

COVID-19's Impact on Renewable Energy Development

Joel B. Eisen*

INTRODUCTION

In keeping with this Symposium's focus on accelerating clean energy growth and nations' ability to meet climate goals, this Article examines recent trends during the COVID-19 pandemic that at least temporarily set back the pace of growth, although conditions have rebounded somewhat since a disastrous spring of 2020. This Article supports several near-term policy prescriptions aimed at promoting a speedier return to the upward trajectory renewable energy enjoyed before the pandemic. These include extending the tax policies that support renewables beyond their short-term extensions in pandemic relief legislation and establishing robust programs to help workers in renewable energy industries who have been harmed by the pandemic. As Part II explains, these policies do double duty. They can help reverse the adverse conditions in the renewable energy sector, and they can promote a green recovery from the pandemic that helps reach climate goals while being more effective for economic growth than the stimulus programs that have been put in place so far. As this Article went to press, the Biden Administration released its broad-based infrastructure plan,¹ which addressed these policies, highlighting how they are viewed as critical to the nation's economic recovery.

Two caveats are in order. The Article focuses on the use of renewable resources to generate electricity (for convenience, using the shorthand "renewable electricity"). Of course, renewable resources have numerous other applications, such as their significant and growing use in transportation. But changes in electricity usage patterns during the

* Professor of Law, University of Richmond School of Law. Many thanks to the University of Kansas School of Law for its kind invitation to take part in the Symposium on "Accelerating Clean Energy: The Next Decade of Reform," and to Professor Uma Outka for her continued leadership and outstanding scholarship on these issues. Thanks also to Caroline Jaques for her research assistance.

1. *Fact Sheet: The American Jobs Plan*, White House, OFFICE OF THE PRESS SEC'Y (Mar. 31, 2021), <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/> [<https://perma.cc/7DDC-NBQW>] [hereinafter *White House Fact Sheet*] (addressing these policies under the heading "Spur jobs modernizing power generation and delivering clean electricity").

pandemic were more significant for renewable energy resources than the abrupt decline in travel, primarily because there is less fuel substitution in transportation at present as vehicles and planes still rely mostly on fossil fuels.² The second caveat is that the Article concentrates mostly on impacts in the United States, even though other nations have not been spared the pandemic's fury.

The pandemic has had many terrible consequences, with millions of illnesses, numerous deaths, catastrophic failures by the federal government to deal with the pandemic, and a comprehensive and dramatic disruption of our social and economic fabric. With our national attention having shifted rapidly to combating COVID-19 and to planning for economic recovery, how has the energy system changed, and how will it continue to do so? These are challenging questions. We cannot be sure how long the pandemic will last, or whether it will even end, or how. The economic disruption put tens of millions of Americans out of work, and consumer sentiment has been damaged. Nearly all sectors of the economy are struggling. Our focus is—as it should be—on containing this pandemic, preventing the continued loss of life, and working on economic recovery. Still, many thoughtful observers have begun to wonder how our society will change in the long term as a result of the pandemic, even if making long-term conclusions about the lasting impact of the pandemic is a challenging proposition at best.

Before the pandemic, growth in the renewable energy sector was impressive. At the beginning of 2020, renewable energy was on a long winning streak and had achieved many milestones. Costs for core technologies like solar modules are dropping rapidly, even faster than many had predicted.³ As a result, many renewable energy systems are quickly becoming less expensive than ever before, and either approaching or undercutting the costs of new fossil fuel plants.⁴ The United States has seen over two million solar system installations, and innovative financing models and other developments have prompted still more growth in the residential sector.⁵

2. *Energy Use for Transportation*, U.S. ENERGY INFO. ADMIN. (June 2, 2020), <https://www.eia.gov/energyexplained/use-of-energy/transportation.php> [https://perma.cc/6Y6S-PHMF].

3. *Renewable Power Generation Costs in 2019*, INT'L RENEWABLE ENERGY AGENCY 1, 19 (June 2020), <https://www.irena.org/publications/2020/Jun/Renewable-Power-Costs-in-2019> [https://perma.cc/QXT8-SDVA].

4. *Id.* at 1, 21–23.

5. *See United States Surpasses 2 Million Solar Installations*, SOLAR ENERGY INDUS. ASS'N (May 9, 2019), <https://www.seia.org/news/united-states-surpasses-2-million-solar-installations#:~:text=Today%2C%20the%20%20million%20residential,will%20have%20a%20solar%20installation> [https://perma.cc/5L4L-XU2U].

The growth has also been dramatic for utility-scale systems.⁶ As the Symposium website states, “in the renewable energy transition . . . wind and solar power have become essential generation resources on the electric grid.”⁷ In the United States and around the world, electricity generated from renewable resources is now the least expensive means of adding new utility-scale generating capacity to the grid.⁸ At times, more electricity was generated from renewable resources on some regional grids in the United States than from any other source. In the spring of 2020, some regions saw a forty-day renewables win streak against coal, an almost unheard-of result a mere few years ago.

The long-term outlook for renewables is even brighter. Many coal plants are scheduled to be retired, and no new ones are being built.⁹ Renewable electricity systems are being widely deployed around the world, from offshore wind in the North Sea to large wind farms in China to solar power systems here in the United States.¹⁰ More nations see renewable energy as a means of bringing electrification to places that lack sufficient infrastructure and as a means of phasing out fossil fuel electricity and meeting Paris climate targets. Massive projects were underway in the beginning of the year and even during the first few months of the pandemic.

In the near-term, however, COVID-19 has been a bit of a setback for renewable energy. In Part I, I describe four significant impacts of the pandemic on renewable energy. First, the unbridled upward trajectory of growth that characterized the past two decades slowed down considerably in 2020, although it rebounded a bit by the fall. This spring, there was an immediate drop in installation and financing for projects. Residential solar installations were the hardest hit, but larger projects were delayed due to the constricting of the supply chain that brings solar modules from China to the United States and wind turbines from Europe to Asia. Core

6. “Utility-scale” is typically defined as a project that generates electricity with a capacity much larger than residential or most commercial systems, usually at ten megawatts in size or larger. *Renewable Energy: Utility-Scale Policies and Programs*, U.S. DEP’T OF ENERGY, OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, <https://www.energy.gov/eere/slsc/renewable-energy-utility-scale-policies-and-programs> [<https://perma.cc/68W4-56UN>] (last visited Mar. 3, 2021).

7. *2020 Kansas Law Review Symposium, Accelerating Clean Energy: The Next Decade of Reform*, U. KAN. L. REV., <https://law.ku.edu/kansas-law-review-symposium> [<https://perma.cc/UR4K-KP3C>] (last visited Mar. 11, 2021).

8. *See Renewable Power Generation Costs in 2019*, *supra* note 3, at 1, 21.

9. *Nuclear and Coal Will Account for Majority of U.S. Generating Capacity Retirements in 2021*, U.S. ENERGY INFO. ADMIN. (Jan. 12, 2021), <https://www.eia.gov/todayinenergy/detail.php?id=46436#:~:text=After%20substantial%20retirements%20of%20coal,of%20the%20U.S.%20coal%20fleet> [<https://perma.cc/8MPK-LABA>].

10. *See Renewable Power Generation Costs in 2019*, *supra* note 3, at 1.

components became more difficult to obtain, and project growth slowed to a crawl. By the end of the year, the picture had stabilized. Some data showed that 2020 had even been a banner year for installations, while other data showed a more mixed picture.

The second impact of COVID-19 on renewable energy could be described as something of a small silver lining. With more Americans working from home, there has been a sea change in electricity demand. Overall demand dropped considerably, although it is not certain that this will continue. There was also a flattening of demand, with less electricity being required during the day (no big office buildings running air conditioning at full blast) and more electricity being required in the evenings. The pandemic has been different from other major crises: energy prices went down, not up. This made for a more positive competitive environment for existing renewable energy plants, particularly in electricity wholesale markets.

The third impact is that the financing environment for renewable energy projects changed as a result of the pandemic. Private sector tools such as tax equity financing, where an investor claims the tax benefits of a transaction in return for an equity investment in a project, became more challenging to obtain. Two factors led to a more uncertain environment for tax equity financing: a decrease in “tax appetite” (need for tax benefits to offset income) by institutional investors putting deals together, and a continued uncertainty about the availability of the tax credits that drive deals forward. By the end of the year, the market for tax equity was still difficult. Conventional debt financing was constrained as well, with banks making it more difficult to lend on some projects.

Finally, with millions of Americans out of work, renewable energy industries were not spared. The pandemic put a stunningly large number of employees in the sector out of work, due in large part to retrenchment in system deployments. With projects stalled, renewable energy companies laid off their workers in droves. By the end of the year, many hundreds of thousands had yet to return, as discussed in Part II. This is the most persistent negative impact in the renewable energy sector and part of a continuing human tragedy as the pandemic rages on.

This Article analyzes these impacts and then suggests near-term measures that are crucial to putting renewable energy back on the upward trajectory it enjoyed until the pandemic hit. COVID-19 did not change the fundamental justifications for public and private sector investment in renewable energy as a means of addressing climate change and achieving other goals. If anything, there is an even more urgent need for targeted measures to ensure that the momentum built up over the past two decades is not lost and that no backsliding on emissions reductions takes place.

Research has shown that this type of measure can be as effective or more so than traditional forms of stimulus in prompting economic recovery. The pandemic exacerbated energy poverty, forcing already strapped lower income households to the brink, and requiring urgent action. Boosting the pace of growth, particularly by supporting renewed growth of the clean energy workforce, can have a positive impact on ameliorating that.

In Part II, I describe two of the most significant near-term policies for promoting renewables: extending the deadlines for expiration of the Production Tax Credit (PTC) and Investment Tax Credit (ITC), two tax policies that are important to additional project deployments; and putting workers in renewable energy industries back to work with a combination of training, education, and financial support for small businesses. All are necessary to reinvigorate the renewable energy sector.

I. COVID-19'S IMPACTS ON RENEWABLE ENERGY DEVELOPMENT

A. *Before COVID: An Unparalleled Success Story*

There has been an appreciable increase in renewable energy projects over the last decade.¹¹ Renewable electricity's installed global generation capacity grew four times over.¹² Before COVID-19 hit, global renewable energy system deployments were at an all-time high. In 2019, utility-scale renewables accounted for seventeen percent of all electricity generation in the United States, with that figure expected to hit a remarkable twenty-one percent by 2021 through new construction of wind and solar plants.¹³ The United States Energy Information Administration (EIA) recently noted that renewable electricity is growing faster than any other source.¹⁴ And early in 2020, installations of residential solar systems in the United States

11. See *Clean Energy Investment Trends, 1H 2020*, BLOOMBERGNEF (July 13, 2020), <https://data.bloomberglp.com/professional/sites/24/BNEF-Clean-Energy-Investment-Trends-1H-2020.pdf> [<https://perma.cc/U973-BMND>].

12. *A Decade of Renewable Energy Investment, Led by Solar, Tops USD 2.5 Trillion*, BLOOMBERGNEF (Sept. 6, 2019), <https://about.bnef.com/blog/decade-renewable-energy-investment-led-solar-tops-usd-2-5-trillion/> [<https://perma.cc/WCE7-3QGX>] (discussing the Global Trends in Renewable Energy Investment report).

13. *Frequently Asked Questions: What is U.S. Electricity Generation by Energy Source?*, U.S. ENERGY INFO. ADMIN. (Nov. 2, 2020), <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3> [<https://perma.cc/WWS8-5PYC>]; U.S. ENERGY INFO. ADMIN., *SHORT-TERM ENERGY OUTLOOK: ELECTRICITY 4* (2021), https://www.eia.gov/outlooks/steo/pdf/steo_full.pdf [<https://perma.cc/3B9Z-NXU2>] [hereinafter *SHORT-TERM ENERGY OUTLOOK: ELECTRICITY*].

14. *SHORT-TERM ENERGY OUTLOOK: ELECTRICITY*, *supra* note 13, at 24 (referring to the U.S. Electricity Generation by Fuel, All Sectors chart).

were off to a strong start.¹⁵

In the past decade, technology and cost improvements for renewable energy systems have been dramatic.¹⁶ The cost of solar modules has plummeted.¹⁷ New wind turbines are more efficient and less expensive than ever before.¹⁸ Using the levelized cost of energy (LCOE), a widely used measure of the overall cost of a new electricity generation facility, several renewable energy technologies are at or even below the cost of new fossil-fuel plants.¹⁹ The cheapest technology to provide new electricity generation capacity in many nations throughout the world uses some form of renewable energy resource.²⁰

Policy drivers for continued growth have been on the upswing in many states. The majority of states have and are ratcheting up renewable portfolio standards that require utilities to deliver a specific percentage of electricity from renewables, either by generating it themselves, buying it from others who do, or purchasing tradable renewable energy certificates.²¹ Virginia recently enacted a sweeping new Clean Economy Act that, among other provisions, contains a new renewables requirement that will transform the electricity generation portfolios of the state's two major investor-owned utilities by 2050.²² Some states are requiring that utilities deliver one hundred percent of their electricity from renewable

15. See MICHELLE DAVIS, COLIN SMITH, BRYAN WHITE, RAVI MANGHANI, XIAOJING SUN, MOLLY COX, GREGSON CURTIN, SHAWN RUMERY, RACHEL GOLDSTEIN, COLIN SILVER & JUSTIN BACA, U.S. SOLAR MARKET INSIGHT Q4 2020 EXECUTIVE SUMMARY 7 (2020), <https://www.seia.org/research-resources/solar-market-insight-report-2020-q4> [https://perma.cc/QUL8-63C3] [hereinafter SEIA/WOOD MACKENZIE Q4 2020].

16. See *Renewable Power Generation Costs in 2019*, *supra* note 3, at 7.

17. See *id.*

18. See *id.*

19. Fuel costs for most renewable electricity are either low or zero, so instead of focusing solely on a project's upfront capital cost, the more appropriate comparison is the LCOE, which attempts to calculate the total cost per unit of electricity generated over a project's entire assumed life, figuring in not only capital costs but also operating costs. *Levelized Costs of New Generation Resources in the Annual Energy Outlook 2021*, U.S. ENERGY INFO. ADMIN. 1 (Feb. 2020), https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf [https://perma.cc/Y3TJ-ZBY7].

20. *Renewables are the Cheapest Source of New Bulk Electricity in Countries Representing Two-Thirds of the World Population and 72% of Global GDP: Cheapest Source of New Bulk Generation, 1H 2020*, BLOOMBERGNEF (June 10, 2020) (webinar slide) (on file with author).

21. See *State Renewable Portfolio Standards and Goals*, NAT'L CONF. OF STATE LEGISLATURES (Jan. 4, 2021), <https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx> [https://perma.cc/FS36-CZM3].

22. H.B. 1526, Reg. Sess. (Va. 2020); see Sarah Vogelsong, *Virginia's Clean Energy Transition: A Special Series by the Virginia Mercury*, VA. MERCURY (Nov. 30, 2020), <https://www.virginiamercury.com/2020/11/30/virginias-clean-energy-transition-a-special-series-by-the-virginia-mercury/> [https://perma.cc/2A3G-2QHJ] (describing, in a five-part series, the Virginia Clean Economy Act and its significance for the state's clean energy transition).

resources in the not too-distant future.²³

These and other policies have led to a veritable explosion in renewable electricity growth in the United States. The majority of new and planned power plants in the United States will generate electricity from renewable resources, particularly wind and solar.²⁴ No new coal-fired plants are on the drawing board for the foreseeable future.²⁵ In the first months of 2020, renewable electricity exceeded generation from coal-fired plants in parts of the United States.²⁶ As discussed below, the pandemic actually accelerated this trend, with the share of electricity generated from renewables outpacing coal on some regional grids for over forty days in a row at one point.²⁷

B. COVID-19 IMPACTS

This section discusses four different types of impacts of the pandemic on renewable energy growth. First, the pandemic led to a slowdown in project growth, although it was more pronounced for smaller systems than larger, utility-scale projects already underway. Second, the pandemic dramatically changed the shape of the electricity demand curve in the United States, with impacts on renewable energy's market fortunes. Third, the pandemic altered the conditions for financing new projects. Fourth, the pandemic had a pronounced negative impact on employment in the renewable energy sector, with many losing their jobs as a result of the economic downturn.

1. Near-Term Slowdown in Project Growth; Some Recovery

Like many things about the pandemic, the near-term slowdown in renewable energy project growth was wholly unexpected. In 2019, the International Energy Agency (IEA) predicted that 2020 would be another year of double-digit growth in global renewable energy deployments.²⁸

23. See Heather Payne, *Pulling in Both Directions: How States Are Moving Toward Decarbonization While Continuing to Support Fossil Fuels*, 45 COLUM. J. ENV'T L. 285, 296 (2020) (including California, the District of Columbia, Hawaii, Maine, New Mexico, New York, Rhode Island, Virginia, and Washington).

24. See SHORT-TERM ENERGY OUTLOOK: ELECTRICITY, *supra* note 13, at 4.

25. See *id.* at 4, 12.

26. See *id.* at 12.

27. See *infra* note 93 and accompanying text.

28. *Renewable Energy Market Update: Outlook for 2020 and 2021*, INT'L ENERGY AGENCY (May 2020), <https://www.iea.org/reports/renewable-energy-market-update/covid-19-impact-on-renewable-energy-growth#abstract> [<https://perma.cc/WF4J-6MAB>].

The IEA expected a boom in wind projects in the United States, timed to correlate with the eventual sunset of the Production Tax Credit (PTC).²⁹ Other prognostications were just as favorable. In November 2019, one report predicted that wind and solar installations in the United States would double to 20 GW in capacity, again noting that project developers would be rushing to make maximum use of the federal tax credits before they were set to expire.³⁰

Several months later, the pandemic had reversed this situation. As the IEA noted in a revised report, the immediate aftermath of the disruption occasioned by the pandemic's first wave was a "sudden break in . . . [the] nearly unstoppable rise in the capacity of renewable energy . . ."³¹ The IEA expected that global capacity growth would drop by thirteen percent in 2020, which, as noted above, would be the first decline in two decades.³² One analyst called 2020 "the first recession that the solar industry will be facing since maturing into a mainstream product . . ."³³ In June, the House of Representatives Select Committee on the Climate Crisis issued a sweeping report calling for national action.³⁴ This report also noted that the pandemic had a particularly pronounced impact on slowing wind and solar "project development, permitting, and construction" in the United States.³⁵

The immediate decline in installations of smaller scale residential and commercial projects was especially severe.³⁶ By one estimate in mid-summer, there would be a thirty-one percent decrease by the end of 2020 compared to 2019.³⁷ There were several reasons for this slowdown.

29. *Id.*

30. Steve Piper, *The 2020 U.S. Renewable Energy Outlook*, S&P GLOB. MKT. INTELLIGENCE 2 (Nov. 2019), https://www.spglobal.com/marketintelligence/en/documents/111919_the-2020-us-renewable-energy-outlook_finalv4-revised.pdf [<https://perma.cc/HKG3-SJR8>].

31. Katherine Dunn, *COVID-19 is Crippling the Energy Market, with One Big Exception: Renewables*, FORTUNE (May 20, 2020, 10:17 AM), <https://fortune.com/2020/05/20/renewable-power-coronavirus-capacity-emissions/> [<https://perma.cc/JHX9-A9SS>] (describing the IEA report).

32. *Id.*

33. Emma Foehringer Merchant, *A New Response to Coronavirus: Giving Solar Away for Free*, GREENTECH MEDIA (Apr. 23, 2020), <https://www.greentechmedia.com/articles/read/one-response-to-the-coronavirus-giving-solar-away-for-free> [<https://perma.cc/37EN-8UDS>] (quoting Bryan White of Wood Mackenzie Power & Renewables).

34. See *Solving the Climate Crisis: The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America*, H. SELECT COMM. ON THE CLIMATE CRISIS 1 (June 2020), <https://climatecrisis.house.gov/sites/climatecrisis.house.gov/files/Climate%20Crisis%20Action%20Plan.pdf> [<https://perma.cc/XV68-NDUR>].

35. *Id.* at 39.

36. Dunn, *supra* note 31 ("[T]he COVID-19 pandemic . . . has delayed installation and financing for projects, particularly rooftop-installed solar panels, a powerful source of renewable energy growth.").

37. *COVID-19 & The U.S. Solar Industry*, SOLAR ENERGY INDUS. ASS'N (June 2020),

Signing up customers for distributed generation facilities such as rooftop solar systems (those that generate electricity at or near the premises where it is used) is typically done by face-to-face visits, and shelter-in-place orders limited this activity.³⁸ Installations usually require multiple on-premises visits by construction crews, municipal employees, and others.³⁹ To avoid contracting the virus, homeowners put off these activities.⁴⁰ In any event, these activities were not possible. With lockdowns in place, personal contact was severely reduced. States varied in their restrictions, but in many cases, installers had less ability to access homes and other worksites, as they were not always deemed essential and exempted from the stay-at-home requirements.⁴¹

With economic conditions worsening and the future uncertain, many households and businesses put off their plans to go solar.⁴² Even with declining component costs, the average price of a typical new 5 kW solar system in the United States in early 2020 was over \$10,000 after the applicable tax credits.⁴³ Of course, that figure is a reason to celebrate, as it is a mere fraction of the typical cost a few years ago.⁴⁴ But in a slower economy, fewer households could afford these major purchases, leading

<https://www.seia.org/sites/default/files/2020-06/2020-June-SEIA-COVID-Factsheet.pdf> [<https://perma.cc/89F4-RDNQ>].

38. AUSTIN PEREA, COLIN SMITH, MICHELLE DAVIS, XIAOJING SUN, BRYAN WHITE, MOLLY COX, GREGSON CURTIN, SHAWN RUMERY, AARON HOLM, RACHEL GOLDSTEIN & JUSTIN BACA, U.S. SOLAR MARKET INSIGHT Q2 2020 EXECUTIVE SUMMARY 8 (2020), <https://www.seia.org/research-resources/solar-market-insight-report-2020-q2> [<https://perma.cc/28ML-P2U4>] [hereinafter SEIA/WOOD MACKENZIE Q2 2020] (“[S]tates such as New Jersey, Pennsylvania and Illinois have implemented specific restrictions on solar sales, with door-to-door canvassing specifically prohibited.”). As the quarterly report noted, this prompted companies to switch to handling these activities remotely. See *infra* notes 49–51 and accompanying text.

39. See generally *Planning a Home Solar Electric System*, U.S. DEP’T OF ENERGY, <https://www.energy.gov/energysaver/planning-home-solar-electric-system> [<https://perma.cc/JTU8-QM2M>] (last visited Mar. 4, 2021) (explaining the steps homeowners must follow when equipping their home’s with solar energy which includes obtaining site assessments); Joel B. Eisen, *Residential Renewable Energy: By Whom?*, 31 UTAH ENV’T L. REV. 339 (2011).

40. See Foehringer Merchant, *supra* note 33.

41. SEIA/WOOD MACKENZIE Q2 2020, *supra* note 38, at 8; see also Emma Foehringer Merchant, *Are Solar Workers ‘Essential’? The Industry May Soon Find Out*, GREENTECH MEDIA (Mar. 23, 2020), <https://www.greentechmedia.com/articles/read/are-solar-workers-essential> [<https://perma.cc/S455-8873>].

42. SEIA/WOOD MACKENZIE Q2 2020, *supra* note 38, at 9.

43. Sara Matasci, *How Much Does a Solar Panel Installation Cost?*, ENERGYSAGE (Feb. 4, 2021), <https://news.energysage.com/how-much-does-the-average-solar-panel-installation-cost-in-the-u-s/> [<https://perma.cc/4924-ZMTZ>].

44. See Zachary Shahan, *Home Solar Power Blew Up in 2020*, CLEANTECHNICA (Dec. 13, 2020), <https://cleantechnica.com/2020/12/13/home-solar-power-blew-up-in-2020/> [<https://perma.cc/B7AM-A7NX>] (“[S]olar PV panels were 12x more expensive in 2010 than in 2020 (and 459x more expensive in 1977).”).

to declining numbers of installations.⁴⁵ By the third quarter of 2020, things began to improve in the residential sector.⁴⁶ Some of this was due to successful pivoting by solar companies to handle sales and other matters remotely instead of in person.⁴⁷ The continued drop in solar panel costs, and the increased availability of storage to combine with solar and make it more attractive to homeowners were also central to the recovery.⁴⁸ Two major reports released at year end show a rapid recovery from the earlier drop-off, though they diverge somewhat on just how far the sector came back. One found that in the third quarter, there was a fourteen percent increase in residential projects over the previous quarter, but the overall total was still considerably below pre-pandemic levels.⁴⁹ Another report, by Bloomberg New Energy Finance (BNEF), found that there would be a twenty-one percent year over year increase in residential installations.⁵⁰

Throughout the pandemic, there has been less impact on the pace of utility-scale solar and wind installations. In part, this was because some projects were already underway and experienced few interruptions.⁵¹ Yet some projects experienced delays in the spring due to supply chain disruptions and closure of construction sites.⁵² Limitations on construction imposed during the pandemic, and reduced material availability, led to some near-term slowdowns and increased risk of delays.⁵³ By year's end, however, the pace of construction for larger plants had resumed or was likely to do so by the beginning of 2021.⁵⁴

The long-term future for renewable electricity is obviously still very

45. SEIA/WOOD MACKENZIE Q2 2020, *supra* note 38, at 8.

46. Jules Scully, *US Set for Record 19GW of New Solar Capacity Installations in 2020*, PV TECH (Dec. 15, 2020), <https://www.pv-tech.org/news/us-set-for-record-19gw-of-new-solar-capacity-installations-in-2020#:~:text=US%20set%20for%20record%2019GW%20of%20new%20solar%20capacity%20installations%20in%202020,By%20Jules%20Scully&text=The%20third%20quarter%20saw%20738MW,Image%3A%20Solar%20Mosaic> [<https://perma.cc/BMS9-MVS2>].

47. *Id.*; Julian Spector, *Coronavirus Is Forcing Home Solar Companies to Sell Virtually. Maybe That's a Good Thing.*, GREENTECH MEDIA (Apr. 6, 2020), <https://www.greentechmedia.com/articles/read/coronavirus-is-forcing-solar-companies-to-sell-virtually-maybe-thats-a-good-thing> [<https://perma.cc/9BUU-MRSJ>].

48. Shahan, *supra* note 44.

49. SEIA/WOOD MACKENZIE Q4 2020, *supra* note 15, at 6.

50. Shahan, *supra* note 44 (discussing the report).

51. *See* SEIA/WOOD MACKENZIE Q2 2020, *supra* note 38, at 8.

52. Ivan Penn, *How the Virus Slowed the Booming Wind Energy Business*, N.Y. TIMES (Nov. 10, 2020), <https://www.nytimes.com/2020/10/26/business/energy-environment/coronavirus-renewable-energy-wind.html> [<https://perma.cc/9KP9-Q4X4>].

53. AM. COUNCIL ON RENEWABLE ENERGY, EXPECTATIONS FOR RENEWABLE ENERGY FINANCE IN 2020-2023 1, 10 (2020), <https://acore.org/wp-content/uploads/2020/07/Expectations-for-Renewable-Energy-Finance-in-2020-2023.pdf> [<https://perma.cc/K5J8-YE23>] (“Project delays combined with difficulties securing financing for projects have led to lower projections for solar and wind capacity additions in 2020.”).

54. SEIA/WOOD MACKENZIE Q4 2020, *supra* note 15, at 14–16.

bright. The favorable cost trends, such as continually decreasing solar module costs, are likely to continue.⁵⁵ At utility-scale, wind and solar continue to be extremely attractive compared to coal and natural gas power plants and will be even more so in the coming years. Corporations seeking to procure renewable electricity are an actively growing source of demand for new projects.⁵⁶ As noted below, the challenges in the current environment for financing for utility-scale projects may impact these forecasts. Residential installations are being driven by lower costs, creative financing mechanisms, and a host of state and federal policies.⁵⁷

In summary, it is more useful to think of the reversal in project activity during the first half of 2020 as a temporary hiccup and not a long-term phenomenon. That temporary hiccup still warrants attention. Any slowdown means we are not accelerating deployments, as we must to meet climate goals.⁵⁸ The scale of what is needed to decarbonize by the middle of the century is daunting—much more solar and onshore and offshore wind. Now we are even more behind the eight ball and need to get moving faster.

2. Decreasing and Flattening Electricity Demand; Changing Market Conditions

Changes in how the nation used electricity during the pandemic impacted renewable electricity. To see how, it is necessary to look at two different, but related impacts: (1) the decrease in overall electricity demand; and (2) the flattening of demand over the course of the average day.

55. See, e.g., Zachary Shahan, *Solar PV Panels Were 12× More Expensive in 2010, 459× More Expensive in 1977*, CLEANTECHNICA (Sept. 6, 2020), <https://cleantechnica.com/2020/09/06/solar-pv-panels-were-12x-more-expensive-in-2010-459x-more-expensive-in-1977-tesla-solar-cost-lowest> [<https://perma.cc/2LUK-7KL7>].

56. See generally JOEL B. EISEN, *ADVANCED INTRODUCTION TO LAW AND RENEWABLE ENERGY* (forthcoming July 2021) (manuscript at 101–03) (on file with author) (discussing corporate procurement of renewable energy).

57. Scully, *supra* note 46.

58. *Global Renewables Outlook: Energy Transformation 2050*, INT'L RENEWABLE ENERGY AGENCY 1, 4 (Apr. 2020), <https://www.irena.org/publications/2020/Apr/Global-Renewables-Outlook-2020> [<https://perma.cc/D3JX-SPAT>] (noting the sustained international effort required to meet energy and climate objectives); Miranda Willson & Carlos Anchondo, *Most Clean Energy Tech Is Not on Track to Meet Climate Goals*, SCI. AM. (June 10, 2020), <https://www.scientificamerican.com/article/most-clean-energy-tech-is-not-on-track-to-meet-climate-goals/> [<https://perma.cc/D8PP-KCAM>] (“[O]nly six of 46 clean energy sectors are making enough progress to limit warming to under 2 degrees Celsius.”).

a. Decreased and Flattened Electricity Demand

Beginning with the first of these, by the EIA's July 2020 projections, the nation would consume 4.2 percent less electricity in 2020 than in 2019.⁵⁹ Average daily peak loads were down in April 2020 compared to the previous year.⁶⁰ The California Energy Commission predicted in August that electricity demand in the nation's largest state would decline by four to five percent through 2022, and at least another two percent through 2023.⁶¹ One article called the reduction in national electricity demand the "Biggest Power Demand Plunge Since [the] Great Depression."⁶²

This historic comparison does not tell the full story. Electricity sales are measured in three sectors: residential, commercial, and industrial.⁶³ As the pandemic upended the entire United States economy, it increased residential demand because millions of people stayed at home under shelter-in-place restrictions. Many who were not deemed essential workers worked from home, substituting face-to-face meetings for online sessions. Numerous indicators substantiate the work-from-home trend, such as a meteoric rise in videoconferencing activity.⁶⁴ The result was an increase in residential demand for electricity. The EIA predicted that overall residential demand for 2020 would be roughly on par with 2019, with less heating needed at the beginning of the year due to favorable

59. U.S. ENERGY INFO. ADMIN., SHORT-TERM ENERGY OUTLOOK (STEO) 1, 3 (2020), <https://www.eia.gov/outlooks/steo/archives/jul20.pdf> [<https://perma.cc/BLN9-VWZ9>] [hereinafter SHORT-TERM ENERGY OUTLOOK].

60. Mark Watson, *Pandemic Causing 8%-9% Power Demand Decrease Nationwide: Platts Analytics*, S&P GLOB. PLATTS (Apr. 22, 2020), <https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/042220-pandemic-causing-8-9-power-demand-decrease-nationwide-platts-analytics> [<https://perma.cc/GM2X-HWDG>].

61. Hudson Sangree, *COVID-19 Will Cut Electricity Demand in Calif., CEC Says*, RTO INSIDER (Aug. 28, 2020), <https://rtoinsider.com/rto/covid-19-cut-electricity-demand-california-cec-says-171837/> [<https://perma.cc/ZD3K-HRWQ>].

62. Mark Chediak, Chris Martin & Rachel Morison, *Biggest Power Demand Plunge Since Great Depression Is Reshaping Markets*, BLOOMBERG GREEN (May 20, 2020, 11:20 AM), <https://www.bloomberg.com/news/articles/2020-05-20/biggest-power-demand-plunge-since-great-depression-is-reshaping-markets> [<https://perma.cc/GMT4-88R7>].

63. See SHORT-TERM ENERGY OUTLOOK, *supra* note 59, at 2.

64. See, e.g., Jacob Kastrenakes, *Zoom Saw a Huge Increase in Subscribers — and Revenue — Thanks to the Pandemic*, VERGE (June 2, 2020, 4:59 PM), <https://www.theverge.com/2020/6/2/21277006/zoom-q1-2021-earnings-coronavirus-pandemicwork-from-home> [<https://perma.cc/2MV3-7GMQ>] ("Zoom . . . usage has grown to 300 million meeting participants each day, up from just 10 million in December."). Another noticeable metric was a dramatic decline in vehicle usage as commuting dropped. By June, that drop had largely reversed itself, but in many larger metropolitan areas, the continued decrease in commuting to offices was reflected in lower vehicle use. Rick Schuman, *INRIX U.S. National Traffic Volume Synopsis Issue #15 (June 20 – June 26, 2020)*, INRIX (June 29, 2020), <https://inrix.com/blog/2020/06/covid19-us-traffic-volume-synopsis-15/> [<https://perma.cc/7YPH-XDVT>].

weather conditions, and more electricity needed later as people stayed home.⁶⁵

But the increase in residential electricity demand was more than offset by declines in commercial and industrial demand. As the EIA has noted, commercial demand is “strongly correlated” with employment in the sector.⁶⁶ People concerned about the pandemic were not frequenting stores, restaurants, and other commercial establishments that closed under states’ restrictions. This led to double-digit unemployment in the commercial sector.⁶⁷ When stay-at-home orders were lifted, some states experienced a resumption of commercial activity, with predictable spikes in COVID-19 cases and returns to restricted activities.⁶⁸ In other states, particularly those hit hardest at the outset of the pandemic, people were often hesitant to go to bars, stores and restaurants. The pandemic has had a lasting impact on small businesses, with more than 100,000 estimated to have shut down as of summer 2020.⁶⁹ With stores and restaurants shuttered, and workplaces closed, there has been a dramatic decrease of energy use in the commercial sector. The EIA projected a seven percent

65. SHORT-TERM ENERGY OUTLOOK, *supra* note 59, at 17.

66. U.S. ENERGY INFO. ADMIN., SHORT-TERM ENERGY OUTLOOK SUPPLEMENT: SUMMER 2020 ELECTRICITY INDUSTRY OUTLOOK 4 (2020), https://www.eia.gov/outlooks/steo/special/supplements/2020/2020_sp_01.pdf [<https://perma.cc/NC9K-NYUG>] [hereinafter SUMMER 2020 ELECTRICITY INDUSTRY OUTLOOK].

67. In July, nonfarm employment was lower than its February level by nearly 12.9 million, or 8.4 percent, with retail and professional services sectors hit hardest and down by more than ten percent each. *Impact of the Coronavirus (COVID-19) Pandemic on the Employment Situation for July 2020*, U.S. BUREAU OF LAB. STAT., Table C, <https://www.bls.gov/covid19/employment-situation-covid19-faq-july-2020.htm> [<https://perma.cc/EG36-CL4Q>] (last updated Sept. 23, 2020).

68. In Virginia, for example, Governor Ralph Northam imposed additional temporary restrictions on gatherings and other activities in December to slow down the spread of the virus. VA. EXEC. ORDER NO. 72 (Dec. 14, 2020), [https://www.governor.virginia.gov/media/governorvirginiagov/executive-actions/EO-72-and-Order-of-Public-Health-Emergency-Nine-Common-Sense-Surge-Restrictions-Certain-Temporary-Restrictions-Due-to-Novel-Coronavirus-\(COVID-19\).pdf](https://www.governor.virginia.gov/media/governorvirginiagov/executive-actions/EO-72-and-Order-of-Public-Health-Emergency-Nine-Common-Sense-Surge-Restrictions-Certain-Temporary-Restrictions-Due-to-Novel-Coronavirus-(COVID-19).pdf) [<https://perma.cc/8X4X-KGCT>].

69. Heather Long, *Small Business Used to Define America's Economy. The Pandemic Could Change That Forever*, WASH. POST (May 12, 2020, 4:00 PM), <https://www.washingtonpost.com/business/2020/05/12/small-business-used-define-americas-economy-pandemic-could-end-that-forever/> [<https://perma.cc/DP8W-DKHU>] (“[E]conomists project that more than 100,000 small businesses have shut permanently since the pandemic escalated in March, according to a study by researchers at the University of Illinois, Harvard Business School, Harvard University and the University of Chicago.”); *see also* Alexander W. Bartik, Marianne Bertrand, Zoë B. Cullen, Edward L. Glaeser, Michael Luca & Christopher T. Stanton, *How are Small Businesses Adjusting to COVID-19? Early Evidence from a Survey* (Nat’l Bureau of Econ. Research, Working Paper No. 26989, 2020) (discussing survey results from more than 5,800 “financially fragile” small businesses, finding they had reduced their employees by forty percent on average, that forty-three percent had at least temporarily closed, and that most encountered “problems with accessing [funding from the CARES act] such as bureaucratic hassles and difficulties establishing eligibility”).

year over year decline in commercial demand.⁷⁰ Shuttered factories also used less electricity, and the EIA forecasted a six percent drop in industrial usage.⁷¹

These are truly historic numbers. According to the EIA, commercial demand in April 2020 was at its lowest since 2003.⁷² Industrial usage had not seen such low levels since 1987,⁷³ the year that New York real estate developer Donald Trump told CNN's Larry King, "I don't want to be President."⁷⁴ Commercial and industrial consumers use more power than residential electricity users. A house's increased computer, heating and cooling, and other uses cannot make up for the closing of a multi-floor office building. As a result, the overall picture saw a decrease in demand by five percent year over year as of June.⁷⁵

The decrease in electricity demand during the pandemic has been accompanied by another trend: significant changes in *when* electricity is used.⁷⁶ Electricity use has been spread out more evenly during the average day.⁷⁷ People working from home use electricity at different times of day than those who are commuting to workplaces.⁷⁸ In particular, changes in routines in the work-from-home economy smooth out the peaks in demand that usually result in the mornings when people get up and leave for work, and in the evening when they return.⁷⁹ In utility-speak, the more even spread of electricity usage during the day is called flattening of the "load shape."⁸⁰

Are these changes durable? It is difficult to tell, because it is always challenging to forecast future electricity demand. As noted above,

70. SHORT-TERM ENERGY OUTLOOK, *supra* note 59, at 17.

71. *Id.*

72. *Stay-At-Home Orders Led to Less Commercial and Industrial Electricity Use in April*, U.S. ENERGY INFO. ADMIN. (June 30, 2020), <https://www.eia.gov/todayinenergy/detail.php?id=44276> [<https://perma.cc/98BR-5LKM>].

73. *Id.*

74. *Donald Trump in 1987: "I Don't Want to be President"*, CNN (Sept. 2, 1987), <https://www.cnn.com/videos/tv/2016/05/09/donald-trump-1987-interview-larry-king-live.cnn> [<https://perma.cc/T3YS-7BD2>].

75. SUMMER 2020 ELECTRICITY INDUSTRY OUTLOOK, *supra* note 66, at 2.

76. Sierra Garcia, *How Coronavirus is Changing Electricity Usage, in 3 Charts*, GRIST (Apr. 10, 2020), <https://grist.org/energy/how-coronavirus-is-changing-electricity-usage-in-3-charts/> [<https://perma.cc/VA38-2ALP>].

77. *Id.*

78. *Id.*

79. *Id.*; Will Jolley, *Flattening the (Demand) Curve: Renewable Energy and COVID-19*, LEVEL 10 ENERGY (Mar. 31, 2020), <https://leveltenenergy.com/blog/clean-energy-experts/energy-demand-covid/> [<https://perma.cc/UGZ7-8VGS>].

80. Jim Lazar, *Synchronizing the Electric Regulatory Response to COVID-19*, RAP (May 5, 2020), <https://www.raponline.org/blog/synchronizing-the-electric-regulatory-response-to-covid-19/> [<https://perma.cc/YTJ8-QEGW>]; Jolley, *supra* note 79.

California projected long-lasting demand decreases, and others believe that the decrease in national demand could last into 2022 even if the pandemic abated and the economy recovered.⁸¹ But the picture is a bit cloudy, as the EIA projected a one percent rise in residential electricity demand in 2021.⁸² This difference in projections shows that determining whether demand will recover is a tricky proposition at best because it requires reliable data about when, whether, and where the nation goes back to work. Much of this is still up in the air. California's projections rely on estimates of "floorspace," a common measure of commercial business activity.⁸³ With prognosticators wondering how many workers will go back to large urban office buildings for all or part of the work week,⁸⁴ any such estimates are fraught with uncertainty. Even if the shape of the nation's economic recovery were known, we might not know whether electricity demand would recover. Much of this may depend on whether recovery increases manufacturing activity or helps the service sector, which is less energy intensive.⁸⁵ So where people eventually go back to work is as important as whether they do.

b. Near-Term and Long-Run Impacts; Implications for Renewable Electricity

The near-term decreases in demand and the flattening of demand over the course of the day had major impacts on wholesale electricity markets. When demand started decreasing, wholesale prices for electricity dropped. The PJM RTO, the grid operator for over sixty million customers in the Northeast and Mid-Atlantic, reported a "significant drop in demand" and market prices that were 29.4 percent lower than in the previous year.⁸⁶

81. See Robert Walton, *Clearer Picture of Coronavirus-Driven Grid Load Declines Emerges in US After Weeks of Lockdowns*, UTIL. DIVE (Apr. 9, 2020), <https://www.utilitydive.com/news/clearer-picture-of-coronavirus-driven-grid-load-declines-emerges-in-us-afte/575777/> [https://perma.cc/8L GX-49BZ]; Watson, *supra* note 60.

82. SHORT-TERM ENERGY OUTLOOK, *supra* note 59, at 17.

83. Sangree, *supra* note 61, at 1.

84. See, e.g., Sarah Gibbens, *Goodbye to Open Office Spaces? How Experts are Rethinking the Workplace*, NAT'L GEOGRAPHIC (Apr. 30, 2020), <https://www.nationalgeographic.com/science/2020/04/will-coronavirus-end-the-open-office-floor-plan/> [https://perma.cc/E4LP-2B7E].

85. *Link Between Growth in Economic Activity and Electricity Use is Changing Around the World*, U.S. ENERGY INFO. ADMIN. (Nov. 20, 2017), <https://www.eia.gov/todayinenergy/detail.php?id=33812> [https://perma.cc/P7EP-ZLN7].

86. MONITORING ANALYTICS, LLC, STATE OF THE MARKET REPORT FOR PJM: JANUARY THROUGH JUNE 2 (2020), https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2020/2020q2-som-pjm.pdf [https://perma.cc/78E2-ANX8] (PJM's Market Monitor notes that demand was "lower in the first six months of 2020 than in the first six months of any year

Other regions saw similar historic decreases.⁸⁷

These price drops accelerated two trends that had already been underway for over a decade. The first is the sharp decrease in coal use to generate electricity. As recently as 1990, half the nation's electricity was generated from coal, but by the summer of 2020 the EIA expected that figure to drop to a mere seventeen percent.⁸⁸ Primarily, but not exclusively, coal has lost market share to natural gas, as a result of the availability of inexpensive natural gas from hydraulic fracturing.⁸⁹ The EIA found that natural gas would be responsible for forty-four percent of electricity generation in summer 2020.⁹⁰

The second trend is the increasing penetration of renewable electricity in regional wholesale markets, particularly wind and solar. In part, this is a function of increasing renewable electricity generation capacity. The EIA predicted that renewable electricity's share of generation would increase from eighteen percent in 2019 to twenty-one percent in 2020, largely due to the construction of new power plants.⁹¹ Non-hydropower resources such as wind and solar would account for eleven percent in the summer, up from nine percent in the previous year.⁹² This second trend was amplified during the first six months of the pandemic. As new wind and solar power plants are built and come online, they displace other fuels in electricity markets. Wind and solar have zero marginal fuel costs, as the wind and sun are free. So, when market prices drop, generators who rely upon recovering their fuel prices through higher energy prices—

since the creation of PJM markets in 1999"). One other impact of volatile energy market prices is worth noting. Professor Uma Outka has described the ways in which corporations "invest" in renewable energy without constructing physical infrastructure, such as virtual "power purchase agreements." Uma Outka, "100% Renewable": *Company Pledges and State Energy Law*, 2019 UTAH L. REV. 661, 663, 680–83 (2019). The pandemic affected the relative attractiveness of these arrangements in complex and hardly monolithic ways, given changes in wholesale electricity prices. Keith Goldberg, *COVID-19 Crisis Clouds Future For Electricity Sector*, LAW360 (Apr. 29, 2020, 7:37 PM), <https://www.law360.com/articles/1268412/covid-19-crisis-clouds-future-for-electricity-sector> [<https://perma.cc/8WGA-J5NF>].

87. Lazar, *supra* note 80 (chart in Figure 3 showing price drop in the ISO-New England markets).

88. SUMMER 2020 ELECTRICITY INDUSTRY OUTLOOK, *supra* note 66, at 5 (expected figure for summer 2020); *see also* SHORT-TERM ENERGY OUTLOOK, *supra* note 59, at 18 (expected figure of eighteen percent on average for the entire year 2020).

89. Rebecca Elliott & Jonathan Randles, *Trump's Promise to Revive Coal Thwarted by Falling Demand, Cheaper Alternatives*, WALL ST. J. (Sept. 16, 2020, 11:15 AM), <https://www.wsj.com/articles/trumps-promise-to-revive-coal-thwarted-by-falling-demand-cheaper-alternatives-11600269350> [<https://perma.cc/DRT3-FFLC>]; SHORT-TERM ENERGY OUTLOOK, *supra* note 59, at 18.

90. SUMMER 2020 ELECTRICITY INDUSTRY OUTLOOK, *supra* note 66, at 6.

91. SHORT-TERM ENERGY OUTLOOK, *supra* note 59, at 18 (adding together hydroelectric generation and other renewable generation for 2019 and 2020).

92. SUMMER 2020 ELECTRICITY INDUSTRY OUTLOOK, *supra* note 66, at 6.

primarily those that generate electricity from coal and natural gas—are at a disadvantage. One report that surveyed daily production data from the EIA found that renewable electricity (including both hydropower and non-hydropower resources) had a higher market share than coal for the entire time period between March 25 and May 3, a stretch of forty straight days.⁹³

If the flattening of demand continues, there would be other potentially significant impacts on wholesale electricity markets. Grid operators would not need to have as many extra power plants waiting to fire up to satisfy peak demand.⁹⁴ Normally, they do. So-called “peaking” plants, usually the most expensive plants to run in a region, sit unused for most of the year but then run when called upon to satisfy peak demand.⁹⁵ These plants typically operate on natural gas.⁹⁶ Because they run on fossil fuels and generate greenhouse gas emissions, they have been targeted in recent years by environmental advocates and others who propose that they be replaced by a combination of renewable electricity generation and batteries to smooth out the variability of renewable resources.⁹⁷ With a flatter load shape, there is less need for backup power plants that burn fossil fuels. This leads observers to conclude that renewable electricity could garner an even larger share of the market as the pandemic continues, although that is by no means certain.⁹⁸

93. TIM BUCKLEY, INST. FOR ENERGY ECON. AND FIN. ANALYSIS, RENEWABLES CONTINUE TO BREAK RECORDS DESPITE COVID-19 8 n.14 (2020), <https://ieefa.org/ieefa-renewables-continue-to-break-records-despite-covid-19/> [<https://perma.cc/Q3C4-6QY7>] (citing Rebecca Beitsch, *Renewable Energy Topped Coal in US for 40 Days Straight*, THE HILL (May 5, 2020, 2:00 PM), <https://thehill.com/policy/energy-environment/496181-renewable-generation-surpasses-coal-for-40-straight-days> [<https://perma.cc/H35D-F924>]).

94. Edward Klump, Kristi E. Swartz & Jeffrey Tomich, *Coronavirus and Electricity: 4 Takeaways from CEOs*, E&E NEWS (May 20, 2020, 11:23 AM), <https://www.eenews.net/stories/1063182607/print> [<https://perma.cc/7B7X-HAEE>].

95. *Natural Gas-Fired Combustion Turbines are Generally Used to Meet Peak Electricity Load*, U.S. ENERGY INFO. ADMIN. (Oct. 1, 2013), <https://www.eia.gov/todayinenergy/detail.php?id=13191> [<https://perma.cc/92DW-QM8V>].

96. *See id.*

97. Rachel Ramirez, *These Rarely Used, Dirty Power Plants Could be Cheaply Replaced by Batteries*, GRIST (June 11, 2020), <https://grist.org/energy/report-these-rarely-used-dirty-power-plants-could-be-cheaply-replaced-by-batteries/> [<https://perma.cc/PK7B-W9LF>] (suggesting this as an alternative to using natural gas plants as peakers).

98. *See, e.g.*, Jolley, *supra* note 79. One scenario that might impact this is worth mentioning, although for now it is only hypothetical. If the electricity demand decrease is prolonged, it might negatively impact additions of new wind and solar power plants, as fewer new plants would be necessary to meet the requirements contained in renewable portfolio standards (which typically specify that a percentage of the electricity delivered must come from renewable resources). Adam Wilson, *Pandemic Recession Could Sideline New York Renewables*, S&P GLOBAL MKT. INTELLIGENCE (June 2, 2020), <https://www.spglobal.com/marketintelligence/en/news-insights/research/pandemic-recession-could-sideline-new-york-renewables> [<https://perma.cc/888D-6DA3>].

3. Challenges in Project Financing and Viability

With more demand on wholesale markets, renewable energy projects have outlets for their output. The challenge is to get the projects built. Solar and wind projects need the oxygen of project financing to be viable, but investment in renewable energy projects slowed during the pandemic. As one analyst put it, “[t]he present crisis has pushed ‘pause’ on the investment necessary to meet increasingly aggressive climate and clean energy goals”⁹⁹ The vast majority of funding for renewable energy projects comes from the private sector,¹⁰⁰ and the decreased availability of that funding is a challenge for renewable energy going forward. By some estimates, the uncertain investment climate could last for eighteen months or more.¹⁰¹ Not all projects and funding sources are alike, and the types of funding and the incentives for those providing project funding are different for specific types of projects. Accordingly, it is important to discuss the major funding sources and how the pandemic has affected each one differently.

a. Tax Equity Financing

A common means of financing renewable energy projects is a “tax equity” transaction.¹⁰² Project financing is often structured around the availability of tax benefits, using complex structures that maximize these benefits for the parties to the transaction. In a tax equity transaction, the project itself generates no tax liability.¹⁰³ Instead, the developer partners with one or more third parties that have “tax appetite”: that is, they would benefit from reduced taxes by claiming the renewable energy tax credits.¹⁰⁴ These sophisticated arrangements usually assign the rights to claim the tax benefits to those parties to the transaction in exchange for equity investments.¹⁰⁵ The availability of tax equity financing has often been cited as a major driver for renewable energy investment, and its

99. Walton, *supra* note 81 (quoting Mark Dyson of the Rocky Mountain Institute).

100. EISEN, *supra* note 56, at 83.

101. Walton, *supra* note 81.

102. Sarah Golden, *What Engie’s Tax Equity Deal Tells Us About Financing Renewables*, GREENBIZ (May 1, 2020), <https://www.greenbiz.com/article/what-engies-tax-equity-deal-tells-us-about-financing-renewables> [https://perma.cc/GAS6-9TQB].

103. MARK P. KEIGHTLEY, DONALD J. MARPLES & MOLLY F. SHERLOCK, CONG. RESEARCH SERV., TAX EQUITY FINANCING: AN INTRODUCTION AND POLICY CONSIDERATIONS 1 (2019).

104. *See id.* at 1–3.

105. *Id.* at 1.

absence would consequently have a negative effect on deployments.¹⁰⁶

Tax equity financing was popular before the pandemic, but the changed economic conditions altered the analyses of some would-be investors. The most obvious impact was that tax appetites changed. Many tax equity transactions are undertaken by institutional investors, which include “pension funds, insurance companies, sovereign wealth funds, mutual funds, commercial banks and endowments investing on behalf of themselves or their members.”¹⁰⁷ In a typical structure, this investor makes the investment in a project and then syndicates (divides up) the investment to other firms that reap a share of the tax benefits.¹⁰⁸ This in turn requires the institutional investor to gauge the tax appetites of would-be participants. If a firm cannot forecast its future tax liability because its earnings are uncertain due to the pandemic, it may be less interested in entering into an arrangement to reduce its taxes now.¹⁰⁹ In turn, this could decrease the overall amount of funding committed by institutional investors in tax equity transactions. There is already a relatively small pool of major institutional tax equity investors,¹¹⁰ so reluctance to invest by any participants would hamper the availability of tax equity.

A survey of institutional investors in July found that the vast majority expected tax equity financing to be scaled back due to the pandemic.¹¹¹ These complex deals take time to develop, and those that were in the pipeline and nearing their consummation before the pandemic began were relatively unaffected by it. In May, for example, several major deals were announced that involved the commitment of billions of dollars by

106. Gregory Meyer, *US Renewables Look to Plug Funding Gap as Pandemic Hits Tax Incentives*, FIN. TIMES (Dec. 12, 2020), <https://www.ft.com/content/f54cd9b7-eee8-4a45-b0bb-f441960a5359> [https://perma.cc/SC5A-2YRF]; Golden, *supra* note 101 (“[W]hen it comes to renewable energy, the importance of tax equity cannot be overstated [as i]t is the primary federal incentive to drive investments into clean energy projects.”).

107. Yuri Horwitz, *Why (and How) the Solar Finance Market is Changing in This Crisis*, GREEN TECH MEDIA (May 20, 2020), <https://www.greentechmedia.com/articles/read/why-and-how-the-solar-finance-market-is-changing-in-this-crisis> [https://perma.cc/5FXP-S397]; *see also* Meyer, *supra* note 105 (discussing “deep-pocketed institutions such as JPMorgan Chase, Bank of America and Berkshire Hathaway”).

108. EISEN, *supra* note 56, at 87–88; *see* Meyer, *supra* note 106.

109. Fotios Tsarouhis, *Pool of Tax Equity Investors Recedes as Coronavirus Uncertainty Lingers*, S&P GLOBAL MKT. INTELLIGENCE (July 31, 2020), <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/pool-of-tax-equity-investors-recedes-as-coronavirus-uncertainty-lingers-59688654> [https://perma.cc/J966-9VPQ].

110. Meyer, *supra* note 106 (quoting Keith Martin, a lawyer at Norton Rose Fulbright in Washington, who stated that “[t]ax equity for renewable energy is a \$12bn-\$13bn market, with JPMorgan and Bank of America each investing about \$3bn in 2019” and one banker who stated that “[t]he top five investors hold 80 per cent of the market”).

111. AM. COUNCIL ON RENEWABLE ENERGY, *supra* note 53, at 6 (“Notably, three-quarters of the surveyed tax equity investors predict a decline in tax equity investment.”).

investors who were honoring the terms of prior commitments. One such deal involved the construction of a 133.6 MW solar farm in North Carolina that when completed would supply energy to five corporations (Bloomberg, Cox Enterprises, Salesforce, Starbucks, Workday, and Gap) via a “virtual power purchase agreement.”¹¹²

The landscape for new projects is quite different. In the summer of 2020, some institutional investors, particularly more conservative banks, were slowing down or halting the rate at which they were investing in new projects.¹¹³ Some banks have already stepped out of the market and large tax equity investors are “slowing down new origination.”¹¹⁴ By December, the overall investment climate for renewable energy had recovered somewhat,¹¹⁵ but the picture for tax equity still looked cloudy. One of the nation’s largest solar developers stated that the tax equity market was “somewhat frozen,”¹¹⁶ and a BNEF policy analyst showed that over half of both solar and wind projects lacked tax equity investments.¹¹⁷

Primary concerns for institutional investors are the uncertainty about pandemic-related delays and the sunset of the renewable energy tax credits.¹¹⁸ If delays in projects threatened to push project completion dates into the future, projects might not qualify for the appropriate tax credits, unless the sunset deadlines were extended.¹¹⁹ This has made some would-be institutional investors more reluctant about investing in projects that depend on the availability of tax credits, or to seek higher returns as compensation for taking on the uncertainty.¹²⁰ As one energy finance officer stated, this situation is “making it very difficult to forecast tax liability looking out into next year, and I know that that applies for [2022] as well[.]”¹²¹ One observer called uncertainties over the tax climate the “biggest slowdown” as investors and developers awaited action from the

112. Ivan Shumkov, *BayWa Bags Tax Equity, Construction Funds for 134-MW US Solar Project*, RENEWABLES NOW (Apr. 24, 2020, 11:26 AM), <https://renewablesnow.com/news/baywa-bags-tax-equity-construction-funds-for-134-mw-us-solar-project-696239/> [<https://perma.cc/9LU8-KGXE>].

113. Horwitz, *supra* note 107.

114. *Id.*

115. Keith Goldberg, *Clean Energy Projects Dodge Pandemic’s Wrath In 2020*, LAW360 (Dec. 17, 2020), <https://www.law360.com/articles/1334863/clean-energy-projects-dodge-pandemic-s-wrath-in-2020> [<https://perma.cc/F25H-9Q68>].

116. Meyer, *supra* note 105 (quoting Tom Buttgenbach, chief executive of 8Minute Solar Energy, a California-based company).

117. *Id.*

118. *Id.*; Tsarouhis, *supra* note 109.

119. *See infra* notes 162–67 and accompanying text.

120. Meyer, *supra* note 106.

121. Tsarouhis, *supra* note 103 (quoting Eric Heintz, director of energy finance at M&T Bank Corporation).

incoming Biden administration.¹²² Much of this is related to difficulties in forecasting whether the tax credits would be extended,¹²³ which has always been a bit of a hit or miss proposition.¹²⁴ To the extent that it threatens to slow down the deployment of utility-scale renewable energy projects, that uncertainty is a luxury that we can ill afford with the pressing needs brought on by climate change.¹²⁵

b. Impacts on Debt Financing

Not all renewable energy projects are financed through tax equity financing.¹²⁶ Many are financed through funds obtained from commercial lenders such as major banks.¹²⁷ The pandemic has made it more difficult for project developers to secure this type of financing, and many banks are simply not providing as much capital right now for projects.¹²⁸ The uncertain economic conditions brought about by the pandemic made banks more cautious about lending in general, and more reluctant to invest until the pandemic abates, or at least until there is more certainty about the shape of the economic recovery.¹²⁹

The cautiousness of banks about making new loans manifested itself in a number of ways: higher rates, lower chances that projects will attract the requisite funding,¹³⁰ and, perhaps most notably, tighter loan standards for borrowers.¹³¹ The Federal Reserve's July 2020 quarterly survey of senior bank loan officers found that seventy-one percent of loan officers

122. Goldberg, *supra* note 115 (quoting Billi McCullough of Holland & Hart LLP).

123. *Id.*; Meyer, *supra* note 106.

124. *See infra* notes 162–64 and accompanying text.

125. *See* Meyer, *supra* note 106 (noting that industry executives have observed that “[t]he chill is hampering growth in wind and solar projects just as the climate crisis calls for overwhelming investment in zero-emissions resources . . .”).

126. Steven Mufson & Dino Grandoni, *Coronavirus Crisis Hits Solar and Wind Energy Industry*, WASH. POST (May 4, 2020, 5:00 AM), <https://www.washingtonpost.com/climate-environment/2020/05/04/coronavirus-crisis-hits-solar-wind-energy-industry/> [<https://perma.cc/V4F5-RWT6>].

127. Meyer, *supra* note 106.

128. *Id.*

129. Mufson & Grandoni, *supra* note 126 (quoting Daniel Klier, global head of sustainable finance at HSBC Bank, stating that “[e]verything is quiet because people want to see where we land with the current crisis, and people are holding on to cash”).

130. *Id.* (citing the example of a Texas wind farm put on hold because of uncertainties about funding).

131. Lindsey White, Carolyn Duren, Zach Fox, Harry Terris & Zain Tariq, *Bankers Showing 'Tough Love' in Commercial Lending Amid COVID-19 Uncertainty*, S&P GLOB. MKT. INTELL. (June 15, 2020), <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/bankers-showing-tough-love-in-commercial-lending-amid-covid-19-uncertainty-58978823> [<https://perma.cc/KA79-J3BF>].

observed that lending standards have tightened.¹³² This is the highest rate of tightening since readings in 2008 during the Great Recession.¹³³ The survey found that banks were increasingly imposing terms on borrowers such as higher loan spreads over the bank's cost of funds, and were tightening a wide variety of other lending terms,¹³⁴ which increases the transaction costs of obtaining loans.¹³⁵ As anyone who is familiar with news reports during the pandemic has observed, banks are busy making billions of dollars in loans to struggling small businesses and others under government sponsored programs.¹³⁶ This has further reduced the overall pool of loan funding available, and had a negative impact on the amount of funding for renewable energy projects.¹³⁷

Another impact of tightening loan standards and a reduced credit pool is that lenders are tending to look for those borrowers who they believe are most creditworthy. Banks were more interested in projects sponsored by renewable energy developers who had already proven that they could complete projects successfully.¹³⁸ This will make it more challenging for project developers, such as those investing for the first time in projects such as community solar, who do not have demonstrated track records.¹³⁹

4. Impacts on Renewable Energy Sector Employment

Before the pandemic hit, clean energy industries had been among the fastest growing in the nation. Jobs data from the 2020 U.S. Energy and Employment Report showed that there were almost seven million workers in the United States energy sector in 2019.¹⁴⁰ Clean energy employment

132. Steve Goldstein, *Bank of America Strategist: 'I'm so Bearish, I'm Bullish'*, MARKETWATCH (Aug. 8, 2020, 9:50 AM), <https://www.marketwatch.com/story/bank-of-america-strategist-im-so-bearish-im-bullish-2020-08-07> [<https://perma.cc/GZ34-L6HY>]; see also Horacio Sapriza & Andrew Castro, *The July 2020 Senior Loan Officer Opinion Survey on Bank Lending Practices*, BD. OF GOVERNORS OF THE FED. RESRV. SYS., <https://www.federalreserve.gov/data/sloos/sloos-202007.htm> [<https://perma.cc/DYL2-MXXM>] (last updated Aug. 3, 2020).

133. Goldstein, *supra* note 132.

134. White et al., *supra* note 131; Sapriza & Castro, *supra* note 131.

135. Sapriza & Castro, *supra* note 132.

136. See White et al., *supra* note 131.

137. Ivan Penn, *Oil Companies Are Collapsing, but Wind and Solar Energy Keep Growing*, N.Y. TIMES (Apr. 7, 2020), <https://www.nytimes.com/2020/04/07/business/energy-environment/coronavirus-oil-wind-solar-energy.html> [<https://perma.cc/4425-FNHM>] (quoting Josh Goldstein, chief operating officer at solar developer 8minute Solar Energy, that "because demand for loans has shot up as businesses across the economy struggle, banks have been less able to finance new projects").

138. See White et al., *supra* note 131.

139. Meyer, *supra* note 106 ("The tightening market is hitting developers without the scale or banking relationships to command attention.").

140. NAT'L ASS'N OF STATE ENERGY OFFS. & ENERGY FUTURES INITIATIVE, 2020 U.S. ENERGY AND EMPLOYMENT REPORT X (2020), <https://static1.squarespace.com/static/>

made up a substantial percentage of these workers. Counting workers in energy efficiency and renewable energy jobs, there were nearly three times as many clean energy jobs as in fossil fuel industries.¹⁴¹ The job growth for positions such as solar installers and wind turbine technicians was astronomic. The federal Bureau of Labor Statistics projected that these were two of the nation's three fastest growing occupations,¹⁴² predicting both would rise “much faster” over the next decade than other occupations.¹⁴³

Then came the pandemic. With the accompanying slowdown in renewable energy projects, clean energy employment was hammered. Manufacturing plants in the supply chain, producing building materials, batteries, solar panels and other components, closed due to growing concerns about the spread of the pandemic.¹⁴⁴ Clean energy companies began expanding furloughs and layoffs.¹⁴⁵ In June 2020, over 600,000 clean energy workers—almost twenty percent of all those in the sector—had lost their jobs due to the pandemic.¹⁴⁶ This was a faster rate of job loss than even the dire rate of furloughs and job losses in the broad economy.¹⁴⁷

Even more worrisome than the actual job loss numbers was that many of those impacted were lower income workers and people of color who were already disproportionately adversely affected by the pandemic.¹⁴⁸ One analysis of the job loss data noted that Hispanic and Latino workers

5a98cf80ec4eb7c5cd928c61/t/5ee78423c6fcc20e01b83896/1592230956175/USEER+2020+0615.pdf [https://perma.cc/RMF5-TT8J] [hereinafter NASEO & EFI 2020 ENERGY REPORT].

141. *Id.* at xvi–xxi.

142. *Occupational Outlook Handbook: Fastest Growing Occupations*, U.S. DEP'T OF LAB., BUREAU OF LAB. STAT., <https://www.bls.gov/ooh/fastest-growing.htm> [https://perma.cc/DL83-AEVT] (last modified Sept. 1, 2020).

143. *Occupational Outlook Handbook: Wind Turbine Technicians*, U.S. DEP'T OF LAB., BUREAU OF LAB. STAT., <https://www.bls.gov/ooh/installation-maintenance-and-repair/wind-turbine-technicians.htm> [https://perma.cc/2483-PAYR] (last modified Sept. 1, 2020); *Occupational Outlook Handbook: Solar Photovoltaic Installers*, U.S. DEP'T OF LAB., BUREAU OF LAB. STAT., <https://www.bls.gov/ooh/construction-and-extraction/solar-photovoltaic-installers.htm> [https://perma.cc/AYH6-K9S3] (last modified Sept. 1, 2020).

144. Jeff St. John, *Coronavirus Wipes Out 5 Years of US Solar Job Growth*, GREENTECH MEDIA (May 18, 2020), <https://www.greentechmedia.com/articles/read/coronavirus-wipes-out-solar-job-growth> [https://perma.cc/Z3YP-NPGZ].

145. Philip Jordan, *Clean Energy Employment Initial Impacts from the COVID-19 Economic Crisis*, BW RSCH. P'SHIP 2–3 (June 15, 2020), <https://e2.org/wp-content/uploads/2020/06/Clean-Energy-Jobs-May-COVID-19-Memo-Final.pdf> [https://perma.cc/L5LM-F4FU].

146. *Id.* at 1.

147. St. John, *supra* note 144.

148. Shalanda H. Baker, *How To Create Anti-Racist Energy Policies*, WBUR COGNOSCENTI (Sept. 23, 2020), <https://www.wbur.org/cognoscenti/2020/09/23/utility-bills-energy-climate-change-covid-environmental-justice-shalanda-h-baker> [https://perma.cc/K77W-P722].

were the most adversely affected, putting their job losses at twenty-five percent compared to their fourteen percent representation in overall employment in clean energy industries.¹⁴⁹ As Professor Shelley Welton and I have observed elsewhere,¹⁵⁰ that fourteen percent figure is itself cause for concern that the industry lacks diversity, and the pandemic's reversal of the modest gains made on this front is deeply concerning.

II. SHORT-TERM POLICY PRESCRIPTIONS FOR A REBOUND IN RENEWABLES

This section advocates for short-term policy prescriptions to help ameliorate the near-term impacts of the pandemic in the renewable energy sector. The slowdown in renewable energy deployments, continued uncertainty about new projects' viability, adverse job impacts, and changes in demand may or may not be durable trends. Some analysis shows that by the end of 2020 the sector rebounded well, with a noticeable uptick in utility-scale projects.¹⁵¹ But there is still considerable uncertainty about the future, and there were notable short-term setbacks to renewable energy and the energy system as a whole, particularly in persistent high unemployment. The downturn in deploying renewables earlier in 2020 makes it more difficult to reach climate goals, giving an added urgency to reversing it. As noted above, the Biden Administration's infrastructure plan will almost certainly be the vehicle for near-term action.¹⁵²

Supporting renewable energy as part of our recovery from pandemic-related conditions is also consistent with a broad shift in policy focus. The dislocation of normal activities occasioned by the pandemic created an unparalleled opportunity to reexamine foundational assumptions about our national social and economic frameworks. Sometimes the result was problematic, as in the persistence of those who refused to wear masks to combat the spread of COVID-19. But even that highlighted a new reality. If there was ever a time when we needed to embrace collective solutions to complex problems, it is now. COVID-19 has exposed so many faults in our current system of public infrastructure that many have called for broad-based strategies to invest in a future that makes substantial new investments to improve Americans' lives.¹⁵³

149. Jordan, *supra* note 145, at 3.

150. Shelley Welton & Joel B. Eisen, *Clean Energy Justice: Charting an Emerging Agenda*, 43 HARV. ENV'T L. REV. 307, 330–39 (2019).

151. Goldberg, *supra* note 115.

152. White House Fact Sheet, *supra* note 1.

153. See, e.g., Shalini Vajjhala & Joseph W. Kane, *Four Steps to Undo the Harms of Legacy*

Notably, some have called for economic recovery from the pandemic that simultaneously takes action on climate change. As former Energy Secretary Moniz has stated, this allows government to “do a better job at its core function of risk management and economic stimulus.”¹⁵⁴ He advocates for “a clean energy stimulus program built on the foundation of energy infrastructure modernization and job creation through 2021”¹⁵⁵ From a study of economic recovery programs over the past two decades, there is strong evidence that “green stimulus policies often have advantages over traditional fiscal stimulus.”¹⁵⁶ Recovery measures designed to promote renewable energy growth can be substantial drivers of economic growth and restoring job growth, as a detailed report issued in December noted.¹⁵⁷ Measures to promote renewable electricity growth could be a catalyst for jobs recovery through 2021. And, at the same time, they can help achieve climate goals by incorporating the themes of the Green New Deal resolution¹⁵⁸ and the “just transition” literature¹⁵⁹ that advocates moving society toward decarbonization and away from reliance on fossil fuels while simultaneously adhering to principles such as treating workers fairly.

Before the issuance of the Biden Administration’s plan, recovery efforts largely ignored the clean energy sector. A House of Representatives hearing in September focused on the lack of climate action and planning in pandemic recovery,¹⁶⁰ and one study found the United States is far behind other nations that are making climate action a

Infrastructure in the COVID-19 Recovery, BROOKINGS (Dec. 17, 2020), <https://www.brookings.edu/research/four-steps-to-undo-the-harms-of-legacy-infrastructure-in-the-covid-19-recovery/> [<https://perma.cc/QUU7-57W2>].

154. *Hearing on Reviving our Economy: COVID-19’s Impact on the Energy Sector Before the Subcomm. on Energy of the H. Comm. on Energy and Com.*, 116th Cong. 9 (2020) (testimony of The Honorable Ernest J. Moniz, President and CEO, Energy Futures Initiative, Inc.).

155. *Id.* at 3.

156. Cameron Hepburn, Brian O’Callaghan, Nicholas Stern, Joseph Stiglitz & Dimitri Zenghelis, *Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change?*, 36 OXFORD REV. OF ECON. POL’Y S359, S366 (2020).

157. AM. CLEAN POWER ASS’N, RENEWABLE ENERGY AND INFRASTRUCTURE POLICY SCENARIO ANALYSIS 4 (2020), <https://www.woodmac.com/press-releases/driving-toward-a-majority-renewables-america-to-catalyse-nearly-one-million-direct-u.s.-clean-energy-jobs/> [<https://perma.cc/3GA2-2JZN>].

158. The House of Representatives Green New Deal resolution has numerous goals for addressing climate change and economic growth simultaneously, including achieving “net-zero greenhouse gas emissions through a fair and just transition for all communities and workers,” investment in “infrastructure and industry . . . to sustainably meet the challenges of the 21st century,” and the creation of “millions of good, high-wage jobs” H.R. Res. 109, 116th Cong. (2019).

159. *See, e.g.*, Ann M. Eisenberg, *Just Transitions*, 92 S. CAL. L. REV. 273 (2019).

160. *Green Recovery Plans for the COVID-19 Crisis: Hearing Before the Subcomm. on Europe, Eurasia, Energy, and the Env’t of the H. Comm. on Foreign Affairs*, 116th Cong. (2020).

top priority in their recovery efforts.¹⁶¹ For these reasons, this section discusses several measures designed to promote recovery in the renewable energy sector. These policies are directly targeted to reverse short-term dislocations to renewable energy development and deployment and jobs in renewable energy industries, and to promoting economic growth and climate action simultaneously. There is a pressing need to implement more ambitious agendas for the clean energy transition, but for now, this Article supports these near-term policies that are sound, and are necessary components of a longer-term agenda.

A. *Extending Renewable Energy Tax Incentives*

The first of these measures is an extension of the tax credits for renewable energy projects, which the Biden plan proposes for the next ten years.¹⁶² As noted above, the early months of the pandemic created a near perfect storm for larger projects, prompting slowdowns in project development, permitting, and construction just as the tax credits were scheduled to sunset. This is hardly the first time that the PTC and ITC have been on the brink. Indeed, it is an almost annual ritual,¹⁶³ and Congress usually finds a way to reauthorize the credits together with other tax extenders.¹⁶⁴ Over the past two decades, this has sometimes not worked out, and in years when the credits were not reauthorized, such as 2013, deployments of new facilities have dropped substantially.¹⁶⁵

Despite this occasional uncertainty about their fate, the PTC and ITC have been remarkably successful.¹⁶⁶ The continued uncertainty about project financing and economic conditions in general have prompted

161. Simon Evans & Josh Gabbatiss, *Coronavirus: Tracking How the World's 'Green Recovery' Plans Aim to Cut Emissions*, CARBONBRIEF (June 16, 2020, 4:30 PM), <https://www.carbonbrief.org/coronavirus-tracking-how-the-worlds-green-recovery-plans-aim-to-cut-emissions> [https://perma.cc/PUB3-PQCJ].

162. White House Fact Sheet, *supra* note 1.

163. See Felix Mormann, *Beyond Tax Credits: Smarter Tax Policy for a Cleaner, More Democratic Energy Future*, 31 YALE J. ON REG. 303, 313–14 (2014) (noting that there are occasional lapses in renewal).

164. MOLLY F. SHERLOCK, CONG. RSCH. SERV., R43453, THE RENEWABLE ELECTRICITY PRODUCTION TAX CREDIT: IN BRIEF 3–6 (2020), <https://crsreports.congress.gov/product/pdf/R/R43453> [https://perma.cc/6784-S276] (describing and listing the numerous laws that have extended the credits).

165. RYAN WISER, MARK BOLINGER, GALEN BARBOSE, NAÏM DARGHOUTH, BEN HOEN, ANDREW MILLS, KRISTINA HAMACHI LACOMMARE, DEV MILLSTEIN, DANA HANSEN, KEVIN PORTER, REBECCA WIDISS, MICHAEL BUCKLEY, FRANK OTERI, AARON SMITH & SUZANNE TEGEN, U.S. DEP'T OF ENERGY, 2014 WIND TECHNOLOGIES MARKET REPORT 3 fig.1 (2015), <https://www.energy.gov/sites/prod/files/2015/08/f25/2014-Wind-Technologies-Market-Report-8.7.pdf> [https://perma.cc/2UB8-QGFV] (depicting the decrease by year).

166. See, e.g., SHERLOCK, *supra* note 164, at 9 n.24 (citing several studies supporting that PTC has driven investment and growth within the wind industry).

numerous calls for the postponement of the sunset deadlines for the renewable energy tax credits. Their extension has broad support from industry participants and policymakers.¹⁶⁷ A variety of proposals to extend the tax credits were put forth. In July 2020, the House of Representatives passed House Resolution 2, the “Moving Forward Act,” a more than \$1.5 trillion plan to rebuild American infrastructure.¹⁶⁸ The Moving Forward Act included an extension of the wind PTC to a beginning of construction deadline of January 1, 2026 (five years beyond its current expiration), with a sixty percent PTC for construction beginning after December 31, 2019.¹⁶⁹ Similarly, it would have extended the thirty percent solar ITC to a beginning of construction deadline of January 1, 2028 (a six-year extension).¹⁷⁰ Eventually, in December, the omnibus pandemic relief bill included short extensions of the PTC and ITC.¹⁷¹ The PTC was extended for one year, as it had already been extended through 2020 in the 2019 tax bill, and the ITC was extended for two years.¹⁷²

Going beyond this short-term extension—as the Biden plan proposes—would be a desirable accommodation of tax policy to the extenuating circumstances imposed by the pandemic. Short-term extensions of the PTC may not be sufficient to resolve the uncertainty about some larger projects and make investors more comfortable and more willing to invest in renewable energy projects going forward. By the summer of 2021, we may still be in the throes of the pandemic, and once again face a situation in which the PTC is about to sunset. It would be appropriate to consider giving some additional stability by giving some assurances that projects will not run up against tax credit deadlines simply by virtue of the pandemic.

A related issue was the pandemic’s impact on the “continuity safe harbor,” where the need to act was readily apparent. If projects are delayed, they may not benefit from tax credits because eligibility for the PTC and ITC are determined largely by the date on which a project begins

167. Tsarouhis, *supra* note 109 (“Concern that investors may not be eager to invest in 2021 has prompted a coalition of energy companies, industry and environmental groups, and state regulators to urge Congress to postpone the phaseout timelines for renewable energy tax credits.”).

168. Moving Forward Act, H.R. 2, 116th Cong. (2020).

169. *Id.* § 90401(c).

170. *Id.* § 90402(c)(1).

171. Catherine Morehouse, *Federal Stimulus Includes Wind, Solar Tax Credit Extensions, Adds First US Offshore Wind Tax Credit*, UTIL. DIVE (Dec. 22, 2020), <https://www.utilitydive.com/news/federal-stimulus-includes-wind-solar-tax-credit-extensions-adds-first-us/592572/> [<https://perma.cc/7VRS-8GL2>].

172. *Id.*

construction.¹⁷³ The relevant provisions define “beginning of construction” for PTC or ITC qualification purposes in two ways: either when “physical work of a significant nature begins” or when the “taxpayer pays or incurs . . . five percent or more of the total cost of the facility”¹⁷⁴ The latter is generally known as the “Five Percent Safe Harbor.”¹⁷⁵ To obtain tax credits, projects must also satisfy a “Continuity Requirement” that generally requires “continuous efforts to advance towards completion of the facility.”¹⁷⁶ If individual projects face delays in obtaining materials through the supply chains, or work is slowed due to constraints imposed on workers as a result of the pandemic, both of these might be affected. A difference of even a year could cause project developers to miss critical deadlines for receiving the soon-to-expire tax credits.¹⁷⁷

In May, the IRS provided some relief on this issue with its Notice 2020-41, which modified prior notices about the beginning of construction requirements.¹⁷⁸ Responding to pleas by industry and a bipartisan group of lawmakers to extend the safe harbor, the IRS now gives qualifying renewables projects that began construction in either 2016 or 2017 an extra year, or until December 2021, to complete work and to qualify for the relevant tax credits.¹⁷⁹ This provides much-needed relief, especially for wind developers that face pandemic-related delays and were racing to complete projects before the tax credits expire at the end of 2020. Extending the credits themselves would alleviate this uncertainty when it arises again in 2021, as noted above.

B. Creating Incentives for Renewable Energy Job Growth

As of the writing of this Article, the pandemic’s most persistent and (unfortunately) precisely calculable negative impact on the renewable energy sector is the continued drop in employment. Jobs reports in mid-September and early December showed that the situation had not improved much from the spring.¹⁸⁰ A weak recovery left nearly 500,000

173. 26 U.S.C. §§ 45, 48(a)(5); see I.R.S. Notice 2020-41, 2020-25 I.R.B. 954.

174. I.R.S. Notice 2020-41, 2020-25 I.R.B. 954.

175. *Id.*

176. *Id.*

177. Brad McElroy, *How COVID-19 is Impacting Renewable Energy*, RENEWABLE ENERGY WORLD (Apr. 29, 2020), <https://www.renewableenergyworld.com/solar/how-covid-19-is-impacting-renewable-energy/#gref> [<https://perma.cc/696F-RHW6>].

178. I.R.S. Notice 2020-41, 2020-25 I.R.B. 954.

179. *Id.*

180. Philip Jordan, *Clean Energy Employment Initial Impacts from the COVID-19 Economic*

workers still unemployed by August,¹⁸¹ and data from October showed 446,000 workers in the sector were still unemployed.¹⁸² In November, thirteen percent of the clean energy workforce was out of work,¹⁸³ twice the national unemployment rate.¹⁸⁴ Some form of assistance that puts employees back to work will be necessary to accelerate recovery, support the clean energy workforce and put the pace of project growth back on track.

There are many reasons to promote clean energy jobs, beginning with the sheer scale of human misery in the fall and winter of 2020. Those out of work were suffering. Many Americans were facing poverty, as shown by such indicia as food insecurity, defined as “a lack of consistent access to enough food for an active, healthy life[.]”¹⁸⁵ Nearly one out of every four United States households experienced food insecurity at some time during 2020.¹⁸⁶ By December 2020, one in eight Americans, or nearly twenty-six million people, did not have enough to eat.¹⁸⁷ Although precise data is not available, almost certainly some of those who had lost their jobs in the renewable energy sector would be counted among that number. And food insecurity was hardly the only way in which Americans were suffering. By December, millions of households were in danger of disconnection of electricity service, facing a loss of one of life’s basic needs.¹⁸⁸ Adding hundreds of thousands of jobs, or even more, back to the renewable energy sector would go a long way toward alleviating these

Crisis, August 2020, BW RSCH. P'SHIP (Sept. 14, 2020), <https://e2.org/wp-content/uploads/2020/09/Clean-Energy-Jobs-August-COVID-19-Memo-Final.pdf> [https://perma.cc/R9LZ-PC36] [hereinafter Jordan, *August 2020 Employment Impacts*]; Philip Jordan, *Clean Energy Employment Initial Impacts from the COVID-19 Economic Crisis, November 2020*, BW RSCH. P'SHIP (Dec. 8, 2020), https://bwresearch.com/covid/docs/BWResearch_CleanEnergyJobsCOVID-19Memo_Nov2020.pdf [https://perma.cc/Q5HY-EN6V] [hereinafter Jordan, *November 2020 Employment Impacts*].

181. Jordan, *August 2020 Employment Impacts*, *supra* note 180, at 1.

182. Jordan, *November 2020 Employment Impacts*, *supra* note 180, at 1.

183. *Id.* at 2.

184. *Employment Situation Summary*, U.S. DEP'T OF LABOR, U.S. BUREAU OF LAB. STAT. (last modified Feb. 5, 2021), <https://www.bls.gov/news.release/empsit.nr0.htm> [https://perma.cc/32MF-8A97] (stating a national unemployment rate of 6.3 percent).

185. Christianna Silva, *Food Insecurity in the U.S. by the Numbers*, NPR (Sept. 27, 2020, 4:30 PM), <https://www.npr.org/2020/09/27/912486921/food-insecurity-in-the-u-s-by-the-numbers> [https://perma.cc/HV4G-FS3N].

186. *Id.*

187. Todd C. Frankel, Britney Martin, Andrew Van Dam & Alyssa Fowers, *A Growing Number of Americans are Going Hungry*, WASH. POST (Nov. 25, 2020), <https://www.washingtonpost.com/graphics/2020/business/hunger-coronavirus-economy/> [https://perma.cc/JJ96-9FY9] (citing *Week 18 Household Pulse Survey: October 28 – November 9*, U.S. CENSUS BUREAU (Nov. 18, 2020), <https://www.census.gov/data/tables/2020/demo/hhp/hhp18.html> [https://perma.cc/ER6T-EQ5T]).

188. Joel B. Eisen, *COVID-19 and Energy Justice: Utility Bill Relief in Virginia*, 22 VT. J. OF ENV'T L. (forthcoming 2021) (on file with author).

problems.

Measures that put people back to work in the renewable energy sector would help lead to a broad-based economic recovery, because the types of jobs in the sector are diverse¹⁸⁹ and geographically distributed throughout the nation.¹⁹⁰ As one commentator put it, “[c]lean energy workers are infused within every sector of our economy.”¹⁹¹ There is no one single type of “renewable energy job.”¹⁹² For instance, in the solar industry, installers work on residential and commercial systems and utility-scale solar projects,¹⁹³ and others work in construction, electrical, engineering, and management professions.¹⁹⁴ These are often good-paying jobs, as pay for renewable energy jobs is at or above the average for all sectors of the economy in general.¹⁹⁵ This is especially true for those with a high school diploma or less who can work in jobs such as installation, where the average wage is often well above the minimum wage.¹⁹⁶ There is substantial potential for movement upward from entry-level positions to higher-level and better-earning positions in operations or management, with the right training program.¹⁹⁷

Investing in green jobs can pay off. Research shows that investments in clean energy have a positive multiplier effect on creating jobs. One recent study found that one million dollars spent on renewable energy leads to about seven to eight full-time equivalent direct and indirect jobs, more than twice as many as yielded by comparable investments in fossil fuel fields.¹⁹⁸ Scholars have found that specific types of spending on green jobs for recovery after economic downturns is effective, after studying the

189. Joseph W. Kane & Ranjitha Shivaram, *How Clean Energy Jobs Can Power an Equitable COVID-19 Recovery*, BROOKINGS (Sept. 10, 2020), <https://www.brookings.edu/blog/the-avenue/2020/09/10/how-clean-energy-jobs-can-power-an-equitable-covid-19-recovery/> [https://perma.cc/SZX3-SAPA].

190. *Building a 100 Percent Clean Economy: Opportunities for an Equitable, Low-Carbon Recovery: Hearing Before the Subcomm. on Ent’y & Climate Change of the H. Comm. on Energy and Com.*, 116th Cong. 4 (2020) (written testimony of Devashree Saha, Senior Assoc., World Research Inst.).

191. Kane & Shivaram, *supra* note 189.

192. See NASEO & EFI 2020 ENERGY REPORT, *supra* note 140, at x–xvii.

193. *Id.* at 47–50, 57.

194. *Id.* at 47–50.

195. *Id.* at 108.

196. THE SOLAR FOUND., 10TH ANNUAL NAT’L SOLAR JOBS CENSUS 2019 13 (2020).

197. NASEO & EFI 2020 ENERGY REPORT, *supra* note 140, at 108.

198. CHARLES F. KUTSCHER, JEFFREY S. LOGAN & TIMOTHY C. COBURN, ACCELERATING THE U.S. CLEAN ENERGY TRANSFORMATION: CHALLENGES AND SOLUTIONS BY SECTOR 38 (2020) (citing Heidi Garrett-Peltier, *Green Versus Brown: Comparing the Employment Impacts of Energy Efficiency, Renewable Energy, and Fossil Fuels Using an Input-Output Model*, 61 ECON. MODELLING 439, 440 (2017)).

American Recovery and Reinvestment Act (ARRA).¹⁹⁹ The ARRA was the omnibus stimulus law that sparked economic recovery after the Great Recession, and it allocated millions of dollars spent on training for workers in renewable energy and energy efficiency.²⁰⁰ A recent study found that these investments were effective,²⁰¹ although the extent depended on specific conditions particular to individual localities. One of these is what labor economists call the “skill distance between jobs”: whether workers are being trained for jobs that have similar skills to those required in their former employment.²⁰² For example, training programs are more successful where those who are out of work had already been working in the energy sector before losing their jobs, as they “have the prerequisite general skills for these new green jobs.”²⁰³

Investing in jobs in the renewable energy sector can also reverse the historically poor record of its industries in diversity and inclusion.²⁰⁴ As Professor Welton and I pointed out in our article on energy justice, people of color and women have been underrepresented in the construction trades, engineering, and management positions in renewable energy industries for years.²⁰⁵ The sector was slow to recognize this problem, and has only recently begun outreach efforts.²⁰⁶ There is an ongoing lack of racial and gender diversity, with representation in positions such as installation being well below the national average.²⁰⁷ Near-term measures can target the enduring inequities in these professions by giving a broader-based workforce the skills, training, and career opportunities that will help create more jobs and a more just economic recovery.

A full description of the Biden plan’s green jobs proposals is beyond the scope of this Article. However, the discussion above suggests the broad contours of what is necessary for recovery and promotion of job creation in the renewable energy sector. It would include measures designed to promote green job training, possibly establishing and funding

199. *Id.* at 19.

200. *Id.* at 38.

201. Ziqiao Chen, Giovanni Marin, David Popp & Francesco Vona, *Green Stimulus in a Post-Pandemic Recovery: The Role of Skills for a Resilient Recovery*, 76 ENV'T & RES. ECON. 901, 909 (2020).

202. *Id.* at 904.

203. *Id.* at 909.

204. Welton & Eisen, *supra* note 150, at 334–39.

205. *Id.*

206. *Id.* at 338–39.

207. *Id.* at 334–35; see Mark Muro, Adie Tomer, Ranjitha Shivaram & Joseph W. Kane, *Advancing Inclusion Through Clean Energy Jobs*, BROOKINGS (Apr. 18, 2019), <https://www.brookings.edu/research/advancing-inclusion-through-clean-energy-jobs/> [https://perma.cc/NSR6-QCM7].

job incubators and apprenticeship programs for on-the-job experience.²⁰⁸ Programs of this sort should focus on education and training, with an emphasis on retooling the workforce so, for example, a worker who has mechanical skills could be taught how to maintain a wind turbine. And there should be targeted efforts in science and engineering programs to create a pipeline to renewable energy jobs at all levels. This would reach out to constituencies that are historically underrepresented in these industries by, for example, conducting outreach to “community colleges, job training organizations, housing authorities and other entities that serve lower-income and minority populations”²⁰⁹

In addition to training and education programs, some form of continued direct governmental assistance may be essential to help some firms recover and keep existing jobs in place. In some parts of the clean energy sector, such as solar system installation, the majority of firms involved are small businesses that suffered mightily during the pandemic.²¹⁰ In mid-2020, one report noted that “‘it will be very tough for the clean energy sector to return to its economy-leading jobs growth’ without help from Congress or state governments”²¹¹ Early on, many were supported by the Paycheck Protection Program (PPP), the loan program designed to keep businesses afloat.²¹² The construction sector was among the largest recipient of PPP loans in terms of volume of loans,²¹³ and firms in this sector make up a considerable percentage of the clean energy economy.²¹⁴ Some near-term assistance of this sort may be necessary to spark job growth.

208. Kane & Shivaram, *supra* note 189.

209. *Workforce Development, LOW-INCOME SOLAR POL’Y GUIDE*, <https://www.lowincomesolar.org/practices/workforce-development/> [https://perma.cc/BWR7-7MMH] (last visited Mar. 14, 2021).

210. Ellen Hughes-Cromwick, John Milko, Ryan Fitzpatrick & Andres Prieto, *How Clean Energy Businesses Can Survive and Thrive After COVID-19*, THIRD WAY (Aug. 21, 2020), <https://www.thirdway.org/memo/how-clean-energy-businesses-can-survive-and-thrive-after-covid-19> [https://perma.cc/LYE4-WWKT].

211. Kelsey Tamborrino, *Clean Energy Job Layoffs Slow, but End of PPP Looms*, POLITICO (June 24, 2020, 7:00 AM), <https://www.politico.com/news/2020/06/24/clean-energy-job-layoffs-slow-but-end-of-ppp-looms-336968> [https://perma.cc/KD73-Y6GW].

212. Hughes-Cromwick et al., *supra* note 210 (“Half of respondents received or expected to receive funding from the Federal Paycheck Protection Program (PPP).”); see *Paycheck Protection Program*, U.S. SMALL BUS. ADMIN., <https://www.sba.gov/funding-programs/loans/coronavirus-relief-options/paycheck-protection-program> [https://perma.cc/WT5B-QN56] (last visited Mar. 5, 2021).

213. John Caulfield, *Construction Businesses Top One Cohort of Borrowers Under Paycheck Protection Program*, BLDG. DESIGN & CONSTR. (July 8, 2020), <https://www.bdcnetwork.com/construction-businesses-top-one-cohort-borrowers-under-paycheck-protection-program> [https://perma.cc/48WW-HF2J].

214. See NASEO & EFI 2020 ENERGY REPORT, *supra* note 140, at xiii–xiv.

CONCLUSION

During the COVID-19 pandemic, the renewable energy sector of the economy has been substantially disrupted. The uncertainties going forward are daunting, and we should do what we can to reverse unfavorable short-term trends. The short-term policy prescriptions this Article advocates for supporting renewable energy are well worth pursuing, as the adverse impacts are already significant enough for renewable electricity that it is worth our attention to reverse them. The short-term project delays, slower growth, and job losses are immediate and tangible. These challenges will affect our ability to resume a growth trajectory for renewable electricity, although it is too soon to predict by how much. Getting the pace of new smaller scale installations back to where it was at the beginning of the year—not to mention accelerating it—will require a sustained effort.

For now, we should embark on a recovery effort that promotes economic growth and emissions reductions. These policies can also be useful and provide a lift to a national conversation that takes us toward much broader objectives of addressing the climate crisis, the greatest threat to humanity. The impacts of the climate crisis will dwarf the COVID-19 pandemic in both duration and intensity.²¹⁵ This makes it more important to act now, as the sustained public and private sector efforts required to combat the adverse effects of the pandemic can be a precursor for dealing with the climate crisis. Perhaps we may someday look back on this time and recognize that the societal mobilization needed to combat a threat today through a green stimulus program may offer useful lessons for how we might someday comprehensively mitigate and adapt to climate change.

215. Sara C. Bronin, *What the Pandemic Can Teach Climate Attorneys*, 72 STAN. L. REV. ONLINE 155, 155 (2020); Hepburn et al., *supra* note 156, at S360 (calling the climate crisis “much graver”).