

Clean energy companies can follow the lead of the fossil fuel companies of the past in terms of creating a culture of support, but it will take investment in communities and efforts to create

384. *See also supra* Part II.D (discussing energy justice).

385. *See, e.g.*, Douglas Bessette & Jacob White, *Detroiters More Likely to Support Local Solar Power Development if They Think it Reduces Energy Prices for Their Community*, CONVERSATION (Mar. 7, 2024), https://theconversation.com/detroiters-more-likely-to-support-local-solar-power-development-if-they-think-it-reduces-energy-prices-for-their-community-223838 [https://perma.cc/5H8L-3KSL] (discussing a survey showing both rural and urban residents are more likely to support solar projects where the benefits "stay local" through on-bill payments, encouraging "good neighbor" payments, and project subscription services).

386. *See supra* notes 324–329 and accompanying text (discussing New York policies); *see also Regulations*, N.Y. OFF. OF RENEWABLE ENERGY SITING, https://ores.ny.gov/regulations [https://perma.cc/A32H-U6GA] (discussing new regulations in New York); Lori Bird & Katrina McLaughlin, *US Clean Energy Goals Hinge on Faster Permitting*, WORLD RES. INST. (Feb. 9, 2023), https://www.wri.org/insights/clean-energy-permitting-reform-us [https://perma.cc/Q5JD-T4HU] (summarizing New York reforms).

387. *See, e.g.*, S.B. 2956-A, 2023–2024 Reg. Sess. (N.Y. 2023), https://legislation.nysenate.gov/pdf/bills/2023/S2956A [https://perma.cc/9X2B-CZS2] (discussing the benefits of communities having information about their local renewable energy sources).

that culture and narrative through realized benefits that can be replicated in communities across the country.

B. TARGETED STRATEGIES FOR REPURPOSED ENERGY PROJECTS

The above ideas work for all clean energy development in general. But there are additional strategies that Congress, federal agencies, states, local governments, and clean energy developers and advocates should use to make repurposed energy a central component of the clean energy transition. With repurposed energy, the argument that wind and solar plants are displacing existing agricultural production, open space, or aesthetic benefits that communities value is lessened significantly. Doubling down on repurposed energy can build community support for local clean energy development that can, if done well, serve as a foundation to build support for clean energy development more generally.

To capitalize on these benefits, developers, federal and state agencies, and local governments supporting clean energy development can and must lean in on available federal and state funding for projects and create communication plans for tracking and publicizing repurposed energy success stories. Similar to New York, states should also appoint clean energy community leaders to assist with outreach and engagement with communities about the benefits most important to them.[388] Reduction in pollution associated with clean energy in the repurposed energy context goes beyond eliminating fossil fuel power plants, which may or may not directly impact host communities. With repurposed energy, pollution reduction through capping or remediating mine sites and landfills is much more concrete and transformative. Such efforts can build on existing community preferences for projects on repurposed energy sites. As noted earlier, the 2024 survey by Lawrence Berkeley National Laboratory found significantly more local support for large solar projects built on former

388. *Find a Clean Energy Communities Coordinator*, NYSERDA, https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Communities/Find-a-Participating-Contractor [https://perma.cc/PS3D-KWYD] (detailing how to find an expert to help navigate clean energy programs/goals).

landfills, industrial sites, retiring coal plants, and marginal farmland than on land that did not have these characteristics.[389]

Repurposed energy also addresses the important issue of fear and distrust of change. Part of our proposed new narrative in favor of clean energy generally, and repurposed energy specifically, needs to combat the assumption that change in general and energy change in particular is always bad for communities. Clean energy skeptics and opponents have created an effective message that the change that comes from clean energy will swallow up vast amounts of land, destroy rural culture, ruin viewsheds, result in solar panel and wind turbine waste with nowhere to go, and cause many other harms.[390] There is insufficient discussion of the localized benefits of a clean energy transition in terms of addressing existing harms—reducing and ultimately eliminating fossil fuel extraction sites, power plants, and disposal sites across the country. Our fossil fuel economy continues to cause localized air,[391] water,[392] and land pollution.[393] It is also the documented cause of significant death and

389. Rand et al., *supra* note 28, at 81 ("Disturbed sites (e.g., landfills, industrial sites) are vastly preferred over forests and productive farmland for siting additional LSS [large-scale solar].").

390. Susskind et al., *supra* note 5.

391. *See, e.g.*, Longxiang Li et al., *Exposure to Unconventional Oil and Gas Development and All-Cause Mortality in Medicare Beneficiaries,* 7 NATURE ENERGY 177, 180 (2022) ("We found evidence of a statistically significant association between residential exposure to UOGD [unconventional oil and gas development], characterized using PE [proximity-based exposure] and DE [downwind-based] exposure metrics, and the relative risk of all-cause mortality in a large cohort of Medicare beneficiaries."); *Deaths Associated with Pollution from Coal Power Plants*, *supra* note 94 (noting deaths from coal particulate matter).

392. *See generally, e.g.*, Leif H. Olson et al., *Influences of Coal Ash Leachates and Emergent Macrophytes on Water Quality in Wetland Microcosms*, WATER AIR SOIL POLLUTION, Aug. 2017, at 1, 2 ("[T]race element concentrations measured from [coal ash] lagoon outfalls in the USA are often above drinking water guidelines [internal citation omitted]."); Kelly Maloney et al., *Unconventional Oil and Gas Spills: Materials, Volumes, and Risks to Surface Waters in Four States of the U.S.*, 581–582 SCI. TOTAL ENV'T 369 (2017).

393. Sudhir K. Upadhyay & Sheikh Adil Edrisi, *Developing Sustainable Measures to Restore Fly-Ash Contaminated Lands: Current Challenges and Future Prospects*, 32 LAND DEGRADATION & DEV. 4817, 4818–19 (2021) (noting fly ash production and land contamination issues associated with fly ash from coal-fired power plants).

disease.[394] Repurposed energy projects address this issue directly by replacing long-term sources of pollution with new, clean energy generation projects in the same location. Thus, there are both direct and localized environmental benefits associated with the clean energy development in addition to the more dispersed and remote climate benefits.

We often take these local harms of a fossil fuel economy for granted in an industrialized society. These harms have become a mostly invisible part of the status quo; they have existed for so long that they are rarely subject to question, and they must be aired and highlighted. In other words, there is much more to say about the localized benefits of the positive changes clean energy development will bring beyond the fact that it is needed to address global climate change.

The problem of treating our fossil fuel economy as fixed, with clean energy development expanding on top of it rather than as a substitute for it, permeates a range of analyses about the clean energy transition. For instance, RMI—an energy research NGO—pointed out in early 2024 that recent financial analyses showing a massive capital expenditure (capex) increase for the clean energy transition is wrong, because it assumed a continued investment at current levels in fossil fuel capex.[395] Instead, RMI concluded that "[a]s fossil fuel capex falls, the net growth in capex is only 2% a year, in line with the past seven years, and much lower than in the decade after 2000."[396]

When reduction of longstanding and seemingly "fixed" harms from the fossil fuel economy can be paired directly with the creation of new clean energy through repurposed energy projects, change may be met with less opposition. This is particularly true if developers can address the loss of jobs and tax revenues associated with any remaining fossil fuel jobs and tax benefits in communities. In coal communities, these benefits are already on the decline, but in many oil and gas communities, they remain strong, and residents see no ready replacement.[397]

---

394. *Deaths Associated with Pollution from Coal Power Plants*, *supra* note 94.

395. Kingsmill Bond et al., *The Great Reallocation: Capital Expenditure on Energy Production*, RMI 3 (Jan. 2024), https://rmi.org/insight/the-great-reallocation?submitted=1# [https://perma.cc/NTG9-TQ3Y].

396. *Id.*

397. *See supra* text accompanying notes 374–375.

Accordingly, this issue must be addressed through state and federal policies, just transition strategies, and the like.

To make repurposed energy a reality and to prove its benefits—beyond changing the narrative—further substantive policies, building on those highlighted in Part III, are needed. States with existing brownfields programs that provide technical assistance and/or liability comfort letters should create separate divisions within their brownfield programs to prioritize clean energy development on brownfields. For states that do not already have technical assistance or liability assurances for brownfields development in general, they should adopt them for repurposed energy projects as a pilot and then determine whether to expand them to other types of brownfield developments.

On permitting for clean energy projects, states that do not have statewide permitting or statewide standards for any wind or solar projects could create them solely for some or all repurposed energy projects to prioritize those developments.[398] This may invoke reduced political opposition from rural residents and local governments than has been seen in states that have recently created statewide permitting for some clean energy projects, like Michigan or Illinois.[399] States can then provide

398. *See supra* Part III.B for a discussion of preemption and permitting reform. For a detailed summary of state permitting reforms and incentives for renewable energy on contaminated sites, see, for example, *Profiles of State Programs for Renewable Energy Development on Landfills, Mines, and Formerly Contaminated Sites*, *supra* note 330 (summarizing different states' efforts concerning renewable energy development on brownfield/contaminated sites).

399. *See, e.g.*, Nicole Sevrey, *Senate Follows House's Lead to Erase Local Control of Energy Siting Decisions*, MICH. FARM BUREAU (Nov. 9, 2023), https://www.michfb.com/about/news-media/senate-follows-houses-lead-erase-local-control-energy-siting-decisions [https://perma.cc/JHW9-D96U] (emphasizing Michigan Farm Bureau's opposition to Michigan's legislation limiting local control over renewable energy); Ruth Thornton, *In Rural Michigan, Farmers Split over Big Solar*, BRIDGE MICH. (June 26, 2024), https://www.bridgemi.com/michigan-government/rural-michigan-farmers-split-over-big-solar [https://perma.cc/CE9W-GP7V] (noting how several local townships had legislation that conflicted with Michigan's statewide permitting legislation); Jim Meadows, *Laws in 2 Midwest States Make it Hard for Local Governments to Reject Green Projects*, NPR (Mar. 12, 2024), https://www.npr.org/2024/03/12/1237888056/laws-in-2-midwest-states-make-it-hard-for-local-governments-to-reject-green-proj [https://perma.cc/BU39-C9BM] (noting arguments that Illinois "had a gun held" to local governments' heads—threatening to sue local governments if they did not support preemption of local control over renewable energy siting).

expedited permitting, local government coordination, and other assistance for repurposed energy projects, like New York does with its Build-Ready Program.[400] Even in the absence of state action, local governments themselves can prioritize repurposed energy projects to channel clean energy development away from prime farmland and other more desirable lands.

It is important to note that moving permitting authority from the local level to the state level for repurposed energy projects or any clean energy projects does not in itself solve the permitting problem and may not even improve it. It all depends on precisely what states will do with permitting authority if and when they have it. It remains to be seen whether Illinois, Michigan, New York, and other states that have recently taken over the siting and permitting of clean energy plants can create the fast, expedited, and equitable process they aspire to build. Legislation enacted in 2024 in Minnesota is designed to reduce redundant permitting hurdles for new wind and solar projects that have long been permitted at the state level and can potentially be a model for other states if it is successful.[401]

It is for this reason that both in states that already have statewide permitting and in states that do not, using repurposed energy as a pilot project for bold and ambitious siting and permitting reform holds such potential. As discussed in Part III, this type of reform includes imposing time limits on permit decisions, categorical exclusions from environmental review (or a presumption in favor of an exclusion), build-ready sites, and technical support directed specifically toward repurposed energy projects.

In the local government context, permitting tools beyond the energy sphere could be particularly informative. Affordable housing is perhaps the most prominent example of regulations and associated permitting requirements impeding much-needed development. Detailed studies of the perpetually inadequate supply of affordable housing show that, in some cases, even municipalities with relatively ambitious funding for such housing

400. *See supra* notes 77, 184, 275–276 and accompanying text; *see also* Jonathan Arnold & Marisa Beck, *Permitting Reform for Clean Energy Projects in New York and California*, CAN. CLIMATE INST. (Nov. 14, 2023), https://climateinstitute.ca/publications/permitting-reform-for-clean-energy-projects-in-new-york-and-california [https://perma.cc/JD46-NGXN] (discussing best practices in New York and California).

401. *See supra* notes 338–339 and accompanying text (discussing 2024 law).

projects have low quantities of it, or vice versa.[402] These studies identify the many factors that affect whether projects prioritized by local government actually get built. These include, for example, local exactions, zoning approval requirements, "approval delay," "local political pressure,"[403] environmental review, prohibition of specific land use types within the base zoning code, "imposition of fees and costs" on specific development types, and "onerous process."[404]

With respect to prohibitions of specific types of land uses, a key indicator in the housing context examines the total amount of land area within a municipality and the percentage of land zoned for multifamily housing.[405] Another predictor of impediments to affordable housing is the degree to which a local government process is ministerial—following a list of pre-set review factors, such as "by-right" zoning—or discretionary, allowing for subjective, case-by-case review, as in a conditional use permit application.[406] Discretionary review tends to substantially delay or wholly obstruct projects.[407] Removing these types of hurdles in the local approval process for renewable energy—particularly for renewable energy on repurposed lands—would enable more renewable energy development at a faster pace.

---

402. O'NEILL-HUTSON ET AL., *supra* note 343, at 28 (noting that municipalities in California with "affordable housing incentive programs" and "dedicated affordable housing funds" had "other regulatory tools" that impeded the development of affordable housing (citing Rolf Pendall et al., *From Traditional to Reformed: A Review of the Land Use Regulations in the Nation's 50 Largest Metropolitan Areas,* THE BROOKINGS INST. (Aug. 2006), https://www.brookings.edu/wp-content/uploads/2016/06/20060802_Pendall.pdf [https://perma.cc/ZK9L-ZLYW])).

403. *Id.* at 28–30 (citing to the Wharton Residential Land Use Regulatory Index (WRLURI) and discussing the creation of a new index with "more local information," called the Berkeley Land Use Regulation Index (BLURI)).

404. *Id.* at 45.

405. *Id.* at 45–46 ("We use multi-family housing as a proxy for housing that could supply middle-income housing. Conceptually, this proxy depends on a supply-side remedy to housing affordability and filtering; it assumes that an increase in supply will reduce housing prices and make housing more affordable to middle-income households that do not qualify for deed-restricted housing (likely because their income exceeds the thresholds for subsidized housing) but are still priced out of the current market.").

406. *Id.* at 51 (discussing how discretionary review can impose challenges to meet conditions of approval and delay construction).

407. *Id.*

Targeted funding programs, siting and permitting reform efforts, and governmental data support are already influencing repurposed energy. A substantial number of renewable energy projects have been successfully located on brownfields in states that have adopted targeted programs.[408] If the federal government and states adopt more comprehensive repurposed energy programs, they can capitalize on the growing number of developers across the country beginning to target brownfields for new renewable energy development to take advantage of financial incentives in the IIJA and IRA.

As noted earlier in this Part, local governments can also engage in targeted reforms to promote repurposed energy. For instance, local governments can reduce substantive permitting and regulatory requirements for wind and solar projects on brownfields to encourage developers to work with states and other government actors to seek out those sites. Austin, Texas has done something similar in the context of affordable housing on all types of land, as have some states.[409] While EPA has created helpful publications and information regarding state programs to support and expedite repurposed energy projects,[410] a catalogue of existing efforts by local governments would provide valuable information for other cities and stakeholders to adopt such reforms at the local level. Table 2 summarizes the toolkit for supporting repurposed energy—both through governmental

408. *See generally, e.g.*, *Examples of State Policies Supporting Renewable Energy Development on Landfills, Formerly Contaminated Lands, and Mines*, *supra* note 275 (discussing different states' efforts to support repurposed energy development on brownfields sites).

409. *Affordability Unlocked Development Bonus Program*, AUSTINTEXAS.GOV, https://www.austintexas.gov/department/affordability-unlocked-development-bonus-program [https://perma.cc/S6CS-WMAE] ("The 'Affordability Unlocked' Development Bonus Program waives or modifies some development restrictions in exchange for providing low and moderate-income housing."); AUSTIN, TEX., CODE ORD. §§ 25-1-720 to -725 (implementing the Residential Affordable Housing Development Bonus Program). *See generally* Owen Minott et al., *Expanding Affordable Housing Opportunities: Zoning and Land Use Case Studies*, BIPARTISAN POL'Y CTR. (Oct. 3, 2023), https://bipartisanpolicy.org/blog/expanding-affordable-housing-opportunities-zoning-and-land-use-case-studies [https://perma.cc/LCL5-3M5Z] (providing examples of effective low-income housing reforms).

410. *See generally, e.g.*, *Profiles of State Programs for Renewable Energy Development on Landfills, Mines, and Formerly Contaminated Sites*, *supra* note 330 (surveying different state efforts to support renewable energy development on repurposed sites).

reforms and broader "people-based" approaches—that we propose in this Article.

Table 2. Recommendations for a Repurposed Energy Regime

Regulatory/ permitting	See Table 1 (streamlined and expedited permitting, offsets, information support; preemption if needed)
More ambitious permitting/ regulatory reform	• States: establish separate clean energy permitting divisions within state brownfields offices • FERC: Require priority for repurposed energy projects in regional interconnection queues • Congress: Exempt renewable energy development on brownfields from CERCLA liability
Communication	• Track and publicize repurposed energy success stories through community-driven communications plans • Create clean energy funding and outreach programs to inform communities of the specific monetized benefits that will flow from projects and over what time period • Hire and support community clean energy coordinators
Benefits to communities	Require community benefit agreements or ensure that tax or other benefits from renewable energy flow to host communities and directly to residents through energy bill credits or other payments

CONCLUSION

It is time to shift the focus of the policy literature on clean energy development away from doom and gloom scenarios, and toward practically and politically feasible solutions that enable and accelerate the energy transition. Repurposed energy is one of these core solutions. It addresses the objections to renewable energy that are growing in both progressive and conservative communities, supports valuable economic development in the communities most in need of job opportunities and a new tax base, and avoids the disruption of greenfields such as farmland and wildlife habitat.

Federal, state, and local efforts toward rapid development of renewable energy should focus funding, streamlined and more uniform permitting, and informational support on repurposed energy sites. States without existing statewide siting processes should consider preempting local control over the siting of renewable energy on repurposed sites as a pilot approach. Indeed, the justifications for easing development on repurposed sites through permitting reforms or preemption are strong. Repurposed energy has fewer environmental impacts, tends to benefit rather than disrupt communities, and reduces the very types of impacts that many local governments have addressed through restrictions on renewable energy development.

The future of renewable energy development in the United States is a decidedly optimistic one, particularly when viewed through the lens of beneficial reuse of underutilized land and infrastructure, economic revitalization, and community benefits. Repurposed energy can help make that future a reality.

***