



## All the Pretty Workhorses: Giant Wind Farm Comes to New Mexico, Featuring GE Vernova's 3.6-154 Turbines

Getting renewable electricity to big population centers is a growing challenge in the United States, but in the high desert of central New Mexico a plan is coming together. There, near the tiny town of Corona, GE Vernova will deploy 674 of its new “workhorse” 3.6-154 wind turbines\* for the SunZia project and its developer, Pattern Energy. When completed in 2026, this colossus of a project will weigh in at a total 3,500 MW, making it the largest wind farm — and in fact the largest renewables project — in the Western Hemisphere, providing enough power for some 3 million people.

Spread out over a million acres, SunZia's ambitious scope has been compared to the Hoover Dam. But it has a leg up on that landmark project: Back in the 1930s, the U.S. didn't have access to the fast transmission technology available today. SunZia will send its wind-generated electricity through high-voltage direct current cable (HVDC) to Phoenix, where the power can be sent onward to markets in Arizona and California. “This is just the kind of project,” says Steve Swift, chief commercial officer at GE Vernova's Onshore Wind business, “needed to really decarbonize the U.S. and stay on the path to climate goals.”

To bring a project like this to fruition requires complex coordination. One of the biggest challenges in the burgeoning renewables space is the supply chain. Manufactured parts and materials like steel have to converge at the right points, at the right time, and must fit onto trains or ships. If you build your components so that they fit nicely with standard construction equipment, you'll reach the finish line much faster. GE Vernova, which is providing 74% of the turbine capacity of SunZia, has contracted to manufacture some of the turbine towers in Belen, New Mexico, near the project site, saving time and costs. (Facilities in Pueblo, Colorado, and Amarillo, Texas, will also manufacture towers.) The hubs that enable the turbine blades to spin, as well as the big rectangular box that holds the electronics, gears, and motor, known as the nacelle, will be manufactured by GE Vernova in Pensacola, Florida.

Putting it all together in a sparsely populated part of New Mexico is not easy, but the reduced complexity of the workhorse turbine makes the project and logistics execution much simpler. Not nearly as large as an offshore giant like [GE Vernova's 14-MW Haliade-X](#), the 3.6-154 turbine possesses what Kevin Siwik, director of North American sales at GE Vernova Onshore Wind, calls an efficient “logistics and construction envelope.”



This is a machine that can be delivered and installed at rapid scale compared with much larger machines, where you might trade logistics and construction efficiencies for larger nameplates — i.e., higher maximum outputs — “but won’t install at the same pace,” he says. “So this really is intended to be logistically friendly, in a quick time frame.” Siwik points out, for example, that the fleet of commercially available construction cranes in the region are the right fit for GE Vernova’s more compact workhorse, and wouldn’t be able to handle larger turbines. And as with any construction project, time is money: The faster the turbines are erected, the faster the return on investment.

### **Modeling the Landscape**

SunZia is spread out over a million acres, on a rectangle of land roughly 80 by 30 miles, with GE’s turbine array covering a 45-by-25-mile portion of the whole. According to Matt Lynch, commercial



director for North America at GE Vernova Onshore Wind, the site itself is challenging, because at that scale you have a lot of variance in topography. Computer modeling is used to find exactly the right spot for each of GE Vernova's 674 turbines. "From the engineering perspective, having one single product fitting all those locations is a challenge," says Soner Ozkan, senior account manager for Pattern Energy at GE Vernova Onshore Wind. Moreover, to send renewable electricity over the highly efficient HVDC cable, which prevents the kind of line losses typical of older wires, the new wind power will have to be converted to direct current (DC) on-site before being converted back to alternating current (AC) in Phoenix.

That's where another wing of GE Vernova steps in: Financial Services and Consulting Services. Regarding Consulting Services' support, Ozkan says, "They have all the PhDs and the modeling capabilities. And we have weekly discussions with them." While Hitachi Energy is handling the HVDC part of the construction project, Ozkan, Siwik, and Lynch stress that ongoing cooperation is needed to make sure all the technology works together.

GE Vernova's services are integrated into the product development cycle, and for SunZia this meant providing customized software to the turbines, enabling them to work more efficiently with the long-distance HVDC line. In a region known for lightning strikes, for example, turbines and the mini-grid in which they're nested are vulnerable to power spikes. But the system is designed to be able to respond to those surges within 50 milliseconds, ensuring that equipment is protected.

In addition, Financial Services assisted SunZia in reaching financial close with a sizable commitment to finance the monetization of future tax credits. In this way, GE Vernova offers a unique set of full-stack solutions, from modeling to financing, differentiating it from competitors that are unable to offer the same type of one-stop-shop approach.

Lynch says that sequencing a mega-project like SunZia is also crucial so that each completion goal is reached at the right time, in the right order: "What's the best execution plan? What's the best project cycle — not trying to make too aggressive a schedule, where neither party would succeed? What are the milestones? What's the commercial operation date?"

Just one of the major tasks that needs to be addressed at a project like SunZia is establishing road access, a delicate operation required not only for building a pad for each turbine but for maintenance later on. The developer, Pattern Energy, has worked closely with [the National Audubon Society](#) to address the multiple environmental challenges involved in building such a big infrastructure project on healthy rangeland, as well as the impact of the route taken by its 550-mile transmission line across two states.

This is not the first time Pattern Energy and GE Vernova have danced together in the desert. The collaboration on SunZia grew out of the very successful 1,050-MW [Western Spirit wind project](#), a nearby series of four clusters that is now operational after completion early last year. Western Spirit itself was a breakthrough. "That was the largest single-phase installation to happen in the United States at one time, truly ushering in a new era of large-scale projects," Siwik says. The workhorse turbine used in much of the Western Spirit project was a 2.7-MW machine with a rotor diameter of 127 meters (416



feet). Today's workhorse, the 3.6-154 unit for SunZia, will have a rotor diameter of 154 meters (505 feet).

"Our outstanding performance in Western Spirit is really what led us here," says Swift. "That project was built by the same parties — built on schedule, and on budget. Some call it one of the best executions through the pandemic they've ever seen." By the time SunZia is completed, the Pattern Energy and GE Vernova teams will have together delivered a whopping 4.3 gigawatts of new renewable power across the western United States. Western Spirit has historically worked with other suppliers but is increasingly turning to GE as a favored project partner.

"SunZia is an investment in America's energy future that will pay strong dividends, including more than \$20 billion in expected economic impact, over 2,000 new jobs, and clean power for 3 million Americans," says Hunter Armistead, CEO of Pattern Energy. "SunZia demonstrates that working toward a sustainable future can also create meaningful economic value and a lasting positive impact on local communities. We're proud that SunZia is the result of many years of collaboration with communities, local residents, landowners, environmental groups, and government agencies. We look forward to bringing these benefits to fruition."

### **Credits Where They're Due**

Recognizing that decarbonization needs to [go even faster](#), the U.S. government has once again stepped up its policy support. For many years, solar and wind projects have benefited from the basic production and investment tax credits, which have been extended multiple times by Congress in the past. But the passage of the Inflation Reduction Act (IRA) not only provides the long-term certainty of those PTC and ITC, it also has other bonuses, and one job that GE Vernova takes on is helping developers hit the targets required to qualify for those bonuses. Two in particular are in play in the SunZia project, according to Chrissy Borskey, GE Vernova's executive director of global government affairs and policy.





First, the government identifies areas of the country that have seen job losses in mining and energy production, which makes them the perfect settings to award developer bonuses. While Borskey cautions that more clarification is needed from the U.S. Treasury and the Internal Revenue Service, much of New Mexico lies within this [“energy community” designation](#). And there is no question that the SunZia project



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is expected to inject billions into the local economy and create more than 2,000 construction jobs during peak construction.

The second bonus comes through meeting the IRA’s U.S. manufacturing and sourcing rules. GE Vernova’s decision to produce nacelles and hubs in Florida while also delivering towers with U.S.-made steel are aimed directly at meeting the targets required by the legislation. ”More projects similar to this can quickly move forward as the administration works diligently to finalize the rules and regulations related to the IRA,” Borskey says. While the details are still being worked out, GE Vernova is moving ahead and has invested [\\$20 million in its Pensacola facility](#).

The U.S. has made great strides in decarbonizing its power grid in the past decade, shuttering coal plants and building so much new wind and solar that by the end of 2022 they accounted for nearly 15% of U.S. electricity, according to the Energy Information Administration. But to decarbonize effectively, the U.S. will need more projects of similar scale. SunZia’s size will more or less break the ceiling on large-scale projects, and should set an important precedent.

Pattern Energy and GE Vernova now seem to have optimized such projects to a fine-tuned science, or what Swift calls top-shelf “execution performance.” This bodes well for a future of further renewable energy deployment. Says Siwik, “I think that the message should come across as: If you have a large-scale single-phase project, you ought to be looking at GE Vernova technology.”

*\*GE’s 3.6-MW turbine with a 154-meter rotor is referred to as the 3.6-154 turbine.*

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