The 2020 U.S. Renewable Energy Outlook

S&P Global
Market Intelligence

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Overview

By Steve Piper, Research Director, Energy, S&P Global Market Intelligence

Electricity from renewable power sources is transforming the U.S. electricity grid in ways few would have anticipated just a few years ago. Here, we highlight major trends in markets, technology and regulation to watch for in the year ahead, based on data analysis conducted across our team of energy experts.

Compared to an average installation rate of 10.5 GW per year since 2010, wind and solar installations in 2020 appear likely to exceed 20 GW as developers take advantage of expiring subsidies. S&P Global Market Intelligence further flags nearly 36 GW of wind and solar capacity likely to be added across the country by 2021. Even after federal tax incentives step down, renewable portfolio standard, or RPS, compliance markets will drive 6 GW to 9 GW per year of additions.

A survey of policy activity in the coming year shows that the 2020 Federal Energy Regulatory Commission docket is loaded with proceedings consequential for renewables market access, such as transmission, participation in capacity markets, the role of storage and reform of the Public Utility Regulatory Policies Act, FERC's original open-access ruling. The industry should also keep an eye on statehouses that have committed long term to carbon-free generation, updating existing RPS or establishing even further-reaching targets.

Even in states lacking explicit renewables mandates, leading U.S. utilities increasingly understand that renewable electricity can be a driver of rate base growth while legacy assets become a drag on cash flow. Their capital expenditure plans reflect this shift in regulation. Paired solar-plus-storage projects are also poised to foster a new era of renewables integration, with over 85 projects currently under development and more to come.

Read on for more renewable energy intelligence and analysis critical for charting a strategic path forward next year and in the years to come. To explore the data further, reach out to our team of experts to set up an analysis session.

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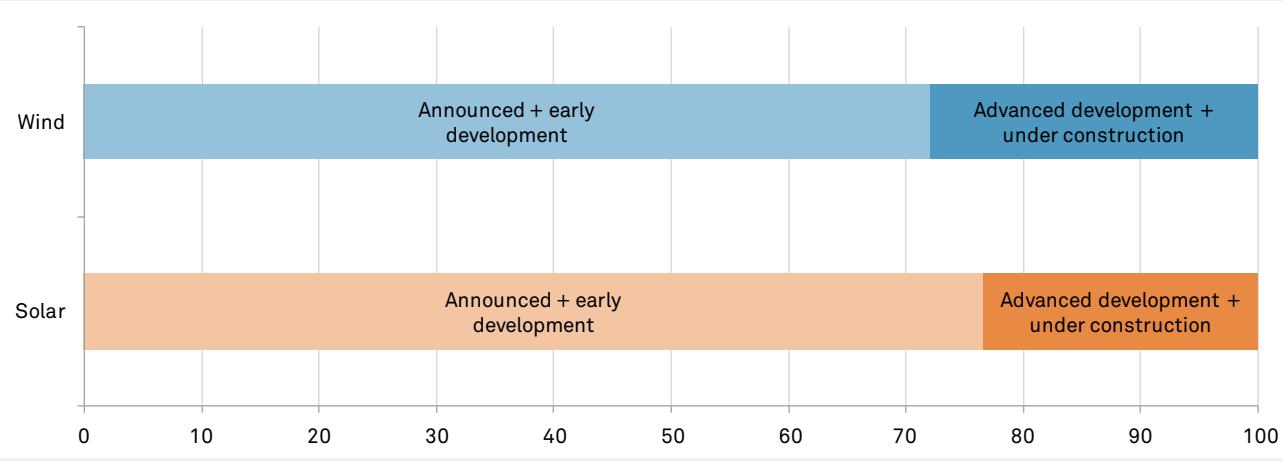
Wind and solar pipeline swells as tax incentive expirations loom

By Ashleigh Cotting, Data Journalism Editorial, Energy, S&P Global Market Intelligence

The pipeline of wind and solar projects under development in the U.S. has ballooned as renewable energy developers race to qualify for expiring tax incentives, with the production tax credit for wind farms scheduled to expire at the end of 2019 and the investment tax credit for solar plants slated to begin phasing down in 2020. Companies have plans to bring nearly 72 GW of wind and solar plants online in 2020, according to S&P Global Market Intelligence data, a considerable increase from recent years. Between 2010 and 2018, annual wind and utility-scale solar additions averaged about 6.9 GW and 3.6 GW, respectively.

It is not likely that all 72 GW of capacity slated for 2020 will achieve that online date. As of Oct. 25, only 26% of that capacity fell into the advanced stages of development. The projects in the early stages of development still need

Majority of wind, solar projects slated for 2020 still in early stages of development (%)

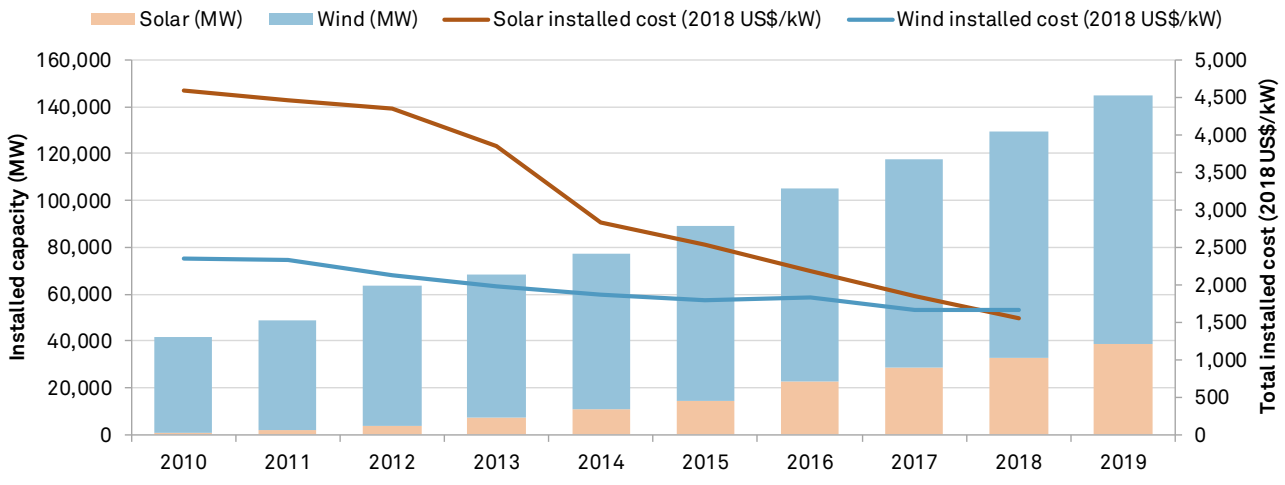


Data compiled Oct. 25, 2019.
Source: S&P Global Market Intelligence

some combination of permits, financing, equipment and/or an agreement for an off-taker, all of which could push a project's completion date beyond 2020. Other emerging challenges, such as increasing transmission upgrade and interconnection costs, will make it even more difficult for companies to get their entire suite of 2020 projects online by year end. There are safe-harbor provisions, though, that give developers several years to finish constructing projects that they hope to qualify for tax incentives.

The impending expiration of tax incentives, however, is not expected to kill the market. Data from the International Renewable Energy Agency shows that the installed costs for wind and utility-scale solar photovoltaic plants have declined significantly in recent years. From 2010 through 2018, the average installed cost for a wind plant in the U.S. dropped 29%. Over the same period, utility-scale solar farms saw installed costs decline by 66%, bringing the average cost on a 2018 U.S. dollar per kilowatt basis slightly below that for wind plants.

Wind, solar capacity continue to climb as installed costs fall



Data compiled Oct. 25, 2019.
Total installed cost figures are weighted averages sourced from the International Renewable Energy Agency report "Renewable Power Generation Costs In 2018."
Sources: S&P Global Market Intelligence; International Renewable Energy Agency

Declining costs should keep the broader renewables market competitive, and companies appear to have a positive outlook. During NextEra Energy Inc.'s third-quarter earnings call on Oct. 22, Rebecca Kujawa, the company's executive vice president of finance and chief financial officer, stated "We expect that overall wind demand in 2021 will be roughly the same levels as in 2019 and that solar demand will continue to increase through the early part of the next decade."

Renewable power forecast: 2020-2030

By Adam Wilson, Research Analyst, Energy, S&P Global Market Intelligence

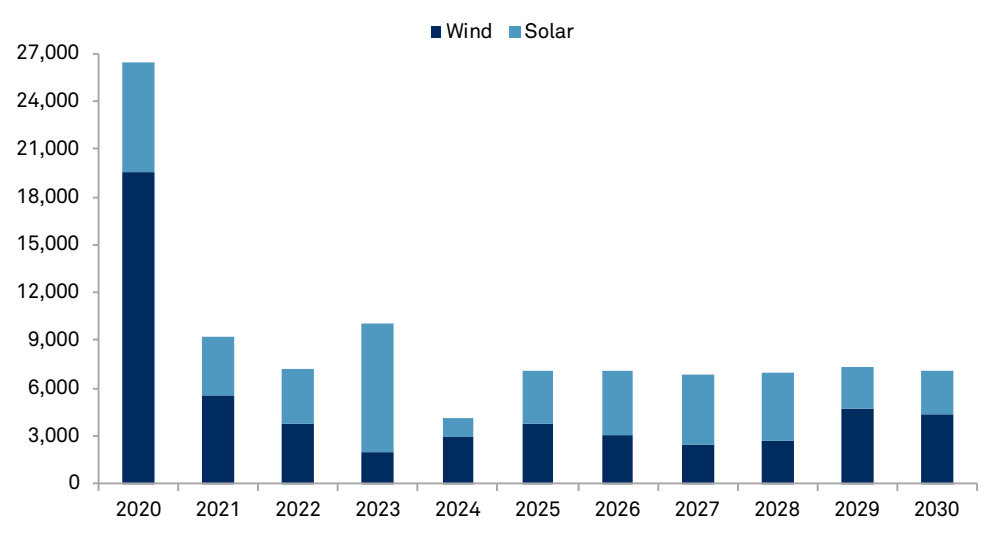
Multiple states have recently implemented changes to their renewable portfolio standards, or RPS, in the last 18 months, beginning with California passing The 100 Percent Clean Energy Act of 2018 requiring carbon-free generation to cover 100% of retail sales by 2045. New Mexico, Washington and Maine all followed suit with similar 100% targets, with the passing of the Energy Transition Act, Clean Energy Transformation Act and Act To Reform Maine's Renewable Portfolio Standard, respectively. On top of other aggressive targets in power-hungry states such as New York, New Jersey, Maryland and Massachusetts, RPS targets alone are forecast to require just shy of 100,000 MW of new wind and solar installations between 2020 and 2030.

Examining the current pipeline of renewable projects across the U.S. shows that solar photovoltaic, or PV, is becoming increasingly popular, with almost 76,000 MW of projects in various stages of development — more than double the current installed capacity of 35,000 MW. The expiration of the federal production tax credit, or PTC, and rapidly dropping prices for solar PV panels despite the impact of tariffs have helped solar continue to emerge as a major player in the utility-scale power landscape. Notably, Texas has more solar capacity — 21,000 MW — than it does wind — 20,743 MW — in the pipeline, which starkly contrasts with its current installed portfolio of 13 times more wind than solar capacity.

Despite the expiring PTC, wind is expected to remain the leading renewable technology in the United States. There is over 133,000 MW of wind capacity in the pipeline currently, and while some of these projects may have qualified for a PTC under the safe harbor rule, it is clear developers still see wind as a lucrative option looking forward, due to falling costs combined with legislative and corporate demand. Additionally, offshore wind is expected to finally make real headway in the U.S. through the 2020s thanks to aggressive state capacity targets in Connecticut, Maine, Maryland, New Jersey, New York, Massachusetts and Virginia totaling over 20,000 MW.

S&P Global Market Intelligence's Power Forecast team projects almost 55,000 MW of new wind and 45,000 MW of new solar installed between 2020 and 2030 just to maintain pace with state RPS requirements alone. California is forecast to install over 21,000 MW of solar just to meet their 60% target by 2030. Nevada and New Mexico also have strong forecast solar capacity additions at roughly 5,600 MW and 5,000 MW, respectively, as a result of strong solar resources and recently increased RPS mandates. Maryland is forecast to install just over 4,600 MW by 2030 to meet its 14.5% in-state solar carve-out.

Total RPS-driven wind and solar capacity additions, 2020-2030 (MW)



Data as of Oct. 24, 2019.
RPS = Renewable portfolio standard
Source: S&P Global Market Intelligence

New York, New Jersey and Massachusetts are estimated to install 9,500 MW, 8,400 MW and 4,700 MW of wind, respectively, thanks to the aforementioned offshore wind targets and aggressive RPS mandates. California, Colorado, Illinois and Michigan each have at least 2,000 MW of wind projected to come online between 2020 and 2030.

These forecast capacity additions do not account for corporate renewable demand and generic renewable builds not counting toward RPS mandates. While challenges and uncertainties such as tariffs and federal legislative changes remain, falling costs and continued implementation of aggressive RPS make the outlook for renewables very bright throughout the next decade.

Federal policy landscape

By Jim O'Reilly, Principal Analyst, Energy, S&P Global Market Intelligence

The Federal Energy Regulatory Commission has authority over electric utility wholesale sales and transmission rates in interstate commerce, the transportation and sale of natural gas in interstate commerce, and the licensing and inspection of private, municipal and state hydroelectric projects. FERC also has jurisdiction over open access to the interstate electric transmission grid and certain mergers and acquisitions.

While FERC has little or no direct role in the development, siting and construction of renewable generating resources other than hydroelectric projects, the commission's policies and actions can have significant indirect impacts on renewables and material consequences for renewable project developers and owners in a number of ways. The following are key FERC matters that warrant close watching in 2020.

PURPA

The Public Utility Regulatory Policies Act, or PURPA, was enacted in 1978 to introduce competition in generation and promote fuel diversity in the U.S. generation portfolio mix. Among other things, PURPA created a framework to encourage the development of small power-production facilities whose primary energy source is renewable, biomass, waste or geothermal resources.

In September 2019, FERC proposed a series of fundamental changes to PURPA that could substantially increase uncertainty for renewable project developers and lenders. The proposed changes are subject to public review and comment and are likely to be modified, perhaps significantly, before FERC issues any final rules sometime in 2020.

Market structure

FERC has long pursued policies to ensure open, competitive wholesale markets for electricity and rates that are just and reasonable. Wholesale power markets in regions of the U.S. administered by regional transmission organizations and independent system operators are constantly undergoing structural changes and refinements to rules governing participation of all generating resources, including renewables, in each region's energy, capacity and ancillary services markets.

Notably for 2020, RTOs and ISOs are in the early stages of implementing rules intended to remove barriers to the participation of energy storage resources, which are often paired with renewable resources, in RTO/ISO markets.

In addition, FERC continues to adjudicate long-running disputes involving state policies that provide incentives for specific generation resources, including coal and nuclear, and the impact of those policies on renewables, reliability and evolving RTO/ISO capacity markets, most notably in the PJM Interconnection.

Electric transmission

FERC requires owners of transmission assets to provide open, nondiscriminatory access to their transmission lines, and renewable projects planning to interconnect to the interstate transmission system must navigate a shifting landscape of rules and regulations. New interconnection rules adopted in 2019, intended to provide additional transparency and certainty to transmission customers including renewable project developers, will continue to impact transmission owners and customers into 2020.

FERC also launched broad inquiries in 2019 into the commission's policies governing the establishment of ROEs for transmission owners and a series of transmission incentives that were originally adopted in 2006 to encourage investment in transmission infrastructure. The outcomes of these two inquiries is uncertain and could have far-reaching implications for transmission owners and customers in 2020.

Mergers & acquisitions

Mergers and acquisitions involving generation resources, including many transactions involving renewable assets, can be subject to FERC's review and approval. Potential consolidation in the industry in 2020 could be affected by horizontal or vertical market power concerns and FERC's review of the potential effect on competition in some cases or regions.

State legislative landscape

By Monica Hlinka, Associate Research Analyst, Energy, S&P Global Market Intelligence

The advancement of renewable energy in the U.S. has led to significant opportunities — and challenges — for governors and lawmakers. While major steps have been taken to enact progressive renewable energy measures at the state level in recent years, 2020 is expected to bring continued legislative and gubernatorial activity.

As public calls for progress on curbing climate change grow and federal activity in that sphere remains stunted, states are looking to bolster their renewable portfolio standards, or RPS, requirements or increase annual target thresholds for the procurement of wind, solar and energy storage. Additionally, several governors may look to endorse legislation that will increase their state's renewable requirements as a way to fulfill certain campaign promises.

During the 2018 election campaigns, eight governors signed the Clean Energy for All pledge, which supports a move toward 100% clean energy by 2050. Of those eight, three governors —Maine, Nevada and Washington — were able to place their signatures on legislation that increased their respective state's renewable energy requirements. During the 2020 legislative sessions, bills may be introduced in the remaining five states — Colorado, Connecticut, Illinois, Michigan and Oregon — to increase their RPS mandates.

With a number of states looking to modify their RPS requirements, advocates and policymakers in Illinois have been more vocal in pushing for such reform. Renewable energy bills have stalled in Illinois, and policymakers are not optimistic that the measures will advance this year. An Illinois governmental agency projected that the state could fall short of its current target of 25% of eligible retail electricity sales from renewable energy by 2025. Changes to Illinois's current policy, the Future Energy Jobs Act, could be addressed during the next legislative session.

Several states have begun implementing carbon-free goals and mandates, rather than renewables-only targets. This trend is likely to continue in 2020, as states and investor-owned utilities continue to announce their greenhouse gas emissions-reduction targets.

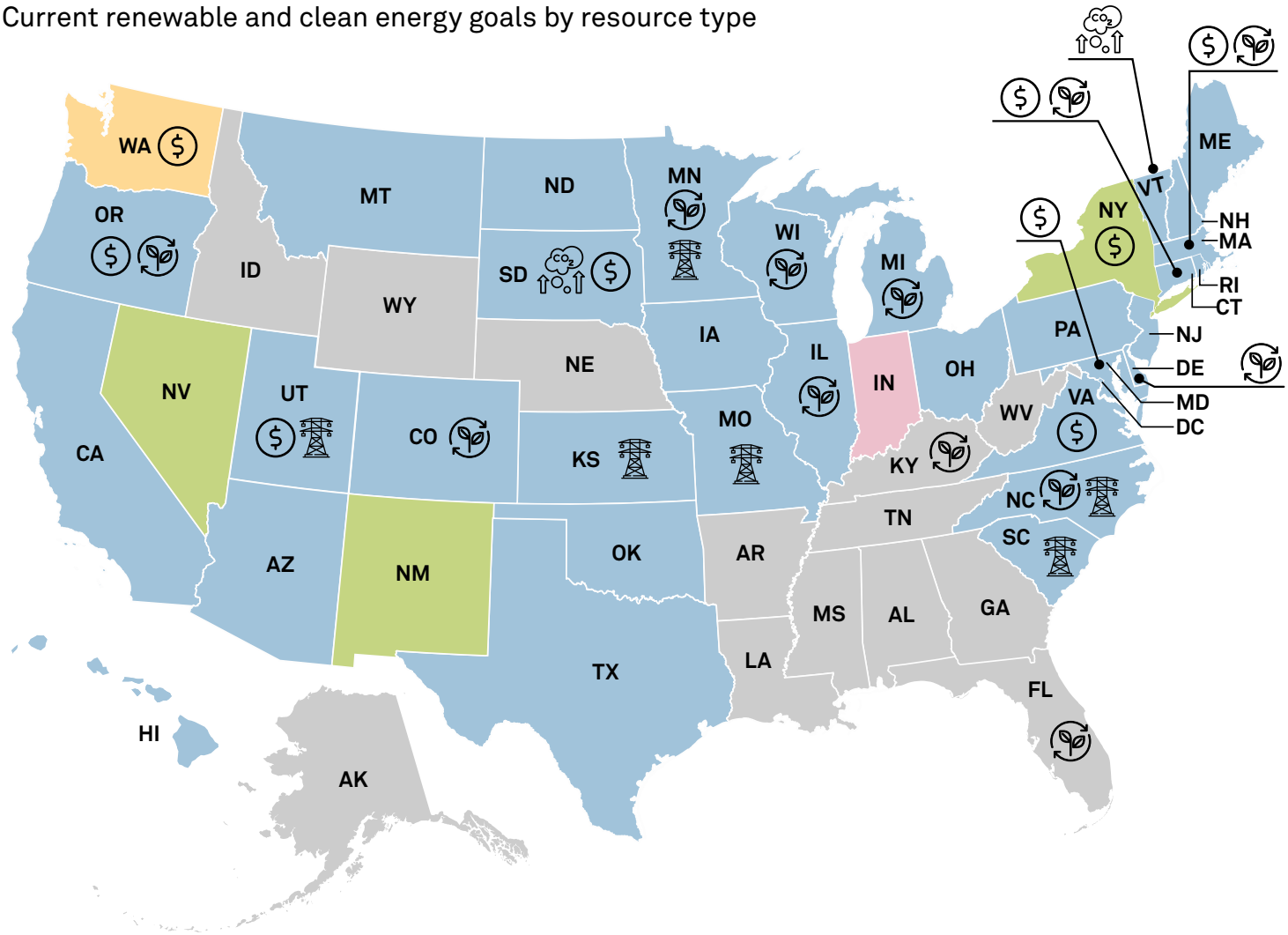
While carbon pricing policies to mitigate climate change have not garnered enough support to be enacted in recent years, it is safe to say that the idea is far from dead. Western states, such as Washington and Oregon, have failed to enact such measures; however, Oregon Gov. Kate Brown let it be known that she is "not backing down" on the issue and is prepared to use executive powers to advance the policy.

Policymakers in Connecticut, Maryland, Massachusetts, New York, Pennsylvania and Virginia may look to introduce carbon-tax or cap-and-trade policies during 2020 in order to help meet their greenhouse gas emission reduction goals. Steps to join the Regional Greenhouse Gas Initiative, or RGGI, cap-and-trade program have been taken in Pennsylvania, as Gov. Tom Wolf ordered the state's Department of Environmental Protection to draft a rulemaking that would enable the state to join the initiative. Currently, nine eastern states participate in RGGI, with New Jersey effectively becoming a participant starting Jan. 1, 2020.

As many states seek to implement clean energy-related measures and directives, they may look to introduce legislation to securitize costs associated with the retirement of certain generation facilities, similar to the securitization measures enacted by Colorado and Montana this past year.

Potential renewables-related policies to be introduced in 2020

Current renewable and clean energy goals by resource type



Current renewable and clean energy goals by resource type

- Renewable resources
- Renewable and carbon-free
- Carbon-free
- Clean energy resources
- No target

Potential policies in 2020

Greenhouse gas emissions target	Carbon pricing	Renewable portfolio standard	Utility securitization

Data as of Oct. 24, 2019.
List was compiled on a best-efforts basis and may not be comprehensive.
Indiana, Kansas, North Dakota, Oklahoma, South Carolina, South Dakota, Utah and Virginia have renewable portfolio goals instead of standards.
Montana, Nevada, North Dakota and Texas will not hold legislative sessions in 2020.
Credit: Arleigh Andes
Source: S&P Global Market Intelligence

Renewable energy capital expenditure outlook

By Jason Lehmann, Research Analyst, Energy, S&P Global Market Intelligence

As environmental and sustainability considerations continue to come into alignment with utility sector investment plans and operational outlooks, renewable energy spending remains a significant part of many utility capital expenditure programs in the coming years.

Utility spending cycle

The utility industry is now about 15 years into a capital spending cycle that started in the early 2000s and grew rapidly as company managements embraced back-to-basics strategies focused on meaningful replacement of aging infrastructure. The genesis of the current spending spree can be pegged to an extent on the blackout of New York City and large portions of the east coast in the summer of 2003. The root cause of the event was traced back to inadequate transmission tree trimming and related infrastructure weakness at certain facilities in northern Ohio. A federal investigation into the issue brought the aging infrastructure in front of Congress; initiatives followed that provided financial incentives for construction of new transmission facilities. Meanwhile, remediation of emissions from dirty coal-burning facilities, stemming from heightened environmental awareness, also drove major capital investment into new generation facilities with the benefit of cleaner emissions profiles.

Virtually all of the new investments were candidates for expanding utility rate base, resulting in a flurry of rate case activity. The spending cycle became a powerful vehicle not only for plant modernization, but also as the widespread capital spending served as a solid source of earnings growth throughout the utility sector. In a 2008 special study published by Regulatory Research Associates, a group within S&P Global Market Intelligence, total capex spending for the investor-owned utility group covered by RRA has been tallied at $36 billion. In the most recent update of the report, published in October, industry spending for energy utilities was expected to total $134 billion in 2019.

Renewables spending up strong

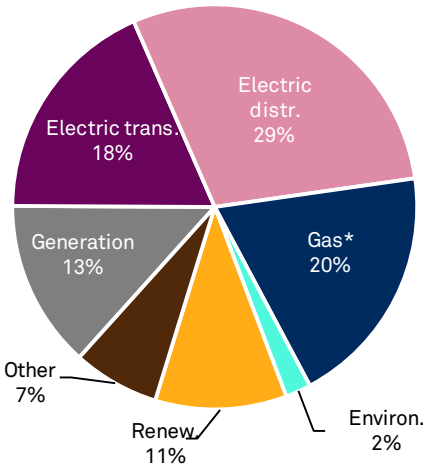
While renewables spending by the utility sector was only a small part — less than 5% — of total industry spending in 2008, roughly a decade later renewables play a much more significant role in utility capital agendas. Spending on renewables is forecast to total about $14 billion across the RRA coverage universe over the three years 2019 to 2021, accounting for 11% of total industry spending.

Select estimated utility planned renewables CapEx ($M)

Company	2019	2020	2021
ALLETE Inc.	380	470	10
Alliant Energy Corp.	645	200	15
Ameren Corp.	500	500	NA
American Electric Power Co. Inc.	1,640	265	265
Avangrid Inc.	1,160	883	1,038
Black Hills Corp.	28	29	NA
CMS Energy Corp.	200	200	200
Consolidated Edison Inc.	200	400	400
Duke Energy Corp.	1,090	960	1,110
Entergy Corp.	NA	NA	420
IDACORP Inc.	60	60	60
MGE Energy Inc.	65	65	NA
New Jersey Resources Corp.	155	104	107
NextEra Energy Inc.	4,810	6,303	5,383
Otter Tail Corp.	119	135	NA
Pinnacle West Capital Corp.	20	21	3
PNM Resources Inc.	89	34	NA
Portland General Electric Co.	5	135	15
Public Service Enterprise Group Inc.	67	42	NA
Sempra Energy	158	84	5
WEC Energy Group Inc.	476	538	200
Xcel Energy Inc.	2,315	1,105	240
Total	**14,182**	**12,533**	**9,471**

Compiled Oct. 16, 2019.
NA = not available
Source: Regulatory Research Associates, a group within S&P Global Market Intelligence

CapEx by business category, 2019E-2021E



Compiled Oct. 16, 2019.
*Gas includes pipeline, storage, distribution and other gas infrastructure.
Source: S&P Global Market Intelligence

Led by NextEra Energy Inc. and Xcel Energy Inc., renewable energy capital expenditures are expected to remain elevated in 2020. Despite industry prognostications that renewable energy installations will slow considerably early in the next decade as federal production and investment tax credits are phased out, S&P Global Market Intelligence believes a number of factors will provide the impetus for ongoing electric utility renewable energy development, including falling technology costs, state policy and renewable portfolio standards, customer demand, and environmental, social and governance considerations, amid a broader trend toward utility sector decarbonization.

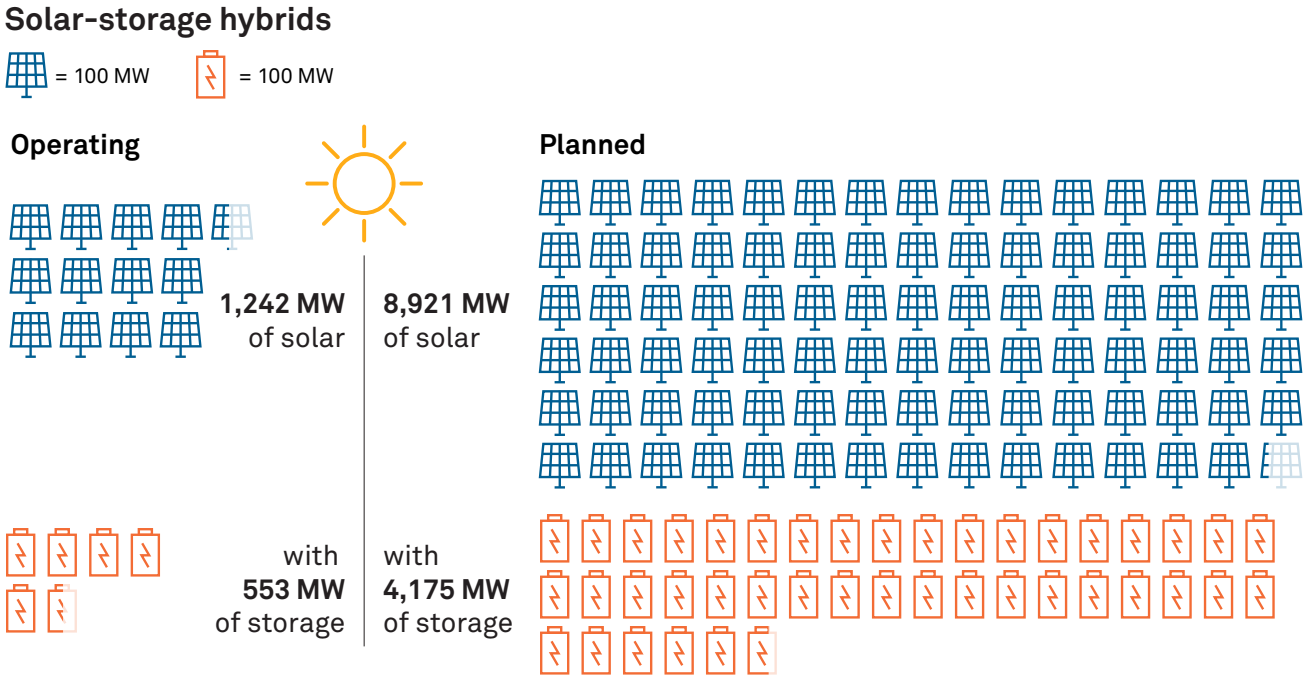
Featured Topic: 'Solar-plus' decade kicks off with massive pipeline of battery hybrids

By Garrett Hering, Reporter, Power and Utilities, S&P Global Market Intelligence

In September, the U.S. solar power industry presented its vision for a "radical transformation" of America's energy landscape over the next decade — one in which solar power provides 20% of the country's electricity mix by 2030, up from less than 3% today.

In 2020, solar companies plan to accelerate their efforts to implement that ambitious plan, which will ultimately require around 500,000 MW of total installed solar photovoltaic, or PV, capacity by 2030, up from less than 70,000 MW today. To make that leap possible, the solar industry's road map relies largely on the marriage of solar PV with less proven, but highly promising, lithium-ion batteries and other energy storage technologies.

"The batteries just take the solar installations to the next level," said Cherif Kedir, CEO of California-based Renewable Energy Test Center LLC. "Energy storage can help enable the adoption and the growth of PV in general."



As of Sept. 26, 2019.
Credit: Cat Weeks
Source: S&P Global Market Intelligence

Renewable Energy Test Center, a subsidiary of Japan's Marubeni Corp., recently launched a new "bankability testing" service in North America to help developers, customers and investors understand and secure the high performance and reliability of their energy storage projects, in both stand-alone and solar-plus-storage configurations, while also meeting safety and quality standards.

Such initiatives will be critical to enabling what the Solar Energy Industries Association, or SEIA, a Washington, D.C.-based trade group, is calling "the solar-plus decade" of the 2020s — an era in which battery-backed PV power plants and rooftop solar systems smooth output from the variable renewable energy resource and contribute to U.S. electric grids after sunset, in those hours of peak electricity demand that are typically served by conventional generation.

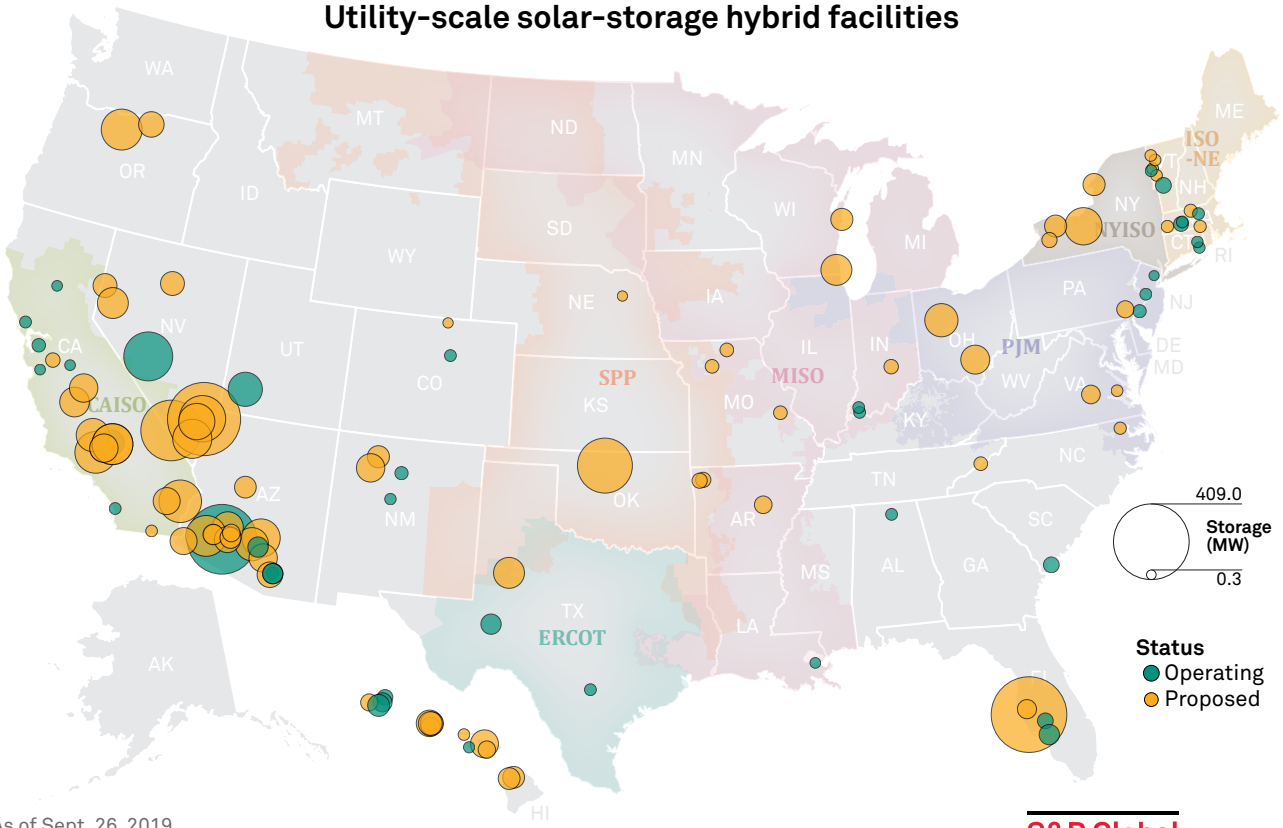
Adding energy storage to PV can also help reduce cuts in solar production during periods of midday oversupply on the grid — a growing challenge in solar-rich states like California — by saving otherwise idled solar-generated electricity for later use.

Project pipeline fills

In the next year, project developers and utilities will seek to make progress on converting an expanding pipeline of solar-plus-storage projects into steel in the ground.

Roughly 40 such systems were in operation in the U.S. as of late September, combining about 533 MW of storage with 1,242 MW of solar. At least another 85 colocated solar and storage projects are under development, most of them in the near- to medium-term planning stages or under construction, according to S&P Global Market Intelligence data. The planned projects combine 4,175 MW of storage with 8,921 MW of solar.

Utility-scale solar-storage hybrid facilities



As of Sept. 26, 2019.
Map credit: Ciaralou Agpalo Palicpic
Source: S&P Global Market Intelligence

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Sixteen of those projects, representing 1,540 MW of solar and 580 MW of storage, are targeted to come online in 2020, along with another 156 MW of storage planned at existing solar facilities.

"We will fill up batteries [with solar] and make storage peakers," said Cliff Graham, senior vice president of U.S. development at EDF Renewables Inc., an affiliate of France-based EDF Group.

EDF is developing several U.S. solar-plus-storage projects, including the Big Beau Solar+Storage Project in the Mojave Desert in California, a 128-MW solar farm with 60 MW of battery storage that is scheduled to enter service in 2021 under separate contracts with Monterey Bay Community Power and Silicon Valley Clean Energy at prices not to exceed $40/MWh.

That is in line with recently contracted battery-backed power purchase agreements in the United States, some of which have been priced in the low $30/MWh.

Contract prices in 2020 will depend on numerous factors, according to Graham, including the size of the battery system and the price of batteries. Whether Congress extends the 30% federal investment tax credit, or ITC, for solar, which can also apply to battery systems that charge on solar, will also influence solar-plus-storage prices in the coming year.

The incentive, at 30% of project cost in 2019, falls to 26% in 2020 and 22% in 2021 before settling permanently at 10% in 2022 for businesses while zeroing out for individual tax filers.

Push for tax credit extension

SEIA is calling for U.S. lawmakers to approve an extension of the incentive by the end of this year, an effort that may spill over into 2020. Extending the 30% ITC would stimulate 82,000 MW of installed solar capacity, drive $87 billion in new private-sector investment and create 113,000 new American jobs, SEIA and consulting firm Wood Mackenzie said in a recent report.

While the solar industry is confident that PV will remain among the most competitive power options in the United States, whether or not the 30% tax credit is extended, some are concerned that storage could become uneconomical without it.

"Storage is still expensive," Graham said. "It works with the ITC. I am skeptical it will be able to compete without the [tax credit]."

In any case, the solar industry is gearing up for its push to become a major part of the U.S. power mix in 2020 and beyond.

"I am very confident of the industry's ability to achieve our goal under any scenario," said Dan Shugar, CEO of NEXTracker Inc., a U.S.-based solar tracking subsidiary of manufacturing specialist Flex Ltd. "I think we can do more than 20%."

Stephanie Tsao, Ashleigh Cotting & Ciaralou Palicpic contributed to this article.

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