Renewables Now

Building renewable energy portfolios in the USA

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Renewables become a major electricity generating source in the USA

In May 2019, renewable energy officially became the second largest electricity generating source in the United States of America. Exceeded only by natural gas, that month renewables produced more electricity than either coal, nuclear, or oil. Over the first five months since the start of 2019, renewable energy sources contributed 20.3% of the net US electricity generation.

In greater detail, the table below shows net generation of utility-scale power plants between January and May across the different renewable power technologies. Output is given in GWh.

Source	Total generation	Y/Y change	Electric power sector generation		Commercial sector	Industrial sector
			Electric utilities	IPPs		
Non-hydro renewables	190,277	+1.3%	23,674	153,771	1,422	11,411
Wind	130,939	+1.8%	18,737	112,059	92	52
PV and Solar thermal	27,825	+6.8%	2,677	24,885	228	37
ALL ENERGY SOURCES	1,617,398	-1.5%	882,455	670,248	5,477	59,217

Source: Renewables Now with data from U.S. Energy Information Administration (EIA), July 2019

In terms of geography, Texas and California are the undisputed leaders in terms of capacity. Texas has 25.6 GW of installed wind and 3 GW of solar, while California has 25 GW of solar and nearly 6 GW of wind power generation capacity, mid-year statistics by the US wind and solar power associations, AWEA and SEIA, show. The top five wind states, according to the latest AWEA figures, are Texas (25.6 GW), Iowa (9 GW), Oklahoma (8.1 GW), California (5.84) and Kansas (5.65 GW). The top solar states, according to SEIA data, are California (25 GW), North Carolina (5.5 GW), Arizona (3.8 GW), Nevada (3.5 GW) and Florida (3.2 GW).

Remarkably, while utilities have lately picked up the pace of investing in renewables, independent power producers (IPPs) still account for almost 87% of the renewable power generation. The trend is likely to continue as the rapid rise in demand for corporate procurement and community or aggregation projects has opened the market for new and innovative approaches in developing a renewable energy portfolio in the US. In this report,

we will look deeper into three of these possible approaches: the utility perspective, merchant projects and Community Choice Aggregation (CCA).

World's largest wind and solar power producer

The 54-MW Butler Ridge Wind Farm in Wisconsin.Photo by NextEra Energy Resources

NextEra Energy Inc is a utility company based in Juno Beach, Florida, that owns electricity suppliers Florida Power & Light Company and Gulf Power Company, as well as NextEra Energy Resources LLC. The latter is a wholesale power generator that develops, builds and operates energy infrastructure, with roughly 24,000 MW in operation, including some 15,100 MW of wind (64% of the portfolio) and 2,500 MW of solar (11%). The company's renewables backlog currently amounts to 11,300 MW, with about 2,100 MW related to repowering projects.

Last year, NextEra Energy was the world's top wind and solar power generator, having produced some 47 TWh of electricity from those two renewable sources combined. Based on data released by the Global Wind Energy Council (GWEC), NextEra Energy Resources owned or operated just as much wind power generating capacity at the end of 2018 as did countries such as Brazil and France. What is even more impressive is that only seven nations around the world had more wind capacity than NextEra Energy Resources.

To achieve this status, NextEra Energy Resources commissioned about 4,800 MW of renewable energy capacity in 2017 and 2018, including wind, wind repowering, solar and storage projects. It inked contracts for more than 10,000 MW of renewables in 2017-2018 and around 40% of the solar contracts signed in 2018 were bundled with energy storage.

Looking forward, NextEra Energy Resources' contracted renewables portfolio will grow to a range of 27,000 MW-34,000 MW by 2022. This equals an expansion of at least 9,000 MW from 2018, when the company had about 18,000 MW of contracted renewables.

The following table summarises the development programme of NextEra Energy Resources, including the MW capacity it expects to own and/or operate in the period 2019-2022 under contracts signed as of June 20, 2019.

	2019 – 2020 Signed Contracts	2019 – 2020 Current Expectations	2021 – 2022 Signed Contracts	2021 – 2022 Current Expectations	2019 – 2022 Current Expectations
Wind	3,878	3,000 – 4,000+	392	2,000 – 3,800	5,000 – 7,800
Solar	1,405	1,000 – 2,500	2,126	2,800 – 4,800	3,800 – 7,300
Energy Storage	50	50 – 150	460	650 – 1,250	700 – 1,400
Wind Repowering	2,130	>2,000	0	0	>2,000
Total	7,463	6,050 – 8,650	2,978	5,450 – 9,850	11,500 – 18,500
Build-Own-Transfer	675	--	110	--	--

Source: Renewables Now with data from NextEra Energy Resources

In a very recent illustration of what developing a renewable energy portfolio means on that sort of scale, in late July 2019, NextEra Energy Resources struck a power purchase agreement (PPA) for what is touted as the US' largest co-located wind, solar and energy storage complex –- a 700-MW project in Oklahoma's Garfield, Alfalfa and Major counties. The first part of the complex will consist of a 250-MW wind farm called Skeleton Creek Wind, which will be brought online by the end of 2019. A photovoltaic (PV) park of 250 MW -- Skeleton Creek Solar – will become operational by end-2023, when a 200-MW four-hour battery storage facility will also be put on stream. The off-taker of the electricity produced by those plants is Western Farmers Electric Cooperative (WFEC).

Hedges galore in Texas or how to go merchant with renewable energy projects

Although traditional PPAs offer low risk to projects' revenue, a limited pool of potential customers and strong competition among project developers have depressed prices in the US. Selling into wholesale markets may increase returns, but such "merchant" projects generally need financial hedges so that future revenues will predictably cover financing costs. (Jay Bartlett, February 2019)

Similar to a PPA, the purpose of the hedge agreements is to ensure, to some extent, a level of certainty for the owner of the asset when it comes to revenue generation. The company

behind the project negotiates a so-called “strike price” with a financial institution that acts as the hedge provider. After the agreement takes effect, the owner of the plant sells its output on the open market at the spot market price. In the event that the spot price is above the agreed strike price, the owner owes the difference to the hedge provider and vice versa -- if the spot price is below the strike price, the owner gets paid the difference.
According to Bartlett, there are currently five general designs for hedging risk in merchant wind (or solar) projects: bank hedges (or fixed-volume price swaps), synthetic PPAs (a.k.a corporate or virtual PPAs), electricity forward contracts, proxy revenue swaps and natural gas forward contracts.

A rare, yet, renewable energy project that relies on a hedge agreement rather than the standard power purchase agreement was recently structured in Texas. Usually, it is wind developers that resort to this type of contracts, but in this case the deal is tied to a solar project -- the 200-MW Holstein photovoltaic (PV) scheme developed by 8minute Solar Energy.

In July 2019, 8minute Solar Energy announced the sale of the Holstein project to the renewable energy subsidiary of utility Duke Energy. The solar power plant is being built by Blattner Energy at a 1,300-acre site in Wingate, Nolan County, using more than 709,000 solar panels. It is expected to become operational in the summer of 2020.

When announcing the purchase, Duke Energy Renewables said that this will be its first solar project to utilise a hedge agreement. The contract was agreed with J. Aron & Company LLC, which is a unit of investment bank Goldman Sachs Group Inc. It has a term of 12 years and will cover most of the plant’s output, but not all of it.
8minute Solar Energy is the party that was responsible for the development of the project. In addition to that, the company arranged the engineering, procurement and construction (EPC), operation and maintenance (O&M), hedge, tax equity and debt agreements for the project.
Snapper Creek Energy Advisors served as the hedge advisor. A tax equity investment in the project will come from SunTrust, while CIT Group and a group of lenders are providing a construction loan, letter of credit and term loan facility.

Overall, Texas seems to be shaping as a hedge hub given the number of announced wind projects using this mechanism, including repowering schemes.

Most recently, in June 2019, Clearway Energy Inc announced it will invest USD 111 million to repower two wind farms in Texas with a combined capacity of 283 MW. One of them, the 122-MW Elbow Creek wind park in Howard County, will be selling most of its electricity under a new hedging arrangement with an investment-grade bank, which extends the project's PPA through 2029 from 2022.

The 250-MW Willow Springs wind park in Texas. Source: Lincoln Clean Energy (LCE)

In March this year, alternative asset manager Ares Management Corp said it would rely on a Proxy Revenue Swap (PRS) structure in order to repower the 60-MW Silver Star, the 145-MW Sherbino Mesa 2 and the 225-MW Trinity Hills wind parks in the Lone Star state. Other wind projects in Texas with long-term hedges include the Horse Creek and Electra facilities, located in Haskell and Wilbarger counties. Each of them has a capacity of 230 MW.

Goldwind Americas' 160-MW Rattlesnake wind farm will also be selling power under a long-term fixed price energy hedge.
The 250-MW Willow Springs wind park, in turn, has been operating since late 2017 in Haskell Count, selling power to Merrill Lynch Commodities.
The popularity of hedges in Texas is mainly attributed to the fact that they do better within deregulated markets such as the Electric Reliability Council of Texas, better known as ERCOT.

Jeff Mckay, director of marketing at 8minute Solar Energy, answered a few questions for the authors of this report. Below you can see the answers.

-- What advantages do hedge agreements have over PPAs?

Hedges provide another avenue for project offtake beyond normal solar power purchasers (IOUs, munis, corporates, etc.). It deepens the market for project offtake and allows developers flexibility on how to best optimize their project economics.

-- Why are hedges popular mostly in Texas? Where else are such deals likely to occur?

Hedge offtake in Texas has a long history on the thermal and wind side of the generation mix. It was natural that solar would reach a point where the project size and economics could work for hedge style offtake. 8minute will expect to see offtake agreements in other geographic locations start to look more similar to a hedge, where fixed volume commitments, hourly shapes, and/or hub settlement becomes more prevalent.

-- Are hedges an option that 8minuteenergy will prefer in the foreseeable future?

8minute will continue to optimize every project based on location, potential offtaker opportunities, size, technology, etc. 8minute continues to value the deep relationships with traditional power purchasers and will continue to find the best ways to meet the customer needs and preferences for power delivery.

Community Choice Aggregation (CCA) as a driver for renewable energy portfolios

Thus far, the non-utility buyers' market has been dominated by a small number of large companies purchasing all, or at least the vast majority, of the output of large projects.
As renewables become more affordable, they are also attracting the interest of smaller buyers who need to aggregate their consumption in order to benefit from the same price levels as the big, energy-hungry corporations.

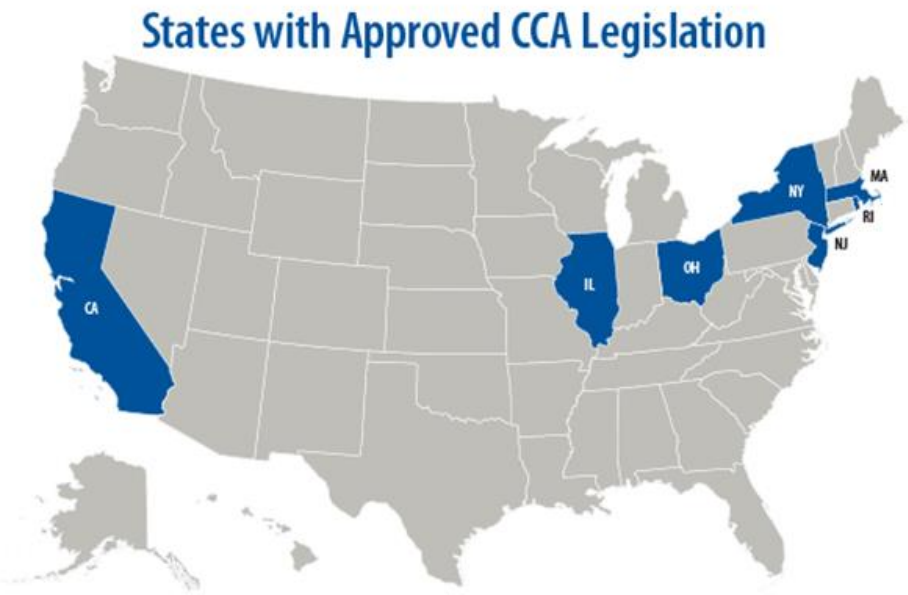
Image by: US Department of the Interior.

A curious business model in that direction is the Community Choice Aggregation (CCA), also known as Community Choice Energy (CCE) projects.
Essentially, CCA are entities, run by city or county governments or by third parties, that aggregate the electricity needs of everyone in the community and sign large contracts with generators -- something individual buyers may be unable to do – without being required to have the necessary transmission infrastructure.

This pooling model functions in synergy with the region's investor-owned utility, which continues to deliver power, maintain the grid, provide consolidated billing and other customer services.

As the name suggests, the "choice" part of the programme is a key feature of aggregation that allows consumers to have greater control of their energy mix and practically gives communities voice to say where their electricity will come from. In many cases, such as in California, CCAs offer greener generation portfolios than traditional utilities and sell the power at more competitive prices by purchasing it directly from the generator.

At present, CCA is statutorily enabled in eight states: California, Illinois, Massachusetts, New Jersey, New York, Ohio, Rhode Island and Virginia.



Source: EPA

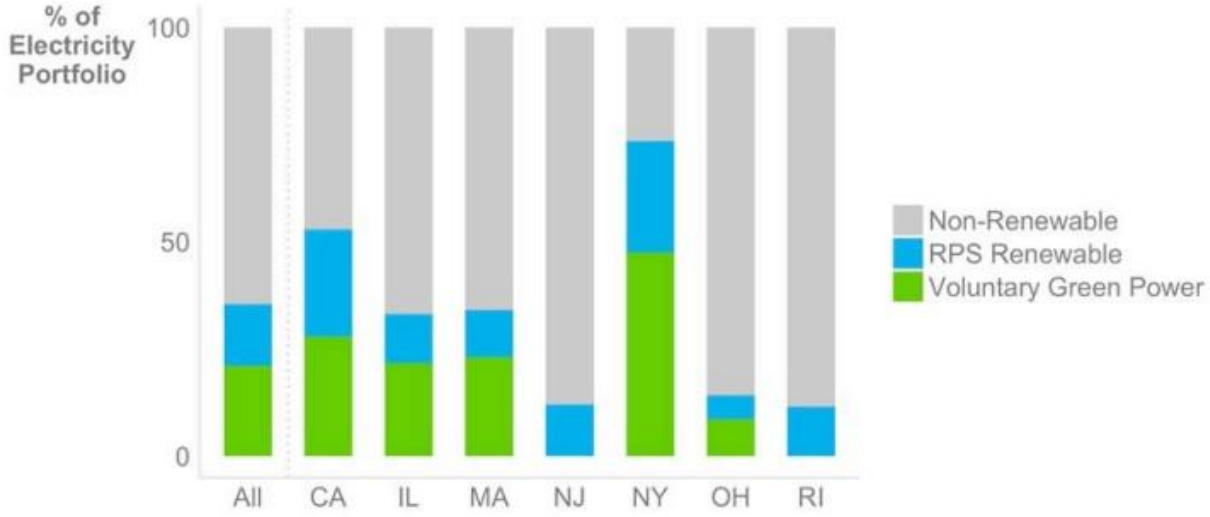
CCA is possible after a public referendum at the local level has been held (as in Illinois and Ohio) or when a local governmental body votes to aggregate its retail electricity and join a CCA programme (as in California). In either case, the CCA becomes responsible for procuring electricity on behalf of its residential, commercial and municipal residents while the utility is just in charge of delivering the power through its transmission and distribution lines and customer billing.

Residents of the CCA's service area are automatically enrolled into the CCA so that the necessary market scale for effective group purchasing is achieved, but they also have the option to switch back to utility service at any time. Although energy aggregation can be done on an opt-in basis, the out-out model is the most common and a more successful one.

The structure of the CCAs, on the other hand, depends on whether the state electricity market is regulated, with utilities there providing all power generation services, or

restructured -- markets where non-utility entities can compete with utilities for the provision of those services. The bulk of markets that have adopted the CCA approach have been restructured, with California and Virginia being the two exceptions having regulated markets. While in restructured markets CCAs can choose a competitive supplier and sign short-term power purchase agreements (PPAs), regulated markets allow CCAs to enter both short- and long-term contracts directly with power generators and electricity service providers and, respectively, act more like utilities.

Statistics by the National Renewable Energy Laboratory (NREL) show the US had about 750 CCAs in 2017, which collectively procured 42 million MWh of electricity.
While Illinois dominated in terms of CCAs count, California was the leader in terms of pooled power, procuring 12 million MWh.
The power portfolios of CCAs include various resources, including fossil fuel-based generation and renewable energy, with all CCAs being required to procure enough renewable energy to comply with state renewable energy mandates, just like utilities. The procured portion of renewable energy above those mandates is called voluntary green power, which, according to NREL's data, in 2017 was 8.9 million MWh and represented about 21% of all CCA sales.



Source: NREL.Voluntary green power shares of CCA electricity portfolios by state in 2017.

Undoubtedly, among the biggest advantages of the CCA model is that it brings local control and freedom of choice and competition into the electricity marketplace. This freedom to choose increases the use of affordable renewable energy and provides environmental benefits to communities as it facilitates the reduction of natural gas consumption and greenhouse gas emissions. Community control of electricity supply through CCAs could also affect where and how voluntary green power is generated.

Pricing is the other biggest propeller of the model, as CCAs typically offer lower rates than basic service and publicly available data generally suggest that CCA rates are at least

competitive with basic service. However, CCA rate advantages tend to vary in regulated markets, such as California, and in restructured markets.

For renewables, in particular, CCAs commonly offer lower rates to customers than their utility counterparts. That's largely because CCAs have been able to procure their renewables much more cheaply over the past several years, compared to utilities that have been procuring solar and wind power under state mandate for more than a decade, back when wind and solar were much more expensive.

On the flip side, the viability of CAAs is highly dependent on their capability to offer electricity cost savings to customers and periods of high rates can impact the CCAs ability to offer voluntary green power. Overall, CCA rates need to be low enough to reduce or prevent customers from exiting the programme but at the same time remain high enough to recoup power procurement and administrative costs.
Structuring a CCA may also encounter political and financial obstacles, mainly related to opposition by investor-owned utilities. California CCAs, for example, have to deal with exit fees to utilities that compensate the latter for sunk investments in long-term contracts signed on behalf of CCA customers. Additionally, the opt out model could pose some risks for the CCA programmes if many customers choose to opt out of the service, resulting in financial instability among the CCAs.

In spite of the challenges on the way, there is no doubt that CCAs have already started to reshape electricity portfolios, and the market itself. According to estimates by NREL, the expansion of CCAs into more states could make them account for as much as 20% of the US residential and commercial load and boost demand for renewables by as much as 53 million MWh annually.

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