

Texas' vast wind resource leads to a call for energy storage

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With more than 10,000 MW of wind energy online, Texas is arguably a prime candidate for energy storage development.

Jason Makansi, executive director of the Coalition to Advance Renewable Energy through Bulk Storage, (CAREBS), told *TransmissionHub*, "Texas has taken an interest in storage as a logical next step from having supported rather massive amounts of wind energy and then built transmission lines, or in the process of building transmission lines, to connect the strong wind areas with the principal load centers, primarily in the eastern part of the state."

According to the American Wind Energy Association, as of January, Texas has 10,337 MW of wind energy online, with 847 MW under construction and 63,504 MW of

wind projects in queue.

Texas is the national leader in overall wind installations and is the first state to reach 10,000 MW of wind energy installations, AWEA said, noting that Texas has seven of the nation's top 10 largest wind farms, including four of the top five.

AWEA also noted that Texas established a renewable portfolio standard (RPS) in 1999, and it was amended in 2005. The current RPS provisions require 5,880 MW of renewable energy by 2015. Furthermore, Texas has a target of reaching 10,000 MW of renewable capacity by 2025, a target that the wind energy industry met in 2010, AWEA added.

"[R]egulators and stakeholders understand that integrating this amount of wind power is going to take some new ideas and new technologies," Makansi said. "Energy storage is one solution set to help solve some of those integration issues."

The most important challenge that can be solved by energy storage involves wind's variability, he said. "Typically, the wind doesn't blow when electricity demand is at its highest, both on a daily and on a seasonal basis," Makansi said, adding, "In the middle of the night, typically in Texas, the wind is blowing strong, but nobody needs electricity and in the middle, it's the opposite. The beauty of energy storage on a broad scale, probably the broadest scale, is that you can park that energy and then time shift it to when the electricity demand is greatest."

Suzi McClellan, who leads the Texas Energy Storage Alliance's state affairs activities, told *TransmissionHub* that storage is valuable in Texas' market because most of Texas is in ERCOT and operates virtually like an island, with limited interconnection with other ISOs. The intermittency of more than 10,000 MW of wind must be managed within the confines of that grid.

"Both of those factors together really could benefit from storage because storage could provide so many different services," she said. "It can help firm up renewable energy like wind and it can help provide regulation service, which helps with the fluctuations that we have just because of the nature of our grid and being an island."

McClellan also said that not a lot of additional resources are expected on the grid in the next few years, so having storage can help "because you can obviously call on the stored energy at times when you need it to meet peak and help alleviate some of that stress on our resources."

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Dottie Roark, manager, corporate communications with ERCOT, told *TransmissionHub* that unlike gas or water, electricity presently cannot be efficiently stored in large quantities and must be generated to meet demand on a real-time basis. Until electricity storage is viable on a commercial scale, generation must be produced exactly when needed to meet customer demand and to avoid system failure.

Roark also noted that new power storage technologies, such as batteries, compressed air energy storage and flywheels, are being developed that could allow the capture of energy during times of low demand and store the energy until needed. "This could be particularly beneficial for intermittent resources like wind and solar energy," she said. "In the future, storage might provide additional tools to stabilize the grid, such as provision of resource capacity for immediate, continuous frequency control."

Texas has one resource that creates an opportunity for one type of large-scale storage, which is compressed air energy storage, and that is underground caverns or geology, Makansi said. "There are such caverns and geologies in many other parts of the country, but Texas happens to have strategically located sites that would be conducive for large-scale compressed air energy storage," he said.

Efforts to advance storage

Makansi also said that for the most part, Texas seems to have a successful electricity market. "However, you can build transmission to connect wind to the load, but that doesn't solve the problem of the wind not blowing when you want it to blow, nor does it solve the problem of the...intermittency and variability of these wind generators," he said.

Because all of that, large-scale and small-scale storage is being discussed in Texas. A couple of things have been able to move that forward, he added. "One, which is to recognize that storage is a separate asset for the electricity grid," he said. "In other words, it's not a generating plant or a power plant, and it's not a transmission line, it's not a distribution network. It's something else and it has at least [been] defined that storage assets are allowed to play in the Texas electricity grid and the electricity market."

The other thing that Texas has done is to define the electricity that is used to charge up a storage facility as wholesale electricity and not retail, Makansi said, adding, "That's also an important thing to encourage energy storage facility development."

Major energy events like the electricity grid being disrupted have made people become more interested in solutions like storage, he said. "The regulators have to have a policy framework in place that allows storage to compete on a level playing field with other options," he said.

In a recent policy brief and proposal, CAREBS advocated a set of policy steps it says are needed to realize the benefits of adding regional bulk storage by defining and monetizing the balancing function, including to ensure that utilities and ISO/RTOs make the full costs of balancing transparent to all market participants.

McClellan noted that Texas does not provide incentives or funding for energy storage.

"Incentives are always helpful, but we are taking some action to push storage forward," she said.

For instance, the state Legislature passed a bill in 2011 that facilitated the process of getting generation resources interconnected, she said. According to the Legislature's website, Senate Bill 943 amends the Utilities Code to define/categorize electric energy storage equipment or facilities that are intended to be used to sell energy or ancillary services at wholesale as generation assets.

Roark said ERCOT is working with the Public Utility Commission of Texas (PUCT) and a stakeholder group to review ERCOT market rules and procedures to identify any barriers that might limit the participation of new technologies such as batteries and new storage technologies. The PUCT is also reviewing energy storage issues (Project No. 39917) considering issues such as how to classify electricity purchased by an energy storage facility for later regeneration and resale as a wholesale transaction, she said.

Storage projects in Texas

McClellan said several storage projects are in the works, including one by **Duke Energy (NYSE:DUK)**, which according to a 2011 company press release, intends to store electricity generated at its Notrees Windpower Project in west Texas using an energy storage and power management system developed by Texas-headquartered **Xtreme Power**.

Duke noted that in 2009, it announced plans to match a \$22m grant from the U.S. Department of Energy to install large-scale batteries capable of storing electricity produced by the company's 153-MW Notrees wind farm. Duke chose Xtreme Power to design, install and operate a 36-MW capacity "Dynamic Power Resource" system at the wind farm. Duke also said it is targeting an in-service date for the battery storage system by late 2012.

Another company working on storage in Texas is **Apex CAES**, which according to its president and CEO, Jack Farley, is working on two compressed air energy storage projects at 315-MW each.

"We're in the process of getting permits for construction and interconnection," he told *TransmissionHub*, adding that the projects are expected to be operational in early 2016. One of the projects is in ERCOT's north zone and the other is in the south zone, he said.

"We will be interconnected to the ERCOT grid and we'll provide a lot of services, like ancillary services, but also fast-ramping energy that will help ERCOT manage intermittent wind and solar," he said. "But, we won't be tied to any particular renewable project."

Farley said Apex's projects compete with conventional gas-fired technology and have a better cost position. "We think [compressed air energy storage] competes with conventional generation in Texas and then beats them, so we're excited about that," he said.



ABOUT THE AUTHOR

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Corina Rivera-Linares, senior analyst for TransmissionHub, has covered the U.S. power industry for the past six years. Prior to joining TransmissionHub, Corina covered renewable energy and environmental issues, as well as transmission, generation, regulation, legislation and ISO/RTO matters at SNL Financial. She has also covered such topics as health, politics and education for weekly newspapers and national magazines.