

As Oil and Gas Wane, Texas Wind Industry Ascends

Market Forces Continue to Drive Change; Case Study Nolan County: Jobs, Economic Development, Tax Base; Record Increases Expected in ERCOT Wind Capacity in 2020 and 2021

Executive Summary

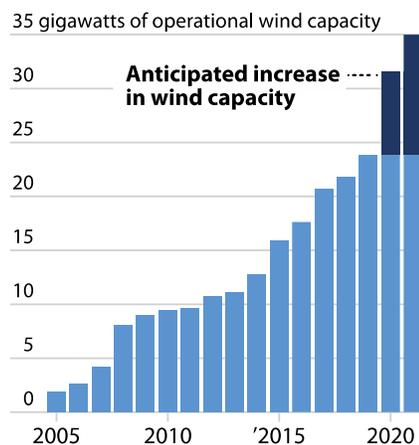
Demand for wind energy continues to grow nationally, and Texas—even in the time of pandemic and recession—is positioned to benefit from the trend. Three broad forces are driving the expansion of wind power nationally and in Texas, which presents a business model that can be replicated elsewhere:

- Rising corporate demand;
- Growing investor interest;
- Strong bipartisan political support.

Texas is the wind-savviest state in the nation, and its growing number of wind farms are widely and correctly perceived as good investments, job creators, tax-base solidifiers, and engines of economic growth.

A Record Increase in Wind Power Generation Capacity in ERCOT

More generation capacity from wind turbines is expected to become operational this year—11.1 gigawatts—than in any previous year in the Electric Reliability Council of Texas' grid area. Another 3.4 gigawatts is expected to be added next year.



Source: ERCOT

Case Study: Nolan County

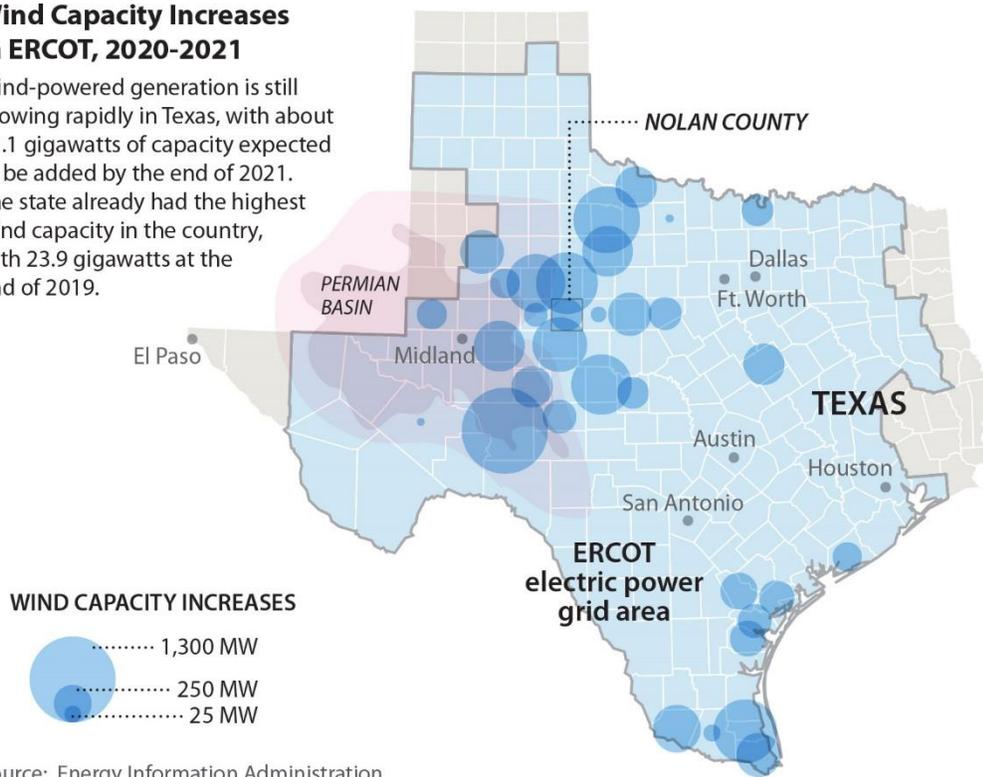
Beyond its industry overview and its Texas-specific outlook, this report details how the wind industry has lifted one community, Nolan County, which sits at the edge of the Permian Basin, and serves as a prime example of how a renewables-based energy economy brings predictable benefits that the boom-and-bust oil-and-gas business cannot.

- Tax revenues in Nolan County have increased, driven significantly by the wind industry, which makes up 6 of the top 10, and 11 of the top 20 property taxpayers today.
- More jobs and higher wages have come to the county, where the unemployment rate was 3.1% in January 2020 and where wind-energy workers are paid on par with oilfield employees.
- Economic diversification has been a direct byproduct, as can be seen in the county seat of Sweetwater, which has drawn a range of wind-energy offshoot service businesses and where Texas State Technical College now graduates 50 to 75 wind technicians per year.
- A knock-on utility-scale solar industry is emerging as a companion business to windfarms.

Lease payments that typically range from \$10,000 to \$20,000 annually per tower are keeping property owners on the land and creating significant cash flow across the community.

Wind Capacity Increases In ERCOT, 2020-2021

Wind-powered generation is still growing rapidly in Texas, with about 11.1 gigawatts of capacity expected to be added by the end of 2021. The state already had the highest wind capacity in the country, with 23.9 gigawatts at the end of 2019.



Source: Energy Information Administration

Business Is Booming, and the Pipeline Is Primed

The Electricity Reliability Council of Texas, which manages the grid that covers most of the state, counted 23,860 megawatts (MW) of wind-powered capacity at the end of 2019—the biggest concentration of wind power in the U.S.—and the number is soaring.

- Wind capacity in ERCOT, the main power utility in the state, is expected to climb by 10,788MW, or more than 45%, by the end of 2021, to 34,648MW.
- Coal-fired generation will continue to lose market share to wind, as will gas-fired generation, and any new Texas power-generation demand will be met by wind and solar.

Overview

Demand for wind energy in the U.S. is growing—and will continue to grow—for several reasons. Among them:

- Rising corporate demand;
- Growing investor interest;
- Strong bipartisan political support.

The Texas wind industry is—and will remain—a prime beneficiary of these trends.

Much of the gains will flow to communities in and around the **Permian Basin**, the biggest fracked gas-and-oil play in the country and one whose decline¹ is occurring in juxtaposition to the rise of renewables.

Corporate Demand for Wind Power Is Accelerating

Corporate demand for wind power has become a high-growth segment of the industry centered largely around a handful of states.

Corporate wind deals—that is, those engineered between developers and non-utility customers—are in place in 29 states, but two-thirds are in Texas, Oklahoma, Kansas, and Illinois, with Texas being the No. 1 state for corporate wind deals. All are motivated by the desire to save money on electricity and to support the growth of renewables, an important part of many companies' branding strategy.²

Corporate demand for renewable power is not as limited to the tech sector as it used to be, and diversification across the corporate customer base is accelerating. In 2018, the top five customers for wind were **Walmart**, **AT&T** (a communications company, not a tech company), **Facebook**, **Google**, and **Kimberly-Clark**. Where

¹ IEEFA. [Texas oil producers burned through \\$749.9 million flaring gas in 2018](#). June 11, 2020.

² American Wind Energy Association (AWEA). [Wind Powers American Business](#). June 2020.

75% of corporate demand for renewables came from tech-sector companies five years ago, 75% was from non-tech companies in 2019.³

Texas, already in first place for corporate deals, stands to continue to make hay from the growing preference for wind, if only because Texas is Texas:

“Corporate buyers tend to procure wind power from states with a high-quality wind resource combined with the presence of a wholesale electricity market, retail choice, or green tariff program.”^{4,5}

While state standards do play a role in the rise of renewable energy, the private sector is emerging as an increasingly important player in the ongoing expansion of the industry.

“Corporate peer pressure is building, especially in the United States, where the failure of federal policy has galvanized the efforts of industry leaders. The cost of renewable energy continues to fall, offering a tremendous long-term hedge against power price inflation... The energy transition is progressing, and the electrification of transportation, HVAC and a variety of industrial processes will increasingly focus corporate attention on how they procure power. Wind is well positioned to take advantage of these opportunities.”⁶

Corporations are interested above all in their bottom lines, and on this point, renewables make complete economic sense.

The latest annual cost comparison by **Lazard** on various forms of power generation⁷ puts the cost of wind at \$28 to \$54 per megawatt-hour (MWh), compared to gas combined-cycle plants at \$44 to 64 MWh, coal-fired power at \$66 to \$112 per MWh, and nuclear power at \$118 to \$192 per MWh. Thin-film solar arrays, which are what the vast majority of utility-scale farms are built around and that are a fast-rising presence in Texas, cost \$32 to \$42 MWh.⁸

Investor Preferences Are a Force

Green, or non-carbon-based energy, is the biggest component of the growing socially responsible impact (SRI)⁹ investment movement. Total SRI holdings by U.S. money managers amounted to \$2 trillion in 2005; by 2018 that figure, according to

³ *Ibid.*

⁴ AWEA. [Wind Powers American Business](#). June 2020.

⁵ Texas has no green tariff program, but its main electricity markets are unregulated, it allows retail choice, and its wind resources are among the best in the world.

⁶ Wood Mackenzie. [Analysis of Commercial and Industrial Wind Energy Demand in the United States](#). August 2019.

⁷ Lazard. [Lazard’s Levelized Cost of Energy Analysis—Version 13.0](#). November 2019.

⁸ The Lazard comparisons are calculated on levelized costs, which factor in project lifetime costs and long-term energy production which favor renewables because wind and solar have zero fuel costs.

⁹ SRI guidelines are close cousins of ESG guidelines, which show similar growth trends and are built around environmental, social and governance standards, a proxy for investor preference.

the latest tabulation by the nonprofit U.S. SIF,¹⁰ had grown six-fold, to \$12 trillion, or one of every four dollars run by U.S.-domiciled professional money managers. The biggest single category of SRI investing is centered on “climate change/carbon” which totaled \$3 trillion in 2018,¹¹ a trend that is not unrelated to customer preferences for clean energy.¹²

While the renewable energy sector—like almost all sectors—has been affected by the coronavirus pandemic, a survey by the **American Council on Renewable Energy** (ACORE) of the renewable energy industry’s “most active” investors this past May found that 50% of them plan to increase their renewable energy holdings by 10% or more in 2020. The survey found also that investor bullishness in renewables is informed by expectations for energy-storage technology, which helps mitigate longstanding concerns around the variability of wind and utility-scale solar.

The ACORE survey, which queried “tax equity investors, lenders, asset managers” and project developers who depend on such financing, included this summary:

“The results reflect a near unanimous sense of optimism, with expectations of strong long-term growth in the renewable sector, despite near-term concern about headwinds posed by supply chain disruptions and other pandemic-related delays.”¹³

“We’re in the middle of raising finance for a big project in Texas,” one developer told ACORE researchers. “The lender community is still pretty strong. We’ve had good response as we’ve gone to market.”¹⁴

A report published in July by a nonpartisan public-policy group called **Environmental Entrepreneurs** makes a strong case for how the next round of federal stimulus meant to offset the disastrous economic effects of coronavirus should include investments in three areas: energy efficiency, renewables, and grid modernization. The report argues that \$99.2 billion in stimulus spending nationally across these sectors would create and sustain 860,000 jobs for five years.

Texas—because of its wind-friendly mindset and its existing wind energy infrastructure—would be the biggest beneficiary.¹⁵

Utility-scale renewables across the board—Texas renewables included—hold an advantage over other forms of power generation in the time of coronavirus, in part because of state-by-state renewable energy requirements that can have an impact

¹⁰ US SIF and US SIF Foundation. [Report on US Sustainable, Responsible and Impact Investing Trends](#). October 2018.

¹¹ *Ibid.*

¹² Consumer Reports. [Majority of Americans Want Cleaner Energy From Renewable Sources](#). October 2018.

¹³ American Council on Renewable Energy. [Expectations for Renewable Energy Finance in 2020-2023: Survey of Leading Financial Institutions and Developers](#). July 2020.

¹⁴ *Ibid.*

¹⁵ E2. [Build Back Better, Faster: How a federal stimulus focusing on clean energy can create millions of jobs and restart America’s economy](#). July 14, 2020.

and are essentially pandemic resistant,¹⁶ in part because some older power-generation business models are dying off,¹⁷ and in part because of sheer industry-transition momentum.¹⁸

Bipartisan Regional Support

While public policy over the years has helped “stand up” the renewables industry through federal incentives and state renewable-energy mandates, the ascendance of wind (and utility-scale solar) is an increasingly apolitical story.

State-mandated renewable energy requirements, or renewable portfolio standards (RPSs), have been helping support the uptake of renewables, serving at the very least to signal political and popular support for wind and solar. All but 13 states have some kind of renewable portfolio standard,¹⁹ although their effectiveness varies widely.

In Texas, a bipartisan RPS commitment was adopted in 1999 calling for 5,880MW of capacity by 2010 and 10,000MW by 2025, goals that probably helped establish the industry but that were achieved so long ago that they seem quaint today (more on this in the section below, *Texas Is a Bull Market for Wind*).

The absence of partisan politics is plain in the distribution of U.S. wind development, which was once a mostly California, or “blue state” initiative, but that now thrives in states that are commonly categorized as politically conservative.

¹⁶ S&P Global Market Intelligence. [State policies are insulating clean energy buildout from pandemic, analysts say](#). July 14, 2020.

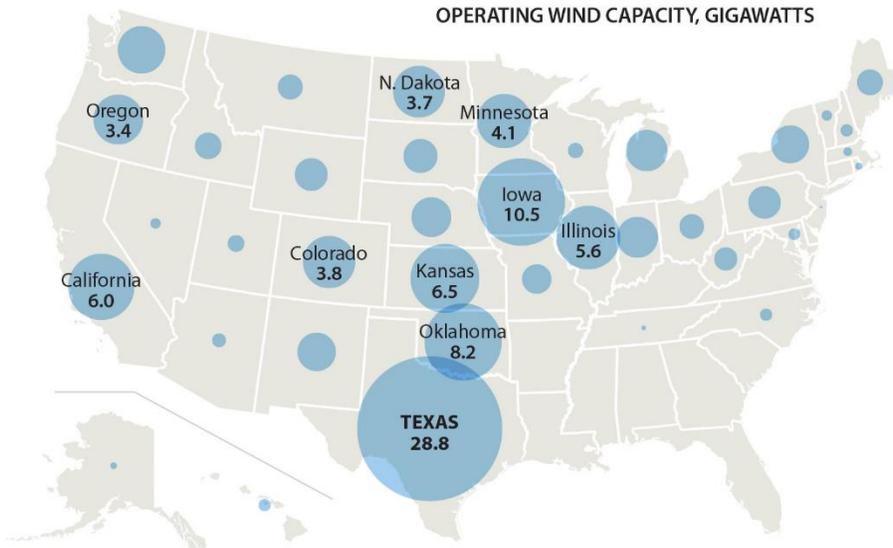
¹⁷ IEEFA. [Solar Surge Set to Drive Much of Remaining Texas Coal-Fired Fleet Offline](#). July 2020.

¹⁸ S&P Global Market Intelligence. [Clean grid buildout to continue amid pandemic uncertainties, execs tell FERC](#). July 10, 2020.

¹⁹ National Conference of State Legislators. [State Renewable Portfolio Standards and Goals](#). April 2020.

Texas, the Leader in U.S. Wind Generation Capacity

With 27 percent of the total U.S. wind-generation capacity—28.8 gigawatts—Texas is easily the leading state for wind power. The state sits in the wind-rich corridor of the Great Plains, an area that has seen rapid growth in wind development.



Source: Energy Information Administration (Electric Power Monthly, July 2020)

Most wind-rich states in the Midwest and across the Great Plains have embraced the industry, which for years has been a going concern and a rising economic force in the region. They include Illinois, Iowa, Kansas, Minnesota, North Dakota, Oklahoma—and to a lesser extent, Nebraska and South Dakota.

By far the wind-savviest state in the nation is Texas, where wind farms are widely and correctly perceived as good investments, job creators, tax-base solidifiers, and engines of economic growth.

Case Study: Nolan County



Of average size among Texas' 254 counties, Nolan County sits about 220 miles west of Dallas on the edge of the oil-rich Permian Basin. Founded in the 1870s during Anglo-American expansion into indigenous lands, the area first attracted bison hunters, followed by cattle ranchers, cotton farmers, two major railroads, and the oil industry.

The county—like much of West Texas—has seen its share of energy-industry boom and bust, beginning in the 1950s and 1960s. But as Texas oil production withered from about 1.3 billion barrels per year in 1972 to 407 million barrels in 1999,²⁰ Nolan County

²⁰ Railroad Commission of Texas. [Crude Oil Production and Well Counts \(Since 1935\)](#). Website accessed July 21, 2020.

came under financial pressure, seeing its oil production plummet from 8.3 million barrels in 1956 to 4.9 million barrels in 1974 to just under 2 million barrels in 1990.²¹

By 2000, the county had become economically stagnant. Its population plunged by 15.7% from 1982 to 1999²² as residents relocated to find better-paying jobs and higher education.²³ Nolan County's per-capita personal income rose 115% during that same period, vastly underperforming the state's overall 181% gain.²⁴ Nolan County's population has since stabilized at around 15,000, and its per-capita personal income has increased 119%, vastly outperforming the state's overall 79% gain. The number of residents below the poverty line has dropped by a third, from 21.7 percent in 1999 to 15.1 percent in 2019.²⁵

The turnaround began in 1999, the year wind development came to town. Landowners and government officials had seen how McCamey, 180 miles to the southwest, had benefited from wind. McCamey, with its wind resources and long history of energy development in the Permian Basin, had become home to what was then the state's largest wind project, the 279MW King Ranch Wind Farm.²⁶ By 2001, McCamey's wind industry accounted for 77% of the state's wind energy capacity, and the state's legislature had proclaimed it the "Wind Energy Capital of Texas."²⁷

Having benefitted over the past 20 years from its rich wind resources and willing landowners, Nolan County today is a prime example of the lucrative Texas²⁸ wind business. The county seat of Sweetwater, where two-thirds of the population live, has attracted wind-related manufacturing and service companies that serve a regional market.

Sweetwater is also now seeing an expansion in utility-scale solar power, which is expected to grow exponentially in coming years as corporations and municipalities expand their renewable-energy portfolios to meet investor and customer preferences.

Nolan County's first wind farm, the 150MW **Trent Mesa project**, became operational in 2001. By 2008, more than 1,800MW of wind capacity had been built it

²¹ Texas A&M AgriLife Extension. [Extension Education in Nolan County](#). Website accessed July 21, 2020.

²² U.S. Census Bureau.

²³ Interview with Roderick Wetsel of [Wetsel, Carmichael, Allen and Lederle LLC](#), co-author of [Texas Wind](#); and Cliff Etheredge, founder of Roscoe Landowners Association. June and July 2020.

²⁴ Federal Reserve Bank of St. Louis (FRED). [Per Capita Personal Income in Nolan County, Texas](#). Website accessed July 21, 2020.

²⁵ Texas Department of State Health Services. [Selected Facts For Nolan County – 2000](#). Website accessed July 21, 2020; FRED, [Percent of Population Below the Poverty Level in Nolan County, Texas](#), accessed July 21, 2020.

²⁶ Texas Bar Journal. [Wind Power: Prospective Issues](#). October 2005.

²⁷ McCamey [website](#). Accessed Aug. 2, 2020.

²⁸ Interviews with Wetsel and Ken Becker, executive director, Sweetwater Enterprise for Economic Development (SEED) Municipal Development District; Miesha Adames, Nolan County landowner and assistant marketing director, SEED; Greg Wortham, former mayor of Sweetwater. June and July 2020.

the county.²⁹ By the time Duke Energy completes its 182MW **Maryneal project** in December, Nolan County's 1,438 turbines will have a combined capacity of 2,373MW,³⁰ or about 9.9% of the total wind-energy capacity across **ERCOT**.

Were Nolan County a country, it would be the 26th largest wind-power nation in the world, ranked between Norway and Finland.³¹

The Texas wind boom as exemplified in Nolan County is being driven by several factors:³²

- *The abundance of a free and easily accessed natural resource.* The wind blows across Nolan County at an average of 8 to 8.5 meters per second at 80 meters above the ground, not as strong as in locales further into West Texas and north into the Panhandle, but more than enough to sustain power-generating operations.³³
- *Willing and knowledgeable landowners.* Because Texas is almost entirely in the hands of private landowners, those landowners are essential to the industry. Being seasoned oil-and-gas exploration and pipeline lease negotiators since the 1950s, Nolan County landowners are sophisticated in energy matters—and with the downturn in the oil and gas industry—are eager to find new sources of income.
- *Public policy.* In addition to a federal production tax credit, which is scheduled to be phased out soon, wind developers have been buoyed also by a local tax abatement, under which the county and other local taxing districts exempt 60% of taxes due for the first five years of a wind project's operational life, then 40% for five years, after which a project pays 100% of assessed taxes.
- *A free and (mostly) unregulated market.* Wind energy development faces virtually no federal

Wind Projects Dominate List of Nolan County's Top Taxpayers

Eleven of the top 20 taxpayers in Nolan County are now wind projects, and paid more than \$2.2 million in 2019.

TAXPAYER	INDUSTRY	2019 TAXES
Horse Hollow 3		\$530,939
Buzzi Unicem USA	Materials	\$487,111
Horse Hollow 2		\$375,788
ONCOR Electric Delivery	Utility	\$280,462
Buzzi Unicem USA	Materials	\$276,553
Buffalo Gap Wind (Phase 2)		\$240,149
Sweetwater Wind 4		\$229,778
Sweetwater Wind 2		\$191,189
Champion Wind Farm		\$145,467
US Gypsum	Materials	\$143,780
Lone Star NGL Pipeline	Oil & Gas	\$133,271
BNSF Railway		\$132,904
Permian Express Partners	Oil & Gas	\$132,489
Roscoe Wind		\$121,326
Inadale Wind		\$110,959
Turkey Track Wind		\$110,279
Buffalo Gap Wind (Phase 3)		\$97,859
Grand Prix Pipeline	Oil & Gas	\$94,176
Union Pacific Railroad		\$88,594
South Trent Wind		\$87,536

Source: Nolan County

²⁹ National Renewable Energy Laboratory, U.S. Department of Energy. [Summary Report of Wind Farm Data, 2008](#).

³⁰ Data compiled by SEED. July 2020.

³¹ Wind Energy International. [Global Wind Installations](#). Accessed July 23, 2020.

³² Interviews with Wetsel (*op. cit.* Footnote 23); John Hensley, Vice President, Research and Analytics, American Wind Energy Association. June and July 2020.

³³ U.S. Office of Energy Efficiency and Renewable Energy. [Texas 80-Meter Wind Resource Map](#). Accessed July 31, 2020.

regulation in Texas (ERCOT manages most of the Texas grid), and due to broad bipartisan support, wind farms have escaped state regulatory interference.

- *Proximity to transmission lines.* Sweetwater began pushing for wind development 20 years ago because of the presence of unused capacity on transmission lines used to power drilling operations in the Permian Basin. A transmission-expansion initiative gained momentum in 2005 after the state funded \$6.9 billion for new lines under the Competitive Renewable Energy Zone program. CREZ doubled transmission capacity in the area upon completion in 2013 so that local wind power could be distributed across ERCOT (the project included a new substation called Sweetwater East constructed in Nolan County in 2008).

Nolan County has benefitted in several ways:

Tax revenues. The taxable value of property in Nolan County increased from \$565 million in 1999 to \$2.1 billion in 2020.³⁴ The wind energy industry's share of that taxable property value grew from 0% in 1999 to 9% in 2006 to 33% in 2019.³⁵ Today, the assessed value of wind farm property in Nolan County is 1.6 times what the county's entire taxable base was in 1999, and 6 of the top 10, and 11 of the top 20 property taxpayers now are wind-related businesses.³⁶ The value of wind to the tax base will increase as more wind turbines come online and as older ones are repowered, or made more efficient with bigger blades, newer software, and improved drivetrains.

County tax revenues went from about \$2.9 million in 1999 to \$5.7 million in 2009 and \$11.2 million in 2019,³⁷ allowing Nolan County and other local taxing districts to build new hospitals and schools, retrofit existing ones with new technology, and rebuild infrastructure.³⁸

Jobs and higher wages. With three event-driven exceptions—during the weeks after the terrorist attacks of Sept. 11, 2001; during the Great Recession of 2007-09; and during the current coronavirus pandemic—unemployment has fallen in Nolan County over the past 20 years, from 6.9% in January 1999 (the year wind-energy development began in the county) to 3.1% in January 2020.³⁹

Much like oil and gas, the wind industry employs workers directly, primarily in transportation, maintenance and construction, and indirectly, in the legal and

³⁴ [Nolan County Appraisal District](#). Accessed July 30, 2020.

³⁵ *Ibid.*

³⁶ *Ibid.*

³⁷ Brenda Klepper, Chief Appraiser, Nolan County Appraisal District. July 2020.

³⁸ Becker, Wetsel, and Worthen.

³⁹ Federal Reserve Bank of St. Louis. [Unemployment Rate in Nolan County, TX](#). Accessed July 20, 2020.

accounting professions, for instance, and in hospitality, retail, and real estate.⁴⁰

As many as 1,100 people have been employed full time in the wind industry in Nolan County,⁴¹ or about 14% of the workforce. That number dropped after a flurry of big projects were completed, but for the past few years, the number of workers employed full time in wind has held steady at around 250,⁴² or about 3.5% of the workforce.

Wind-energy jobs are competitive with those in the oil and gas industry. A wind turbine service technician earns between \$16 and \$38 per hour,⁴³ with a mean hourly wage of \$25.57.⁴⁴ By comparison, the mean hourly wages for an oilfield roustabout, a service unit operator, or a rotary drill operator are, respectively, \$19.40, \$24.10, and \$27.51.⁴⁵

The wind industry has helped the manufacturing sector in Nolan County to raise hourly wages, which now range from \$14.50 to \$21.⁴⁶ By comparison, the mean hourly wage in manufacturing in Texas is \$19.27.⁴⁷

Economic diversification. Before wind, Sweetwater's economy was supported mainly by the oil and gas industry. It also had a gypsum plant, a cement plant, and a radiation-measurement equipment manufacturer. Wind has broadened that economy, attracting a range of new companies in both services and manufacturing that support the wind industry regionally and nationally. This has expanded revenues for existing businesses, such as the cement plant, and it has catalyzed investment in post-secondary education.

Some of the new entrants in Nolan:

- **Wind Energy Turbine Services** – This company, founded in Sweetwater in 2007, provides inspection, repair, and maintenance for wind projects across the U.S. It employs 60 people and generates \$10.3 million in annual sales.⁴⁸
- **Global Fiberglass Solutions** – This Seattle-based company opened a facility recently in Sweetwater to recycle wind turbine blades that are discarded after repowering projects. The company reduces blades to pellets, which it sells to fiberglass manufacturers nationally and internationally. It also plans

⁴⁰ New Amsterdam Wind Source LLC, West Texas Wind Energy Consortium. Nolan County: Case Study of Wind Energy Economic Impacts in Texas. July 10, 2008; interviews with Ken Becker, Miesha Adames, Rod Wetsel.

⁴¹ *Ibid.* Federal Reserve Bank of St. Louis, op. cit. Footnote 28.

⁴² Brochure provided by SEED. July 2020.

⁴³ *Ibid.*

⁴⁴ U.S. Bureau of Labor Statistics. [State Occupational Employment and Wage Estimates Texas. May 2019.](#)

⁴⁵ *Ibid.*

⁴⁶ Becker. (*op. cit.*)

⁴⁷ U.S. Bureau of Labor Statistics. [State Occupational Employment and Wage Estimates Texas. May 2019.](#)

⁴⁸ Dun & Bradstreet. [Wind Energy Turbine Services Inc. company profile.](#) Accessed July 20, 2020.

to produce construction-grade fiberglass panels. It is expected to employ 75 to 125 people over the next two to five years.⁴⁹

- **EMA Electromechanics** – Headquartered in Buenos Aires, EMA, which specializes in the production of combination circuit-breaker/grounding-switch units, opened a 20,000-square-foot assembly factory in Sweetwater in 2010, as part of its strategy to gain a bigger share of the North American wind market. The **Sweetwater Enterprise for Economic Development Municipal Development District**⁵⁰ built the EMA facility, then leased it to the company for seven years under the terms of a SEED loan to the company that was paid off in four years.⁵¹ Today, company officials say the factory generates about \$20 million in annual sales—at about \$100,000 per unit—and that EMA has captured 55% of the U.S. breaker-box market for utility-scale wind and solar.⁵² Averaging about 200 units per year since it opened in Sweetwater, EMA plans to produce twice as many units this year
- **Texas State Technical College** – TSTC, which has offered traditional trade school education at its Sweetwater campus since 1970, started a wind-industry technology program in 2010 that now graduates 50 to 75 students per year with a 12-month basic certificate or a 20-month associate degree program.⁵³ Many students benefit from scholarships funded by wind companies. An added benefit: Sweetwater’s young people now can find steady jobs close to home. As one local wind industry advocate recently put it, “They don’t have to get up every morning and worry, ‘Is the price of wind going down today?’”⁵⁴
- **Crane Service Inc.** – This Albuquerque-based company opened an office in Sweetwater in 2007 and employs about 70 people in wind industry crane operations and services.
- **Ludlum Wind** – This company, a subsidiary of a homegrown Sweetwater manufacturer of radiation-detection equipment, was formed in 2010 and makes specialized components for wind turbines.⁵⁵

Follow-on utility-scale solar development. Sweetwater’s embrace of the wind industry has attracted solar developers, too, who plan to exploit local proximity to the CREZ substation.⁵⁶ Statewide, utility-scale solar is on the rise and poses a

⁴⁹ Interview with Don Lilly, CEO, Global Fiberglass Solutions. August 2020.

⁵⁰ Interviews with Gabriel Acosta, CFO, EMA Electromechanics; Becker *op. cit.* Footnote 23. June and July 2020.

⁵¹ Becker. (*op. cit.*)

⁵² Acosta. (*op. cit.*)

⁵³ Interview with Billie Jones, Statewide Department Chair of Wind Energy Technology, Texas State Technical College. July 2020.

⁵⁴ *Ibid.*

⁵⁵ Interview via email with Chris Hamlin, Wind Component Sales Manager, Ludlum Wind. August 2020.

⁵⁶ Wetsel, Becker. Interview with Ben Mathes, Hecate Energy development analyst. July 2020.

growing threat to ERCOT's coal-fired plants,⁵⁷ and at least three utility-scale projects are under way in Sweetwater:

- A 500MW project by **Hecate Energy**, an established utility-scale solar company. The project is expected to cost between \$300 million and \$400 million, provide 100 full-time jobs for a year, and put from \$2 million to \$3 million annually into the pockets of landowners after it is completed in late 2023.⁵⁸ **Google** has announced it plans to purchase 490MW of solar energy in Texas, including 250MW from Hecate.^{59, 60}
- The 200MW **Holstein Solar project**, built by San Francisco-based 8minute Solar Energy, an established developer, and recently purchased by **Duke Energy**;
- **8minute Solar Energy** has plans also to build a 100MW solar plant as well as a battery project capable of storing 103MW of power.⁶¹

Lease payments that keep landowners on the land and create cash flow across the community. As oil and gas prices declined, and as droughts and falling beef prices took their toll, landowners in Nolan County—most of them descendants of homesteaders from the 19th century—were struggling by 2000, and many faced the prospect of selling their farms and ranches.⁶²

Then came the wind industry. Every turbine tower in the county is tied to a lease payment agreement between a developer and a landowner. About 250 landowners have entered into such deals.⁶³ Although the agreements are kept confidential, the deals can run for up to 30 years, with the landowner receiving the following:

A development fee of \$2 to \$6 per acre for the first years of each lease with incremental increases in subsequent years;

- A royalty of 4.5% to 5% on gross revenues from power purchase agreements developers have struck with buyers;
- A one-time siting fee of \$5,000 per MW of capacity;
- One-time fees for installation of roads, underground cables, and overhead lines on landowner property;
- Security by way of a decommissioning bond paid for by the developer;

⁵⁷ IEEFA: [Solar Surge Set to Drive Much of Remaining Texas Coal-Fired Fleet Offline](#). July 2020.

⁵⁸ Mathes. (*op. cit.*)

⁵⁹ Google CEO blog. [Our biggest renewable energy purchase ever](#). Sept. 19, 2019.

⁶⁰ S&P Global Market Intelligence. [Hecate Energy secures 250-MW Texas solar supply deal with Google](#). Oct. 1, 2019.

⁶¹ Energy Reliability Council of Texas. [Generator Interconnection Status Report](#). June 2020.

⁶² Wetsel, Etheredge. (*op.cit.*)

⁶³ Adames. (*op. cit.*)

- Additional security by way of assured payment of an early-termination penalty payment equal to five years of royalties;
- A lost-hunting compensation fee;
- Attorney's fees.

A single 1.5MW tower typically earns a landowner from \$8,000 to \$12,000 a year in payments. A landowner with a 3.55MW tower can bring in about \$20,000 a year per tower, as will landowners involved in the Maryneal Windpower Project, which will be the newest wind farm in Nolan County and will be completed in December and operational by early 2021. Developed by **Duke Energy Renewables**, it will be built on about 16,000 leased acres (25 square miles). It will include 38 turbines with a capacity of 4.8MW each for a total of 182.4MW, and, all told, will generate more than \$750,000 in lease revenues.

The Maryneal project is also a good example of how corporate demand is driving much of the growth of renewables: **Sprint**, the mobile-phone company recently acquired by **T-Mobile**, has signed a 12-year PPA for Maryneal electricity as part of its commitment to reduce its carbon footprint.

Assuming a rough figure of \$12,000 per tower in lease payments to landowners, Nolan County's 1,323 turbines are annually churning at least \$15.9 million into bank accounts of landowners, who in turn very likely spend a good portion of it in the local economy, as suggested by sales tax data. The city of Sweetwater alone in 2018 collected nearly \$4 million in sales taxes, up 111% over the \$1.8 million collected in 1999.

Social and financial stability. While this benefit is less measurable than others, it is priceless. As one landowner described it:

"Nobody here is driving a Hummer. But they do sleep a little better and smile a little more. They are more positive about the future."⁶⁴

⁶⁴ Etheredge. (*op. cit.*)

Outlook: Texas Is a Bull Market for Wind

Texas has by far the biggest and most robust wind industry in the U.S., and nothing suggests it will do anything other than continue to grow—and in rapid fashion.

The vast portion of the state's electrical grid, which is governed by ERCOT and includes all but the El Paso area, part of the Panhandle and a section of eastern Texas, counted 23,860 megawatts of wind-powered generation at the end of 2019.

The capacity-increase chart here shows how that total will have grown by 45%, or 10,788W, by the end of 2021, to 34,648MW. No segment of the Texas electricity-generation sector has ever seen such explosive growth, and as striking as the 2020 and 2021 increase is—once the dust has settled and as the pipeline expands it could very likely be something closer to 50%.

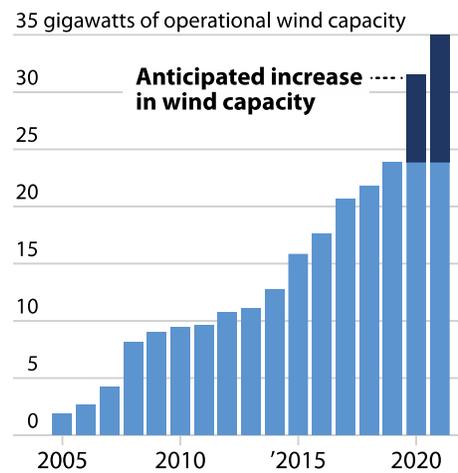
The 2020-2021 new-project figures cited above include what is or will be grid-connected by the end of 2021, what will be built and grid-synchronized by the end of 2021, and the amount of interconnection agreements signed and financial security posted. They do not include 1,799MW that have interconnection agreements but are still working out the financing. A pipeline of wind projects beyond 2021 is developing as well.

National and global forces that include customer expectations, investor preferences, and public policy pressures will continue to drive market forces that will sustain trends in wind-powered generation—in Texas and elsewhere—and at the expense of coal- and gas-powered generation. Utility companies today are simply skipping the middle step from costly coal-fired power to less costly gas-fired electricity by going straight from coal to renewables, bypassing gas altogether.⁶⁵ The fuel chart here provides a recent snapshot of the power-generation mix in ERCOT. It does not represent what the mix will look like in the future, when wind and solar will gain market share, coal will fade, and gas will decline as it becomes less competitive with no-fuel-cost renewables.

This trend strikes very close to home in West Texas, where the biggest fracking play in the country is facing an existential problem as demand shrinks across its customer base, companies consolidate, investors chalk up losses, pipeline

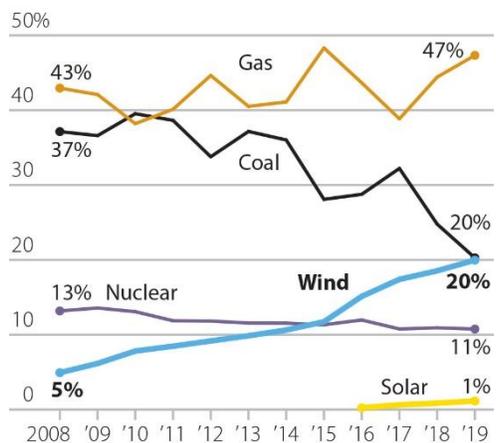
A Record Increase in Wind Power Generation Capacity in ERCOT

More generation capacity from wind turbines is expected to become operational this year—11.1 gigawatts—than in any previous year in the Electric Reliability Council of Texas' grid area. Another 3.4 gigawatts is expected to be added next year.



Source: ERCOT

ERCOT's Fuel Mix for Electric Power Generation



Only fuels with 1% or more share in any year are shown.

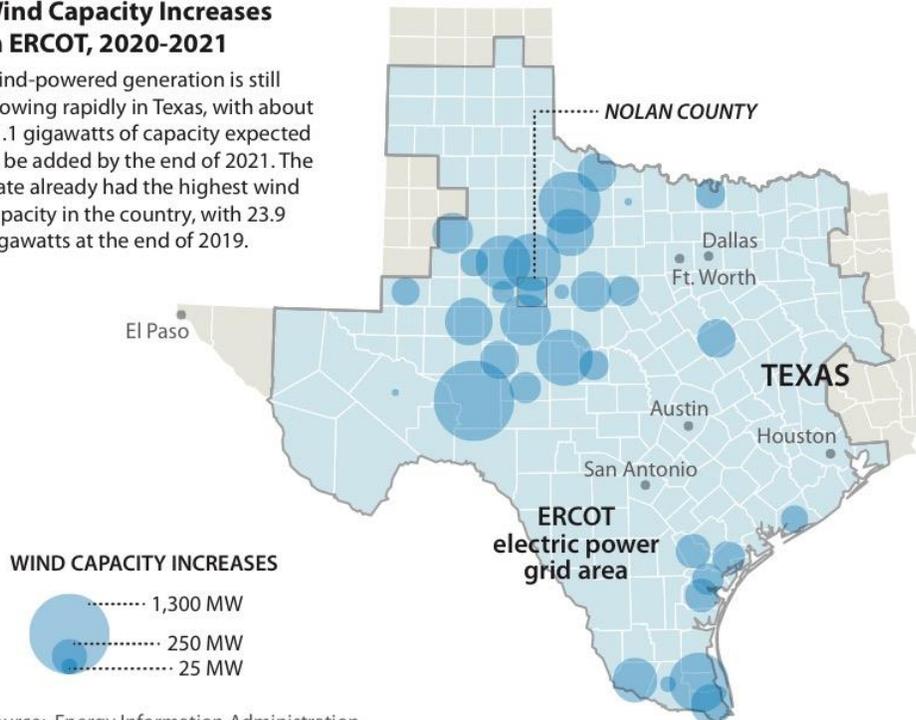
Source: ERCOT

⁶⁵ IEEFA. [Utilities are now skipping the gas 'bridge' in transition from coal to renewables.](#) July 1, 2020.

projects are cancelled, and as the broader transition away from fossil fuels gains momentum.

Wind Capacity Increases In ERCOT, 2020-2021

Wind-powered generation is still growing rapidly in Texas, with about 11.1 gigawatts of capacity expected to be added by the end of 2021. The state already had the highest wind capacity in the country, with 23.9 gigawatts at the end of 2019.



Source: Energy Information Administration

The map above shows where the wind-expansion action is, and will be, in 2020 and 2021.

It also shows how Nolan County, the subject of the case study of this report, is no isolated example, surrounded as it is by thousands of megawatts of new wind projects coming online now and over the next 17 months—through January 2021. The nine-county region surrounding and including Nolan already has some 3,500 turbines, with a combined capacity of about 6,500MW of wind power,⁶⁶ or about 27% of total wind capacity on the ERCOT grid.

Considering the health and momentum of the wind industry alongside the state's up-and-coming utility-scale solar project pipeline, growth in the Texas energy industry stands to be driven more by renewables than by gas and oil production.

And what happens in Texas will not necessarily stay in Texas, as customer and investor preference, cost considerations, and political and public support very likely will continue to drive wind-industry expansion.

The Nolan County example can and will be replicated elsewhere.

⁶⁶ Brochure provided by SEED. July 2020.

Most if not all new power-generation demand across ERCOT will be provided by wind and solar.

The roster of 34 counties listed here in alphabetical order, shows those with new wind projects either online or coming online this year and next (the numbers represent new megawatt capacity per county. Pecos county shows a negative number because it is repowering a wind farm that will result in fewer turbines by acre and a slight net loss in capacity compared to its original project).

While a good part of the activity is taking place in southern Texas, as can be seen on the map on page 16, most is occurring in the more wind-rich area of the state, which happens also to be situated on lands in or near Permian Basin oilfields, which, compared especially to wind-industry prosperity, are not doing so well.

Andrews	160
Archer	12
Bee	241
Borden	158
Callahan	331
Cameron	344
Coke	525
Concho	640
Cooke	180
Crockett	1300
Eastland	193
Fisher	669
Glasscock	455
Haskell	452
Hidalgo	51
Irion	300
Knox	780
Lynn	338
Matagorda	151
McCulloch	180
McLennan	300
Mitchell	100
Nolan	182
Nueces	226
Pecos	-11
Refugio	220
San Patricio	201
Schleicher	200
Scurry	603
Starr	402
Taylor	44
Wilbarger	302
Willacy	714
Zapata	202
Total	11145

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