ACCELERATING ENERGY TRANSITION IN INDIA: A COMPARATIVE PERSPECTIVE

by Uma Outka

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> [C]hange in the Earth's climate and its adverse effects are a common concern of humankind.[1]

This statement, drawn from the preamble to the United Nations Framework Convention on Climate Change (UNFCCC), encapsulates the most basic premise for international cooperation to mitigate climate change and adapt to impacts of rising temperatures and seas. The UNFCCC, a treaty signed more than one-quarter century ago by nearly every nation on earth, recognized the need to "adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs."[2]

Two decades passed, with more negotiation than progress, as global greenhouse gas (GHG) emissions continued to rise.[3] The year 2015 marked a new era in UNFCCC climate efforts, however, when the nations of the world signed a new implementing agreement in Paris, France.[4] Under the Paris Agreement, Parties committed to make "nationally determined contributions to the global response to climate change"[5] toward a specific consensus end: "Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change."[6]

Parties agreed to submit nationally determined contributions (NDCs) to the United Nations, detailing how domestic law and policy would reduce emissions within national borders, understanding that successive filings would intensify in ambition, and reflecting that each nation has "common but differentiated responsibilities and respective capabilities, in the light of different national circumstances."[7] These caveats express the critical recognition that Parties to the treaty come to the challenge of climate mitigation under widely varying environmental, economic, and social circumstances.

In this respect, India stands out with an especially ambitious NDC—a plan that aims for more than any other major emitter that has submitted a plan to date. This Comment focuses on India's NDC as it pertains to energy systems, and in particular, transitioning the electricity sector to a modern, low-carbon grid. It first provides an overview of India's renewable energy goals in comparative context with other top emitters. Comparative energy policy analysis provides insight into reform models that may have broader applicability, and although regulatory regimes governing electricity vary from one country to the next, there are often substantial commonalities that comparative work can highlight.

With this in mind, the Comment addresses two examples of policy innovation in India that build on trends in renewable energy law worldwide: (1) aligning corporate demand for clean power with renewable energy targets, and (2) minimizing renewables' intermittency and land use impacts through hybrid renewables policy. The first corresponds with the trend of an increasing number of multinational companies pledging to power their operations using renewable energy.[8] It also reflects a shift in the elec-

1. United Nations Framework Convention on Climate Change, May 9, 1992, pmbl., S. Treaty Doc. No. 102-38, 1771 U.N.T.S. 107 [hereinafter UNFCCC]. *See* UNFCCC, *Status of Ratification of the Convention*, http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php (last visited Apr. 24, 2020) (listing dates of signature and receipt of instruments of ratification by the Secretary-General of the United Nations).
2. UNFCCC, *supra* note 1, art. 4.2(a).
3. For readers interested in a brief overview of the history of international climate negotiations since the UNFCCC was signed in 1992, see UNFCCC, *UNFCCC—25 Years of Effort and Achievement: Key Milestones in the Evolution of International Climate Policy*, http://unfccc.int/timeline/ (last visited Apr. 24, 2020). For more in-depth accounts of the development of international climate change law, the following two recent publications will be helpful: Daniel Bodansky et al., International Climate Change Law (2017); Daniel A. Farber & Cinnamon P. Carlarne, Climate Change Law: Concepts and Insights (2017).
4. Paris Agreement to the UNFCCC, Dec. 12, 2015, T.I.A.S. No. 16-1104, https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf.
5. *Id*. art. 3.
6. *Id*. art. 2(1)(a).
7. *Id*. art. 2(2).
8. *See* Scott Fulton et al., *Renewable Energy: Corporate Obstacles and Opportunities*, 50 ELR 10181 (Mar. 2020).

tricity sector toward a more prominent role for consumers. Although most of this demand has been focused on the United States and Europe to date, it is now expanding into India as well. This trend has potential to help advance with India's renewable energy goals if regulatory barriers can be eliminated to facilitate companies' access to renewable projects.

The second, India's new National Wind-Solar Hybrid Policy, represents a future-facing innovation to balance the variability of one renewable resource with another. In crafting and refining this policy, India is charting a pathway that, if it continues, other countries would do well to follow in the coming years.

I. India's Plan for Climate Change Mitigation

India needs the world's most urgent collective response to climate change. As the Indian government acknowledges in its NDC, "[f]ew countries in the world are as vulnerable to the effects of climate change as India."[9] Nearly 85% of India is highly vulnerable to climate hazards, such as flooding and extreme weather, which can be especially devastating for the close to two-thirds of Indians who support themselves in agriculture.[10] As the population continues to increase—India is expected to surpass China as the most populous country in the world as soon as 2022—climate impacts will be amplified by the vast number of people whose lives will be affected.[11]

India's plan for climate mitigation under the Paris Agreement stands out for its ambition against the backdrop of weaker commitments from other top emitters. The Climate Action Tracker, maintained by a consortium of scientists evaluating the efficacy of the NDCs countries submit to the United Nations, rates India's plan as the only NDC among the top 10 emitters to be "compatible" with the Paris Agreement's 2°C target.[12] The European Union, Brazil, and Mexico are rated "insufficient," China, Canada, Indonesia, and Japan are rated "highly insufficient," and the United States (following President Donald Trump's announcement of intent to withdraw from the Paris Agreement in 2017) and Russia are rated "critically insufficient."[13]

India's ambition is especially noteworthy, given that it is the country with the greatest number of people lacking electricity service of any in the G20—more than 239 million people, or 18% of the population.[14] Although India is a top-10 emitter when measured in total emissions, it is important to recognize that the top three emitters—China, the United States, and the European Union—account for nearly one-half of all global emissions.[15] Together with India, Mexico, Brazil, Canada, Indonesia, Japan, and Russia, the top 10 collectively are responsible for nearly three-quarters of GHG emissions worldwide.[16] Refocusing on per capita emissions, however, shows India's contribution to be much lower than the rest of the top 10, and indeed, well below the world average.[17]

Yet, even with its ambitious plans for renewable energy development, India's GHG emissions are expected to rise significantly—even double—by 2030, as the economy and population continue to grow.[18] The Indian government has estimated that "more than half of India of 2030 is yet to be built."[19] India's contribution is therefore vitally important to global climate change mitigation, even as it approaches that goal alongside a range of sustainable development objectives critical for the well-being of its more than one billion citizens—poverty alleviation, expanding energy access, and ensuring all have clean water.[20]

India's NDC covers a wide range of areas relevant to emissions reduction—from energy systems and transport to agriculture—as well as preservation of carbon sinks, such as through forest preservation and afforestation.[21] The most critical element related to energy systems, the focus of this Comment, is India's ambition to rapidly accelerate renewable energy development to 175 gigawatts (gW) by 2022, excluding large hydropower—a dramatic increase from 36 gW at the time of the NDC submission.[22] With sig-

9. India's Intended Nationally Determined Contribution: Working Towards Climate Justice 4 (2016) [hereafter India NDC], https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf.
10. *Id*. at 4, 24.
11. *See* Our World in Data, *Historic and Projected Population, 1950 to 2100*, https://ourworldindata.org/grapher/historic-and-projected-population?time=1950.2100 (last visited Apr. 24, 2020) (India and China graphic). *See also UN Projects World Population to Reach 8.5 Billion by 2030, Driven by Growth in Developing Countries*, United Nations, July 29, 2015, https://news.un.org/en/story/2015/07/505352-un-projects-world-population-reach-85-billion-2030-driven-growth-developing.
12. *See* Climate Action Tracker, *Home Page*, https://climateactiontracker.org (last visited Apr. 24, 2020). For a discussion of the rating system, see Climate Action Tracker, *Rating System*, https://climateactiontracker.org/countries/rating-system/ (last visited Apr. 24, 2020).
13. *See* Climate Action Tracker, *Home Page, supra* note 12. For more on the top emitters, see Johannes Friedrich et al., *This Interactive Chart Explains World's Top 10 Emitters, and How They've Changed*, World Resources Inst., Apr. 11, 2017, http://www.wri.org/blog/2017/04/interactive-chart-explains-worlds-top-10-emitters-and-how-theyve-changed (graphic).
14. *See* Xander van Tilburg et al., Ambition to Action, NDC Update Report Special Edition: Linking NDCs and SDGs 19 (2018), *available at* http://ambitiontoaction.net/wp-content/uploads/2018/05/NDC-Upadate-Report-May-2018.pdf; REN21, Renewables 2018 Global Status Report 127 (2018), *available at* https://www.ren21.net/wp-content/uploads/2019/05/GSR2018_Full-Report_English.pdf. These numbers represent a significant achievement, bringing access to 82% from only 43% of the population in 2000. International Energy Agency, Global Energy & CO_2 Status Report 2017, 11 (2018), *available at* https://webstore.iea.org/global-energy-co2-status-report-2017.
15. *See* Mengpin Ge & Johannes Friedrich, *4 Charts Explain Greenhouse Gas Emissions by Countries and Sectors*, World Resources Inst. (Feb. 6, 2020), https://www.wri.org/blog/2020/02/greenhouse-gas-emissions-by-country-sector (based on 2016 data).
16. *See id*.
17. International Energy Agency, *supra* note 14, at 4.
18. Navroz K. Dubash & Ankit Bhardwaj, *Guest Post: India's Emissions Will Double at Most by 2030*, Carbon Brief, Aug. 22, 2018, https://www.carbonbrief.org/guest-post-indias-emissions-will-double-at-most-by-2030 (citing Navroz K. Dubash et al., *India's Energy and Emissions Future: An Interpretive Analysis of Model Scenarios*, 13 Envtl. Res. Letters (2018)).
19. India NDC, *supra* note 9, at 6.
20. *See id*. at 4. For information on the United Nations Sustainable Development Goals (SDGs), see https://sustainabledevelopment.un.org/?menu=1300 (last visited Apr. 24, 2020). For a recent report assessing synergies and potential conflicts between climate mitigation efforts under the Paris Agreement and the SDGs, see generally van Tilburg et al., *supra* note 14.
21. *See generally* India NDC, *supra* note 9.
22. *Id*. at 9. There is already 45 gW of large hydropower in India, but the government's focus for new hydropower is on expanding small systems at the village scale. *Id*. at 9-10.

nificant energy development over the past two years, India ended 2017 ranked among the top five countries for total renewable power capacity, as well as for new investment in renewable power and fuels.[23] India is expected to continue its upward trajectory in electricity demand, with ongoing efforts to expand energy access in rural areas.[24]

Most utility-scale renewable energy development in India is focused on solar and wind power, with roughly 18 gW and 33 gW of capacity respectively at the end of 2017—a record year for wind in India.[25] The year 2017 also saw a record 8 gW of solar photovoltaic (PV) capacity brought online, which doubled 2016 additions.[26] India leads in building mega-solar farms, with the first phase of a 2,000-megawatt (MW) plant—the world's largest to date—dedicated in 2018 in Karnataka.[27] This growth has continued at a rapid rate—by July 2019, India recorded 80 gW of renewable energy, or 22.4% of total installed power capacity.[28]

As renewable energy now exceeds 26% of global electricity generation, energy law and policy is in a dynamic state of flux and innovation, in India as well as in other countries around the world where renewable energy development is taking place.[29] As new policy is formulated, it often becomes clear that preexisting laws—crafted decades previously, in many instances, in support of a heavily centralized, fossil energy-based electric grid—need reform. The degree to which countries can learn from others' experiences depends on the energy resources of each, as well as the capacity for regulatory structures and governance institutions to adapt and advance, rather than hinder, the emergence of a modern, low-carbon grid.

To demonstrate this, what follows offers just two examples of current global trends in the electricity sector, the first in which India is building on other countries' experience, the second in which India is leading policy innovation in a direction other countries may well adapt to their own regulatory contexts.

II. Harnessing Corporate Demand for Renewable Energy

Name-brand multinational companies like Google, Apple, and Facebook are increasingly garnering media attention for making "100 percent renewable" pledges—setting a goal to match their operations' energy consumption with renewable energy generation.[30] In the United States, this corporate demand for clean power is playing a key role in driving continued renewable energy development, despite President Trump's withdrawal from the Paris Agreement and reemphasis on fossil fuels.[31] To give voice to these companies, the RE100 initiative was launched in 2014 to collect and publicize the "100 percent renewable" pledges.[32] As of this writing, there were more than 220 multinational companies pledged through RE100.[33]

Most companies that have joined the RE100 ranks are based in the United States and Europe,[34] and most corporate renewable deals to date have been located there. This demand is expanding now into India and China, however.[35] As of December 2019, five Indian companies and four Chinese companies had become members, with interest among other Indian companies reportedly growing.[36] Companies in the Asia Pacific region, including India, accounted for 40% of new RE100 members, underscoring the region's growth potential.[37] Many multinational companies based elsewhere have a business interest in India that will result in their seeking access to clean power there. For example, Microsoft announced this year that it signed an agreement to purchase solar power from Atria Power for a new office building it has constructed in Bangalore.[38] Similarly, the clothing retailer H&M is working with its

23. The countries with the highest total renewable power capacity at the end of 2017, including hydro, were the United States, Brazil, China, Germany, and India. The top five countries excluding hydro were China, the United States, Germany, India, and Japan. The top countries for investment in renewable power and fuels not including hydro over 50 megawatts were China, the United States, Japan, India, and Germany. *See* REN21, *supra* note 14, at 25.
24. International Energy Agency, *supra* note 14, at 11. IEA, *Global Electricity Demand by Region in the Stated Policies Scenario, 2000-2040*, IEA, Nov. 21, 2019, https://www.iea.org/data-and-statistics/charts/global-electricity-demand-by-region-in-the-stated-policies-scenario-2000-2040. *See also* Bruce Murphy & Hannah Daly, *Electricity in Every Village in India*, Int'l Energy Agency, June 1, 2018, https://www.iea.org/newsroom/news/2018/june/commentary-electricity-in-every-village-in-india.html (on Indian government's announcement that as of April 28, 2018, electricity reached every village in India for the first time, with a next goal being universal household electricity access).
25. REN21, *supra* note 14, at 179.
26. International Energy Agency, *supra* note 14, at 9.
27. Tom Kenning, *1st Phase of World's Largest Solar Park to Be Inaugurated Today in Karnataka, India*, PVTech, Mar. 1, 2018, https://www.pv-tech.org/news/worlds-largest-solar-park-to-be-inaugurated-today-in-karnataka-india.
28. Mridul Chadha, *India: Renewable Energy Dominates 1st Half of 2019 With 58% Share in New Capacity*, CleanTechnica, July 22, 2019, https://cleantechnica.com/2019/07/22/indias-renewable-energy-dominates-1st-half-of-2019-with-58-share-in-new-capacity/ (citing government of India data). Large hydroelectric and nuclear power facilities constitute an additional 14% of low-carbon installed capacity. *Id.*
29. *See* International Renewable Energy Agency, Global Energy Transition: A Roadmap to 2050, at 10 (2018), *available at* https://irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_Report_GET_2018.pdf; REN21, Renewables 2019: Global Status Report, *available at* http://www.ren21.net/gsr-2019/ (last visited Apr. 24, 2020).
30. *See*, *e.g.*, Google, Achieving Our 100% Renewable Energy Purchasing Goal and Going Beyond 1 (2016), https://static.googleusercontent.com/media/www.google.com/en//green/pdf/achieving-100-renewable-energy-purchasing-goal.pdf; Press Release, Apple, Apple Now Globally Powered by 100 Percent Renewable Energy (Apr. 9, 2018), https://www.apple.com/newsroom/2018/04/apple-now-globally-powered-by-100-percent-renewable-energy/; Joshua S. Hill, *Facebook Commits to 100% Renewable Energy & 75% GHG Emissions Reduction by 2020*, CleanTechnica, Aug. 30, 2018, https://cleantechnica.com/2018/08/30/facebook-commits-to-100-renewable-energy-75-ghg-emissions-reduction-by-2020/.
31. Readers interested in this trend should note that the author's recent work includes an in-depth analysis of this trend in the United States and energy law developments at the state level. *See* Uma Outka, *"100 Percent Renewable": Company Pledges and State Energy Law*, 2019 Utah L. Rev. 661 (2019).
32. *See generally* RE100, *Home Page*, http://re100.org (last visited Apr. 24, 2020).
33. *Id.*
34. RE100, Approaching a Tipping Point: How Corporate Users Are Redefining Global Electricity Markets 8-9 (2018), *available at* https://www.theclimategroup.org/sites/default/files/re100_annual_report.pdf.
35. REN21, *supra* note 14, at 177.
36. RE100, Progress and Insights Annual Report annex 1 (2019), *available at* http://media.virbcdn.com/files/5c/aa8193f038934840-Dec2019RE100ProgressandInsightsAnnualReport.pdf.
37. *Id.* at 3.
38. *Microsoft Announces First Renewable Energy Deal in India*, Microsoft, Mar. 5, 2018, https://news.microsoft.com/2018/03/05/microsoft-announces-first-renewable-energy-deal-in-india/.

supply chain firms in Bangladesh, China, and India to shift to renewables.[39]

In light of India's ambitious goals for renewable energy growth, it is positioned to meet demand from companies that wish to contribute to new renewable development, consistent with the principle of additionality. "Additionality" is defined in this context as "access to new projects that reduce emissions beyond business as usual" by the Renewable Energy Buyers Alliance, which includes it among the Corporate Renewable Energy Buyers' Principles it developed to guide policy development designed to meet corporate demand.[40]

Many companies now eschew or avoid the use of unbundled renewable energy credits (RECs)—that is, those sold separately from the underlying electricity generated by renewable energy—and instead favor buying clean power bundled with its associated RECs. Although unbundled RECs have been used worldwide as a way to offset energy use, they are often associated with facilities that have already been built. For this reason, companies are questioning their value for advancing a low-carbon shift in the electricity sector, and seeking instead to help new renewable energy facilities to be built.[41]

India may have an advantage in this regard due to its projected increase in demand for electricity and corresponding need for new large-scale installations. In the United States, by contrast, where residential and commercial electricity demand is expected to remain relatively flat, corporate demand for new renewable energy facilities can present a quandary for utilities, which may struggle to respond to companies' requests without producing surplus electricity, potentially leading to curtailments, or retiring coal-fired power plants.[42] Moreover, the Indian Companies Act 2013 requires larger companies to devote resources each year to corporate social responsibility (CSR) activities, which include enhancements for environmental sustainability. The NDC estimates "that a fair share of the available CSR funding of about 220 billion Indian Rupee (USD 3.5 billion) annually will be invested in environment initiatives."[43]

Falling prices for renewable energy, however, means that, increasingly, the switch to wind or solar is economically beneficial above all. Google, for example, cites a desire to insulate its business from "fuel-price volatility" using long-term renewable energy contracts.[44] In India, RE100 members including Tesla Motors and Infosys regard the "business case for switching" as "strong in India" due to falling costs of renewables and evolving technology.[45]

The World Resources Institute, through the Green Power Market Development Group (GPMDG), has been convening stakeholders and advocating for better alignment of national and state-level energy policy in India with companies' interest in renewable energy so that each is mutually reinforcing.[46] Corporate deals have been accomplished in India, but companies that have explored such contracts have encountered delays and regulatory barriers that, if addressed, would support this alignment and streamline such projects. The GPMDG, for example, is working on ways to aggregate large consumer demand so that it can be directed in support of a utility-scale renewable energy facility.[47]

A 2018 report by the World Business Council for Sustainable Development collected recommendations based on companies' experiences to date to guide reforms to provide predictability and more effective facilitation of corporate procurement objectives.[48] Regulatory variability state-to-state is a primary barrier that, if minimized, could accelerate corporate procurement of new renewable projects in India. Clear policy and regulatory support for such transactions will ease the paths for more corporate investment in the rapid renewable energy deployment plan outlined in India's NDC.[49]

III. Policy Innovation for Hybrid Renewable Energy

Although wind and solar resources are commonly grouped together in renewable energy law and policy, the wind and solar industries have developed along related but separate trajectories. As a result, most renewable energy facilities are based on one type of renewable energy—it may be a wind farm, it may be a solar PV park, but typically projects have not featured both.

A recent policy innovation by India's Ministry of New and Renewable Energy (MNRE) seeks to bridge this divide to the advantage of both renewable resources. In May 2018, the MNRE finalized the National Wind-

39. RE100, *supra* note 34, at 40.
40. *See* Renewable Energy Buyers Alliance (REBA), *Corporate Renewable Energy Buyers' Principles*, https://buyersprinciples.org/principles/ (last visited Apr. 24, 2020). Note that additionality is a concept with deep roots in the UNFCCC implementation, especially in regard to the development of criteria for projects under the Clean Development Mechanism. For more on this, see, e.g., Charlotte Streck, *Ensuring New Finance and Real Emission Reduction: A Critical Review of the Additionality Concept*, 2011 Carbon & Climate L. Rev. 158 (2011).
41. *See* REBA, *supra* note 40.
42. U.S. Energy Information Administration, Annual Energy Outlook 2019, 12 (2019), https://www.eia.gov/outlooks/aeo/pdf/aeo2019.pdf.
43. India NDC, *supra* note 9, at 18. For an overview of CSR requirements applicable to Indian companies, see PricewaterhouseCoopers, Handbook on Corporate Social Responsibility in India (2013), *available at* https://www.pwc.in/assets/pdfs/publications/2013/handbook-on-corporate-social-responsibility-in-india.pdf. For text of the statute, see the Companies Act 2013 (India 2013), http://www.mca.gov.in/Ministry/pdf/CompaniesAct2013.pdf.
44. Google, *supra* note 30, at 4.
45. RE100, *supra* note 34, at 36.
46. *See* World Resources Institute, *Green Power Market Development Group*, https://www.wri.org/our-work/project/electricity-initiative/scaling-indias-clean-energy-green-power-market-development (last visited Apr. 24, 2020) (concept for scaling up renewable energy in India).
47. *See generally* Alex Perera et al., *5 Reasons India Needs a Green Power Purchasing Group*, Green Power Market Dev. Group, Jan. 9, 2013, https://gpmdg.org/blog/5-reasons-india-needs-a-green-power-purchasing-group/.
48. World Business Council for Sustainable Development, Accelerating Corporate Procurement of Renewable Energy in India 30-31 (2018), *available at* https://www.wbcsd.org/Programs/Energy-Circular-Economy/Climate-Energy/REscale/News/helping-companies-accelerate-renewable-energy-procurement-in-India.
49. *See* RE100, *supra* note 34, at 22 (quoting Rakesh Bohra, a manager for Infosys in green initiatives, recommending that "a specific policy around corporate sourcing of renewables needs to be developed to persuade more corporates to invest").

Solar Hybrid Policy, presenting a model that few if any other national governments have developed.[50] The Hybrid Policy is based on a compelling premise: solar and wind resources are complementary to each other, and "superimposition of wind and solar resource maps shows that there are large areas where both wind and solar have high to moderate potential." The MNRE recognized that "hybridization" of wind and solar technologies offers two important benefits: (1) it can help in "minimizing the variability" of the intermittent renewable resources, thereby supporting grid stability; and (2) it will allow for more efficient use of existing transmission infrastructure as well as land, which is difficult to acquire for large projects without compromising other prime land uses.[51] The goal of the policy is to encourage new wind-solar hybrid plants as well as "hybridization of existing wind and solar plants."[52] A facility qualifies as a wind-solar "hybrid plant" if at least 25% of the power capacity comes from the other resource.[53]

The Hybrid Policy was amended in August 2018 to more clearly recognize the benefit of also incorporating energy storage capacity and clarify affirmatively that energy storage is encouraged under the policy.[54] In so doing, the MNRE is aligning the policy with the global growth trajectory for energy storage, which is expected to double six times by 2030 worldwide.[55] Projections show 70% of energy storage capacity will be installed in eight countries: the United States, China, Japan, India, Germany, the United Kingdom, Australia, and South Korea.[56]

The Hybrid Policy does the initial work of situating wind-solar hybrid projects within existing regulatory frameworks, with guidance for development approaches. Although it is still too early to assess its efficacy, the Hybrid Policy is especially innovative from a land use perspective. Utility-scale renewable energy projects are difficult to site due to local environmental impacts and harmful effects that can be highly disruptive to local communities. This can occur if wetlands are filled, if forests are cleared, if agricultural lands are lost for the construction of a facility, or if local people are displaced to make space for the project.[57]

The Hybrid Policy promotes maximizing use of land that is already devoted to wind and solar, and sends a message to developers that the same is expected of future projects. More efficient use of land for renewable energy generation may reduce the number of new facilities needed. The Hybrid Policy, or a companion, could go further still to innovate energy policy if it were to directly address a priority of land types that should be avoided for new projects, such as productive agricultural lands and forests, and lands that should be considered first. Conflicts over land use are inevitable, which underscores the need for strong protections for local communities, public participation, and policy guidance to assist with site selections and conflict resolution.

Though the United States is much less densely populated and has expansive land area, conflicts between local communities and energy projects nonetheless regularly occur.[58] Siting power plants is a state and local concern in the United States, and the sensitivity and sophistication of siting policies ranges widely in the degree to which they guide site selection and community outreach. At the federal level, the U.S. Environmental Protection Agency established a program known as RE-Powering America's Land, focused on siting renewable energy facilities on landfills, mine sites, and other contaminated land parcels that have limited value for other uses.[59] As of late 2019, the program has identified 352 renewable energy installations on 329 such sites "with a cumulative installed capacity of 1,710.2 megawatts," mostly solar installations on former landfills.[60] If it were mandatory to prioritize these lands, then numbers would undoubtedly be larger still.

In India, with its dense population and high agricultural production, scaling up renewable energy to 175 gW will inevitably involve siting conflicts. Prioritizing land

50. Government of India, MNRE, National Wind-Solar Hybrid Policy, No. 238/78/2017-Wind (2018) [hereinafter India-MNRE, Hybrid Policy], https://mnre.gov.in/img/documents/uploads/2775b59919174bb7aeb00bb1d5cd269c.pdf. *See also* Herman K. Trabish, *Utilities Take Note: Hybrid Renewable Projects Are Coming*, Util. Dive, Apr. 3, 2018, https://www.utilitydive.com/news/utilities-take-note-hybrid-renewables-projects-are-coming/520319/. Very recently, in the U.S. state of California, the state public utilities commission directed utilities and community choice aggregators in the state to procure clean energy capacity including from hybrid solar and storage systems. Iulia Gheorghiu, *California Proposes Extending 4.8 GW Gas Capacity as Bridge to 3.3 GW of New Clean Energy by 2023*, Util. Dive, Nov. 11, 2019, https://www.utilitydive.com/news/california-proposes-extending-48-gw-gas-capacity-as-bridge-to-33-gw-of-ne/567035/.
51. India-MNRE, Hybrid Policy, *supra* note 50, paras. 1.2-1.3.
52. *Id.* paras. 1.5, 2.1.
53. *Id.* para. 4.3.
54. Government of India, MNRE, Amendment in National Wind-Solar Hybrid Policy, No. 238/78/2017-Wind (2018), https://mnre.gov.in/img/documents/uploads/41e72559eb1140d18ad1a082ec050426.pdf.
55. Michelle Froese, *Global Storage Market to Double Six Times by 2030, Says BNEF*, Windpower Engineering & Dev., Nov. 20, 2017, https://www.windpowerengineering.com/global-storage-market-double-six-times-2030-says-bnef/ (citing Bloomberg New Energy Finance, Energy Storage Forecast 2017-2030 (2017), available by subscription).
56. *Id.*
57. *See*, *e.g.*, Radhika Shah & Phil Bloomer, *Respecting the Rights of Indigenous Peoples as Renewable Energy Grows*, Stan. Soc. Innovation Rev., Apr. 23, 2018, https://ssir.org/articles/entry/respecting_the_rights_of_indigenous_peoples_as_renewable_energy_grows (offering recommendations for renewable energy developers and investors to promote projects consistent with "robust human rights due diligence"); Shilpi Kapur Bakshi, *Renewable Energy, a Land Guzzler*, Hindu BusinessLine, Mar. 9, 2018 (on land scarcity and calling for "identification of wasteland for projects while mapping the renewable energy potential over different regions"). *See also* Kanchi Kohli et al., Centre for Policy Research-Namati Environmental Justice Program, Midcourse Manoeuvres: Community Strategies and Remedies for Natural Resource Conflicts in India (2018), *available at* https://www.business-humanrights.org/sites/default/files/documents/India.pdf (addressing land use conflicts including but not limited to energy infrastructure siting).
58. Interested readers may see my prior work on this: Uma Outka, *Environmental Justice in the Renewable Energy Transition*, 19 J. Envtl. & Sustainability L. 60 (2012); Uma Outka, *The Renewable Energy Footprint*, 30 Stan. Envtl. L.J. 241 (2011).
59. U.S. Environmental Protection Agency, *RE-Powering America's Land*, https://www.epa.gov/re-powering (last updated Apr. 20, 2020) (providing guidance for developers and local governments in determining feasibility of land reuse for renewable energy projects).
60. U.S. Environmental Protection Agency, RE-Powering America's Land Initiative: Tracking Completed Projects on Contaminated Lands, Landfills, and Mine Sites (2019), *available at* https://www.epa.gov/sites/production/files/2019-10/documents/re_tracking_matrix_final_508_100219.pdf.

may be complicated by the particular historical development of land rights in India. For example, the classification of "wastelands," which would seem to most closely compare with the lands identified in the RE-Powering Initiative, is contested due to the common use rights that apply on those lands. A recent report of the Centre for Policy Research (CPR)-Namati Environmental Justice Program in New Delhi explains that these land areas often have value to local communities that are not recognized by governmental agencies.[61] Although there is presently no official system for tracking land use change for energy infrastructure, the CPR-Namati Environmental Justice Program studied environmental clearances for major infrastructure projects across India and identified three broad categories of impacts in India from rural landscape transformation for infrastructure and industry: (1) displacement of individuals or communities, with meager or no compensation; (2) dispossession or loss of access to lands essential to local livelihoods; and (3) increased pollution or other environmental degradation that affects local people's economic, health, and social well-being.[62]

Indian law now requires a social impact assessment to weigh local impacts against a project's benefits under the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act 2013, and although a full discussion of land use conflicts is beyond the scope of this Comment, integrating land use issues at the earliest stages of a renewable energy project's site selection and approval process is key to meaningful consideration of local impacts.[63] The Hybrid Policy, with its partial focus on land efficiency, may be a vehicle for developing reinforcing land use protections, building on the general provisions of law in ways particular to the renewable energy industry, and consistent with respect for local communities and the local environment.

IV. Conclusion

It has now been over four years since the signing of the historic Paris Agreement. According to the International Renewable Energy Agency, the current pace of development "needs to be scaled up at least six times faster for the world to start to meet the goals set out in the Paris Agreement."[64]

While other major emitters continue to lag in climate ambition, most notably the United States at the federal level, India remains officially committed to its energy transition plans.[65] India's National Electricity Plan, finalized in April 2018, reinforces the commitments set forth in the NDC and, according to the Climate Action Tracker, could lead India to achieve its goals sooner than expected if duly carried out.[66] Indeed, although the NDC is currently rated "2°C compatible," they project "India could become a global climate leader with '1.5°C compatible' rating if it continues to abandon plans to build new coal-fired power plants."[67]

Whether India will take such a leadership step in the coming years remains unknown, of course, and in light of the recent COVID-19 crisis, the energy industry globally is in turmoil, like much of the rest of the global economy. In India, COVID-19 has already resulted in disruptions affecting the pace of solar energy development.[68] Still, according to International Energy Agency (IEA) reporting in April 2020, while coal and oil were experiencing significant drops in demand, "[r]enewables were the only source that posted a growth in demand, driven by larger installed capacity and priority dispatch."[69] Following India's nationwide lockdown in response to COVID-19, the IEA tracks a sharp drop in coal-fired generation, "bringing the shares of renewables and coal" in India's electricity generation "as close as they have ever been."[70]

In closing, although this Comment has focused on utility-scale renewables and examples pertaining to their role in the energy system transition, it is important to note there are at least two other critical transition elements relevant to the electric grid—distributed generation and energy efficiency. Progress is needed, and is underway, to advance distributed generation of renewable energy as a complementary technology for reorienting the electricity sector from overreliance on centralized large-scale power plants. India has emphasized distributed renewable energy, such as rooftop or small-scale solar, for its potential to expand energy access in rural

61. *See* Kohli et al., *supra* note 57, at 9-13 (discussing the history of this land category in India's legal system for land governance).
62. *See id*. at 21-37 (noting authors' attempts "to access government records that would indicate the extent of recorded land use change across various development sectors such as infrastructure, energy, irrigation and transport," but that "no such records were available" and presenting results of the organization's own review of environmental clearances); *id*. at 38-44 (detailing the impacts on local communities).
63. *Id*. at 16, 38 (discussing the Act). For more on conflicts arising out of land use change in India, including reference to other recent studies of the issue, see *id*. at 45-51. The world's largest hybrid renewables project was in development in Andhra Pradesh, with international headlines featuring the planned 160-MW facility to comprise 120 MW solar and 40 MW wind capacity. *See* Smiti, *India Plan's World's Largest Solar-Wind Hybrid Power Project*, CleanTechnica, Dec. 14, 2017, https://cleantechnica.com/2017/12/14/india-plans-worlds-largest-solar-wind-hybrid-power-project/. A state-level policy reversal threatens these advances, however. *See* Shaurya Bajaj, *Andhra Pradesh Amends Its Solar, Wind, and Hybrid Policy—Pulls Back Incentives*, MercomIndia, Nov. 20, 2019, https://mercomindia.com/andhra-pradesh-solar-wind-hybrid-policy/.
64. International Renewable Energy Agency, *supra* note 29, at 8.
65. Although the U.S. federal government has withdrawn from the Paris Agreement, many states and cities have declared "we're still in" and continue to advance low-carbon energy policies within their jurisdictions. For example, of the 50 states, 29 states have renewable energy mandates, and eight have set renewable energy goals. Standout states with a 100% mandate include Hawaii, California, Maine, Washington, Nevada, and New Mexico, and the number of high-ambition states within the United States continues to grow. *See* NC Clean Energy Technology Center Database of State Incentives for Renewables and Efficiency, Renewable & Clean Energy Standards (2019), https://s3.amazonaws.com/ncsolarcen-prod/wp-content/uploads/2019/07/RPS-CES-June2019.pdf.
66. Climate Action Tracker, *India*, https://climateactiontracker.org/countries/india/ (last visited Apr. 24, 2020).
67. *Id.*
68. *See, e.g.*, GlobalData Energy, *3GW of Renewable Energy Installations in India Expected to be Impacted by Covid-19*, Power Tech. (Apr. 1, 2020), https://www.power-technology.com/comment/renewable-energy-installations-india-covid-19/.
69. IEA, Global Energy Review 2020, 3 (2020), https://www.iea.org/reports/global-energy-review-2020#.
70. *Id.* at 26.

areas, but there are also opportunities for significant expansion among industrial consumers.[71] Strong policies for expanding distributed generation serve the same land use efficiency goals as the Hybrid Policy: to encourage land use that is already developed to be optimally used for electricity generation.

Likewise, law and policy for energy efficiency has special potential in India, due to the dramatic increased urbanization that is expected in the coming decades, which will allow modern efficiency codes to be applied in new construction. The IEA projects India could avoid "almost half" of its annual electric power generation by raising its ambition for energy efficiency.[72] Efficiency is also well aligned with the land use goal of the Hybrid Policy, as effective energy-efficiency policy can reduce the need for new generation. Work in both these areas complement large-scale renewable energy development in all nations' transition to a modern, low-carbon electric grid.

71. For more on distributed generation and micro-grid energy systems potential in India, see, e.g., Bloomberg New Energy Finance, Accelerating India's Clean Energy Transition: The Future of Rooftop PV and Other Distributed Energy Markets in India (2017), *available at* https://data.bloomberglp.com/bnef/sites/14/2017/11/BNEF_Accelerating-Indias-Clean-Energy-Transition_Nov-2017.pdf; World Resources Institute, Impacts of Small-Scale Electricity Systems: A Study of Rural Communities in India and Nepal (2016), *available at* https://wriorg.s3.amazonaws.com/s3fs-public/Impacts_of_Small-Scale_Electricity_Systems.pdf. *See also* Ashok Thanikonda, *Special Economic Zones: An Opportunity to Double India's Onsite Solar Capacity*, World Resources Inst. India, Aug. 14, 2018, https://wri-india.org/blog/special-economic-zones-opportunity-double-india's-onsite-solar-capacity (detailing how "industrial agglomerations" could drive rapid distributed generation growth).

72. IEA, India 2020 Energy Policy Review 16 (2020), *available at* https://www.iea.org/reports/india-2020.