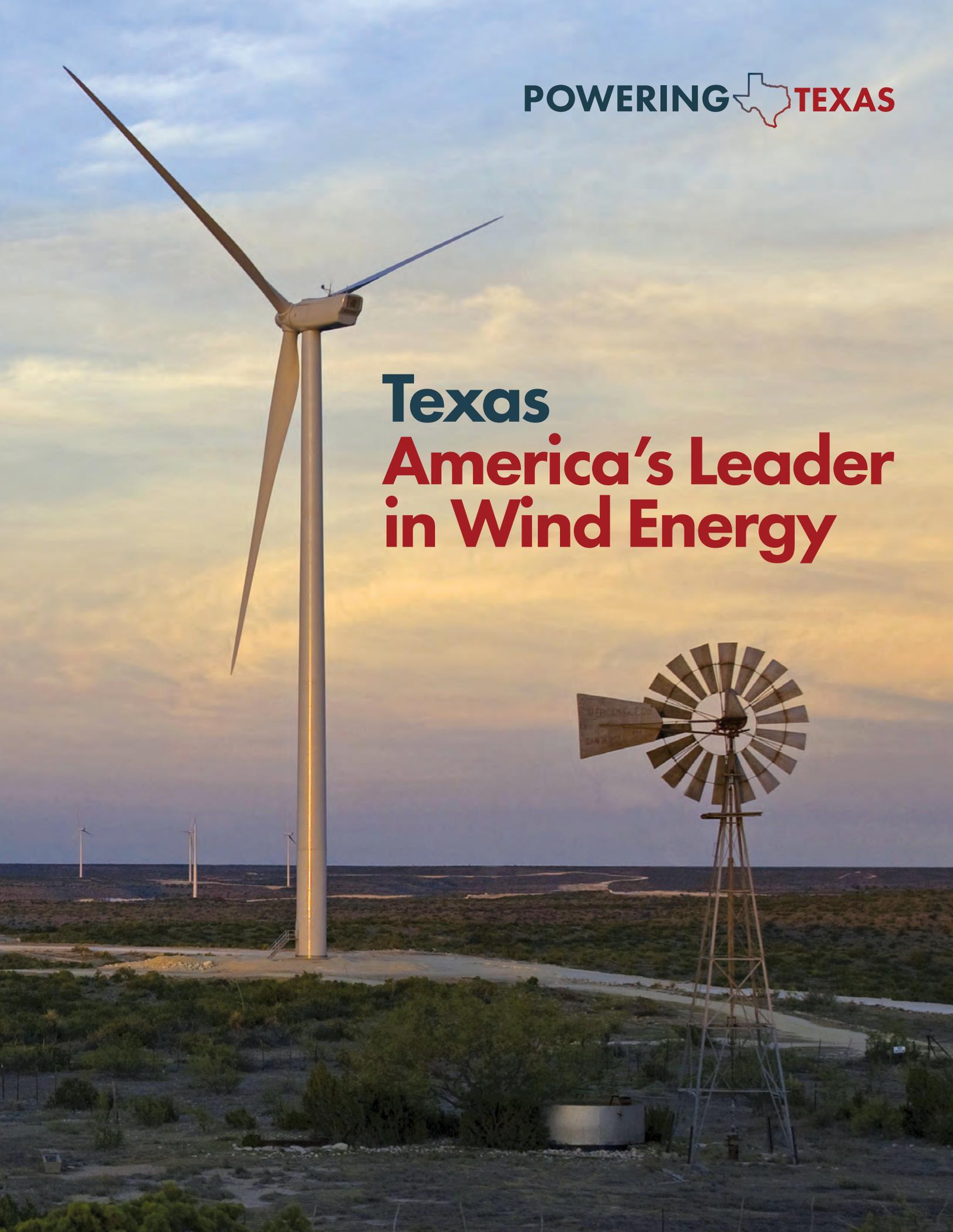


POWERING  TEXAS

# Texas America's Leader in Wind Energy





**The state of Texas is the national leader in wind energy. Texas ranks first in the nation in both installed and under-construction wind energy capacity, generating more power than the next three most prolific wind energy states combined.**

# Texas: America's Leader in Wind Energy

**Texas has led the way in meeting our nation's energy needs for decades. Now, the same state that blazed trails in years past is setting the pace once again—diversifying its economy and creating the energy grid of the future with renewable energy.**

The state of Texas is the national leader in wind energy. Texas ranks [first in the nation](#)<sup>1</sup> in both installed and under-construction wind energy capacity, generating more power than the next three most prolific wind energy states combined. That output makes Texas a leader in wind energy not just nationally, but globally. In fact, if Texas were a country, it would rank fifth in the world in installed wind energy capacity.

The growth of Texas wind energy has been driven by high demand for electricity from a growing economy, excellent wind resources, corporate commitments to predictable and long-term energy resources, a largely independent power grid, and—importantly—competitive, intelligent, conservative policy.

Texas' dominance in wind energy [was fostered with the implementation of a modest Renewable Portfolio Standard](#)<sup>2</sup> (RPS) in 1999 under the leadership of Governor George W. Bush. In 2005, under Governor Rick Perry, the Republican-led state legislature signaled growing support for wind and solar energy by strengthening the Renewable Portfolio Standard to require that 5,880 megawatts come from renewable sources by 2015. Lawmakers also set a goal of 10,000 megawatts of renewable capacity by 2025. Texas surpassed the 2015 goal in 2008 and the 2025 goal in 2010 – and they did so almost entirely with wind power.

The majority of Texas' wind resources are concentrated in West Texas, while the majority of the population and power demand lies in the eastern portion of the state. To address this challenge, Governor Perry also signed legislation directing the development of over 2,300 miles of high-voltage new transmission lines that would allow for the efficient movement of energy from West Texas to the high demand centers further east and south.

The Public Utility Commission of Texas (PUCT) collaborated with ERCOT, Texas' self-contained electric grid, to establish the [Competitive Renewable Energy Zone \(CREZ\)](#)<sup>3</sup> transmission project in West Texas. Completed in 2013, the CREZ transmission project transmits more than 18.5 MW of wind and gas generated electricity across Texas. These transmission lines enable Texas to provide three times as much wind power as any other state.

This foundation of pro-growth conservative wind policy—and the ongoing support of the industry by consumers, policymakers, regulators and leading global businesses in the years that followed—has helped generate [\\$42 billion of investment in Texas wind energy through 2017](#).<sup>4</sup> That massive investment has led to big things for Texas: more than 24,000 well-paying jobs, significant opportunity in the manufacturing sector thanks to 46 active facilities producing wind energy components and equipment, increased state and local tax revenue, and a more diverse economy powered by an energy supply that's built for the future and not susceptible to global price swings.

Corporate demand for renewable energy is driving investment in wind and solar power in the state. Major manufacturers, retailers, technology firms, and other companies are making investments in Texas renewables. Some are even making plans to expand their manufacturing activities thanks to the availability of predictably priced, affordable wind energy.

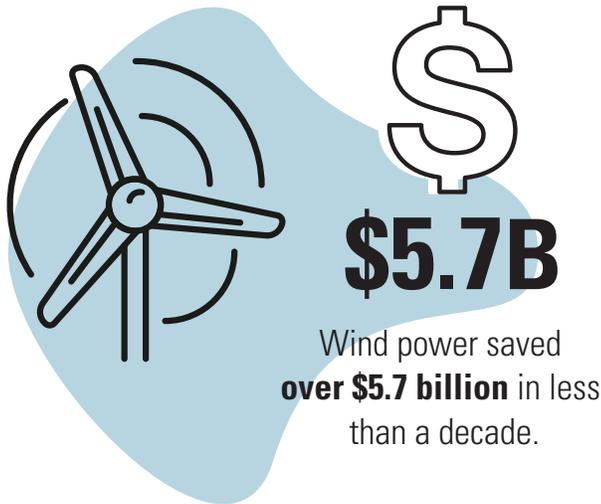
Texas is a windy state, and that wind brings benefits to the state of Texas that reach far beyond power generation. As both generating capacity and consumer demand continue to grow, wind energy will create even more jobs, economic opportunity, and consumer benefits in communities across the state.

**Texas leads the nation in installed wind capacity at over 24 gigawatts (GW), and is also the nation's leader in wind turbines. There are 144 wind projects online in Texas, with the vast majority (133) operating at a scale greater than 10 megawatts.**

This handbook provides information outlining just a few of the ways in which wind is powering Texas' future, discussing the industry's remarkable power output, its economic impact, state and local tax contributions, and support delivered by wind to rural communities across the state. The handbook also discusses issues that are critical to the future growth, such as military siting and permitting.

## Wind Energy in Texas: The Basics

Wind is a [top tier source of energy in the state of Texas](#).<sup>5</sup> During 2017, wind energy provided nearly 15 percent of all in-state electricity production – the tenth highest share of wind electricity in the nation – enough to power 6,235,000 Texas homes. Texas leads the nation in installed wind capacity at over 24 gigawatts (GW), and is also the nation’s leader in wind turbines. There are 144 wind projects online in Texas, with the vast majority (133) operating at a scale greater than 10 megawatts.



Expansion of the state’s wind energy industry has saved consumers money. [Between 2010 and 2017, wind power helped push down wholesale electricity market costs by between \\$350-\\$960 million per year, resulting in Texas consumers saving over \\$5.7 billion.](#)<sup>6</sup>

The wind energy industry is an established contributor to the Texas electrical grid. Maintaining a predictable policy landscape ensures a competitive and balanced market, and empowers renewable energy in Texas to contribute for generations to come. An additional 5,322 megawatts of capacity are under construction, and 1,660 megawatts are in advanced stages of development.

## More than Electricity: The Economic Impact of Texas Wind Energy

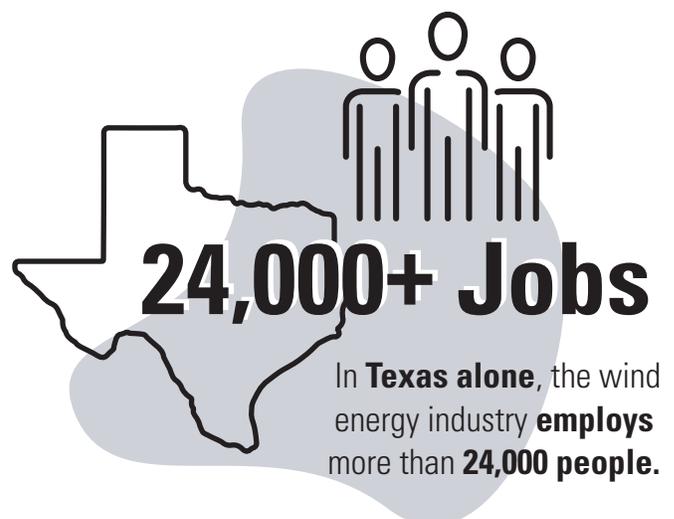
The electricity generated by wind energy powers Texas’ economy, keeping the lights on and services running in the face of high demand. Wind ensures that business owners large and small can count on reliable power when they need it. Wind energy is an economic boon to Texas, creating jobs, opportunity, and revenue that strengthens communities and provides economic opportunity for families.

## Growing Production, Creating Jobs

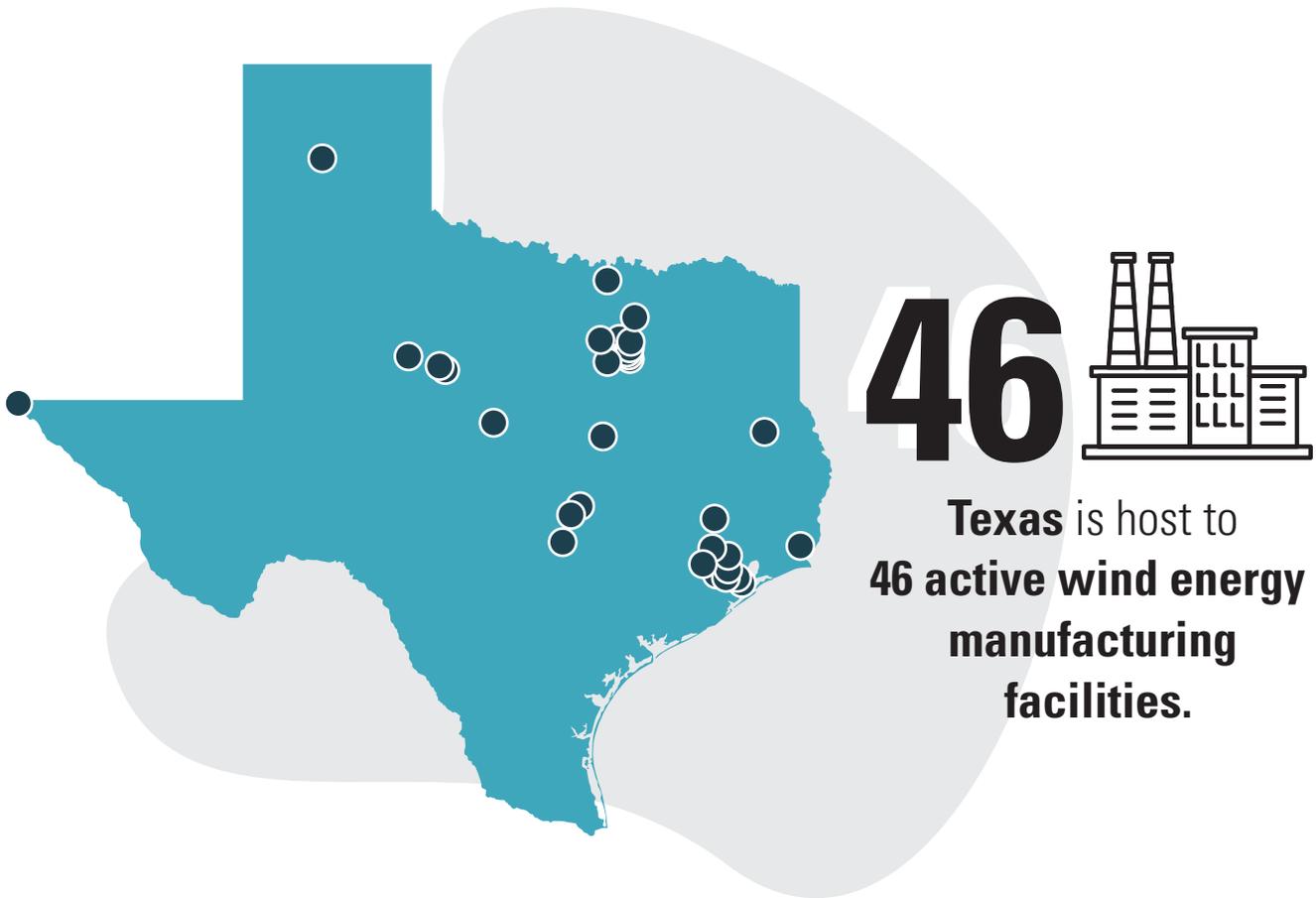
Wind is big business across the country and nowhere is it bigger than in Texas. According to [recent research from the Department of Energy](#),<sup>7</sup> there are more than 100,000 jobs in wind energy across the country. More Americans work in wind than in the generation of nuclear, coal, natural gas, or hydroelectric energy. And in Texas alone, the wind energy industry employs more than 24,000 people.

The industry is creating opportunities for workers at a remarkable pace, and labor statistics indicate that industry will do even more to put Texans to work in years to come. According to the federal [Bureau of Labor Statistics](#), “[wind turbine technician](#)” is the nation’s second fastest growing job,<sup>8</sup> expected to nearly double over the course of the next decade while paying a median salary of around \$54,000 per year.

Armed service veterans are an important part of the wind industry workforce. Nationwide, the wind energy industry employs veterans at a rate 72 percent higher than the national average thanks to their technical expertise and their wealth of transferrable skills, from hard work and discipline to an ability to perform in high-pressure situations.







**“According to the Federal Bureau of Labor Statistics, “wind turbine technician” is the nation’s second fastest growing job.”**

[Jason Grizzle](#),<sup>9</sup> a Regional Manager for E.ON, a wind developer, owner, and operator, in West Texas, said that his time in the military taught him how to be a leader, how to manage people, and to motivate them to work toward a common objective. [Richard Hoffman](#),<sup>10</sup> a welder at Broadwind Towers, noted that military service prepared him for the wind industry because both environments require commitment, discipline, and a desire to do things the right way. Federal policy proposals, like the [Energy Jobs for Our Heroes Act of 2018](#),<sup>11</sup> would help make veteran hiring in the wind sector even more prevalent.

Thanks to a history of entrepreneurship and innovation, extensive private investment, and insightful state policy, Texas wind is poised to provide thousands of jobs in construction, manufacturing, maintenance and more for decades to come. Whether installing new capacity, repowering existing infrastructure to drive greater efficiency and more power output, or simply working in a business in one of the many communities bolstered by wind energy, Texans in search of work will find no shortage of opportunities in and around the wind energy industry.

## Powering Texas Manufacturing

Wind energy manufacturing is thriving, and data suggests that it will continue to do so in years to come. Texas is at the center of this manufacturing boom—and that means more jobs, investment, and tax revenue for the Lone Star State.

A typical [wind energy turbine is comprised of around 8,000 components](#).<sup>12</sup> In Texas and nationwide, this represents a significant opportunity for local manufacturers. There are more than 500 manufacturing facilities in the United States devoted to wind energy, producing everything from major wind turbine components such as nacelles, blades, and towers to internal components like bearings, slip rings, fasteners, and power converters.

Given the size and scale of the components needed to build a wind turbine, manufacturers are motivated to establish local facilities, and that has been good news for the Lone Star State. Texas is a national hotspot for wind energy manufacturing, playing host to [46 active manufacturing facilities](#),<sup>13</sup> including tower manufacturers like GRI Renewable Industries, Trinity Industries, and Broadwind Towers. There are more manufacturing facilities in Texas than in all but one other American state.



The financial impact of the Texas wind energy industry goes beyond the \$42 billion invested through 2017 and the tens of thousands of jobs created in the state. The steady growth of the Texas wind energy industry has also been good news for state and local tax coffers.

[Stable policy at both the state and federal levels](#)<sup>14</sup> encourages major wind manufacturers to invest in U.S. based facilities, often bringing their supply chain with them. This has helped to bring down wind turbine costs and has boosted domestic content. According to the [Lawrence-Berkley National Laboratory](#),<sup>15</sup> the share of domestic manufacturing content for nacelle assembly exceeds 85 percent, while towers are between 80 and 85 percent domestic content. Blades and hubs also have strong domestic content, estimated between 50 to 70 percent. This market will continue to offer new opportunities as current and new manufacturers expand and develop domestic supply chains.

## A Texas-Sized Revenue Generator

The financial impact of the Texas wind energy industry goes beyond the \$42 billion invested through 2017 and the tens of thousands of jobs created in the state. The steady growth of the Texas wind energy industry has also been good news for state and local tax coffers.

The wind industry has helped infuse new life and revenue into some of the state's most economically challenged regions. Wind projects are [often the largest source of county tax revenue in many of the communities which host projects](#).<sup>16</sup> The industry's substantial tax contributions are often used for community development in the form of schools, libraries, hospitals, roads and other local projects. In many instances, local communities wouldn't be able to provide these and other valuable services without the tax contributions from wind projects.

Particularly in rural areas, wind can also help reduce the tax burden on homeowners and business owners. Land in rural areas is often taxed at reduced rates due to "agricultural exemptions," which help make Texas farmers and ranchers more competitive, but also means the local tax burden falls most heavily on homeowners and business owners. In these communities, the increased tax revenue from wind energy projects can help reduce that higher tax burden and improve public services.



### **Sweetwater Case Study**

For a case study in the positive revenue impact made at the local level by the wind energy industry, consider the small town of Sweetwater. Prior to the emergence of wind energy, when the area was mostly known for “cotton, cows, oil, and gas,” the aggregate value of the county’s property tax base was \$500 million. In 2008, thanks to wind investments, it was \$2.8 billion—and it has only grown since then. The drastic increase in the taxable value of land thanks to the wind turbines enabled the county and school district to build new schools, expand the local hospital, and more.



## Strengthening Rural Communities

The positive impact on small towns and rural communities is about more than tax revenue or macroeconomic investment numbers. In communities like Sweetwater and dozens more like it, wind energy is an economic lifeblood: [a drought-proof cash crop](#)<sup>17</sup> that can sustain both individual landowners and entire communities in the face of fluctuating commodity prices, drought, or bad weather that leads to poor harvests.

Nationwide, 99 percent of all operating wind energy capacity is located in rural areas, and that means that it is small towns, rural communities, farmers, and ranchers who are benefitting most from the billions that wind energy has invested in the state of Texas.

In addition to paying taxes to local governments, the Texas wind energy industry pays more than \$60 million annually in lease payments. These payments go almost exclusively to individual landowners, as the vast majority of wind farms are on private property rather than public lands. And because the average wind farm leaves roughly [98 percent of the land undisturbed](#),<sup>18</sup> farmers and ranchers can continue to harvest crops and raise livestock even as the turbine generates dependable, drought-proof, supplemental income.

In an agricultural sector defined by uncertainty the stable cash stream that comes from wind energy lease payments can mean the difference between [keeping a multi-generational](#)

**...the Texas wind industry pays more than \$60 million annually in lease payments.**

[farm in the family or being forced to sell](#).<sup>19</sup> In fact, during the recent drought, many farmers and ranchers credited their wind revenue with helping them ride out the difficult season.

The impacts of uncertainty in the agricultural sector—and the role wind plays in offsetting those impacts—can be seen firsthand here in Texas. After the U.S. announced tariffs on \$34 billion of Chinese products, China responded with taxes of their own, primarily on agricultural products like pork and soybeans. These are the kinds of goods made by family farmers in America's heartland and across Texas.

In 2017, Texas farmers sent [\\$42 billion](#)<sup>20</sup> worth of goods to China. Castro County, in the center of the Texas Panhandle, is a top agricultural producer in the state. Its economy centers on dairies, corn and cotton. [Analysis](#)<sup>21</sup> from Moody's Analytics shows that U.S. tariffs on China could negatively affect nearly 25 percent of Castro County's GDP.



## **Castro County Case Study**

Fortunately, Castro County is also one of the nation's leading locations for installed wind capacity, hosting 282 operating turbines.<sup>22</sup> The landowners that host these turbines can count on a stable source of income during an unpredictable time, augmenting their annual earnings without changing the way they operate. A 2014 study<sup>23</sup> found that farmers with turbines on their land have invested twice as much in their operations over the past five years as farmers without them.

Wind power is helping to sustain the way of life in rural communities. It is helping farmers and ranchers to make a living over the long term. It is driving investment, creating jobs, and building opportunities in small, rural communities that may otherwise have few places to turn for growth. Wind is helping to power a bright future in rural Texas and across the nation, keeping families on their land and preserving their way of life.

## Powering Texas and Protecting the Environment

Wind energy is also helping to protect the land and water that is passed down from generation to generation.

As the Texas wind energy industry continues to boom—creating jobs, driving billions in investment, and providing reliable power at a massive scale—it can be easy to lose track of one of the things that makes wind such an appealing fuel source: its environmental attributes.

Power generation represents the second largest form of water use in the United States, but unlike most other forms of generation, wind power uses no water. It's dry, drought-proof energy that saves water for other important users, like municipalities and agriculture. In 2017, the use of wind energy resulted in [water consumption savings](#)<sup>24</sup> of more than 23 billion gallons relative to traditional electricity generation. That's the equivalent of 177 billion bottles of water. In a state where droughts are common, the importance of these savings cannot be overstated—especially when compared to the water used to generate power from other sources of fuel like coal or natural gas.

Wind energy's emissions impacts are also significant. By generating power from wind, Texas avoided [48.4 million metric tons of carbon dioxide pollution](#)<sup>25</sup>—equivalent to taking 10.3 million cars off the road for one year.

As the nation's grid becomes more modern and efficient, fuel sources that can deliver clean, affordable power at scale will play an increasingly integral role in our independent energy future. As the nation's largest producer of wind energy, Texas is ready to lead the way.



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That's the equivalent of **177 billion bottles of water.**

## Efficient Military Siting

The wind industry works closely with the Department of Defense (DOD) to identify and mitigate any potential impacts of proposed wind farms on military installations and mission readiness. The Department of Defense puts each and every project through a robust review process to ensure wind farms don't impact military base operations. And this process works. Both the DOD and local base commanders review any wind farm proposed near military facilities. If concerns are raised, private developers bear the cost of mitigation through changes to the project, radar upgrades for the base, or other options that alleviate the concerns. Examples of this active partnership can be seen right here in Texas, where the DOD and the United States Navy voiced and ultimately lifted objections to a few projects in South Texas after developers signed [memorandums of understanding](#)<sup>26</sup> to help fund mitigation options and potentially to limit turbine operations in certain circumstances if necessary.

If mitigation options aren't viable, developers simply move on to other projects. No project opposed by DOD has ever been built and no missions or training at bases have been compromised due to the tens of thousands of turbines deployed today.

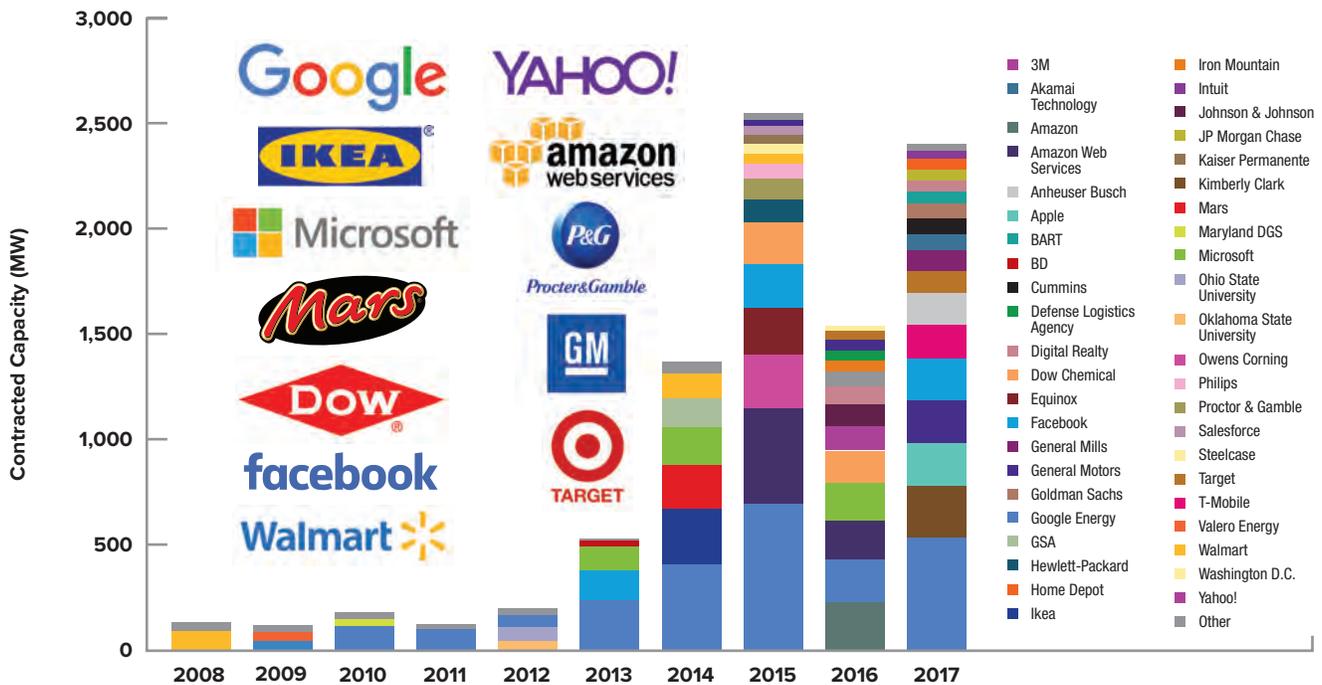
Put simply, current policy is effective—wind turbines and military installations can and do co-exist. Haphazard policy changes—such as arbitrary exclusion or “buffer” zones—put tens of billions of dollars in investment and tens of millions of dollars in land lease payments in jeopardy. What's more, they do nothing to enhance national security or preserve the mission and viability of military installations. The DOD said it best, in a 2015 report to Congress, when they noted that “generic standoff distances are not useful.”

## Corporate Purchasers Say Yes to Wind

In Texas and across the nation, wind energy is becoming both more prolific and more affordable. And as the already strong economics and scale of clean wind energy continue to steadily improve, more and more corporate and non-utility customers are choosing to invest in wind in a big way, both to lower emissions and to secure low-cost, fixed price energy insulated from fuel price fluctuation. This is good news for corporate America, and it's equally good news for the nation's leading wind energy producer: Texas.

Wind power is a smart investment for businesses of all sizes. But for large corporations, wind represents a rare “win-win” scenario: an opportunity to please shareholders and stakeholders of all stripes by delivering reduced power costs and greater predictability while also meeting ambitious

## Wind Power Purchases by Non-Utility Customers



emissions reductions or renewable energy targets. These distinct but equally significant benefits make wind an exceptional investment for corporations building toward a sustainable future in today's competitive marketplace.

[63 percent of Fortune 100 companies, and 48 percent of Fortune 500 companies,](#)<sup>27</sup> currently have a renewable energy target, a greenhouse gas reduction target, an energy efficiency target, or some combination of the three. More than a dozen Fortune 500 companies, including Wal-Mart, IKEA, Google, and General Motors [have committed to 100% renewable energy targets,](#)<sup>28</sup> and these companies are increasingly procuring wind energy to both meet their sustainability goals and secure long-term electricity price stability.

Support for wind as a long-term power solution is growing quickly across the nation, and Texas is playing a starring role. Take General Motors. As one of the United States' leading manufacturers, General Motors's financial outlook is heavily influenced by its power needs. And as a leader in the auto industry – long considered to be one of the sectors most important to global efforts to reduce carbon emissions – environmental sustainability is also of immense importance. Texas wind energy helps address both priorities while driving economic investment in the state. For example, GM [purchased 50 megawatts of wind power from Cactus Flats Wind Farm](#)<sup>29</sup> in Concho County. Starting in 2018, GM sourced more than 193,000 megawatt hours of electricity from wind annually, enough to power the Austin IT Innovation Center, a GM Financial office in Fort Worth and 13 parts warehouses. GM Arlington Assembly, which is [already 50](#)

[percent powered](#)<sup>30</sup> by renewable energy, will soon have all of its electricity needs met with green power.

[General Mills, a big investor in Texas wind energy, signed a 15-year power purchase agreement for 100 megawatts of the Cactus Flats wind project.](#)<sup>31</sup> It is also a significant investment in rural Texas while at the same time providing General Mills with reliable energy at stable prices.

General Motors is far from alone in seeing the wisdom in the purchase of Texas wind energy. AT&T is one of the nation's largest companies, and it also happens to be headquartered right here in Texas – with close to [40,000 of its 273,000 employees living and working in the Lone Star State.](#)<sup>32</sup> In 2018, AT&T announced one of the [largest corporate renewable energy purchases in history.](#)<sup>33</sup> committing to the purchase of 520 megawatts of wind power through two agreements with subsidiaries of NextEra Energy Resources. 300 megawatts will come from a wind farm in Webb and Duval Counties in Texas.

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**... because wind is a “win-win solution — good for the environment and good for business.”**

“As one of the world’s largest companies, we know how we source our energy is important,” said [Scott Mair, AT&T’s President of Operations](#)<sup>34</sup> of the purchase. “Many companies are focused on their own carbon footprint but we believe our industry can do more. We’ve been working for a long time to ensure our wind projects deliver for both our business and the environment. We will continue to explore renewable energy solutions to help create a better, more sustainable world.”

Dow Chemical, another major Texas economic contributor, purchased 200 megawatts of power from the Javelina Wind Project in Mirando City, Texas because wind is a [“win-win solution — good for the environment and good for business.”](#)<sup>35</sup>

As the companies driving our nation’s economic future continue to increase their commitment to powering their business with clean, affordable wind, Texas’ wind energy industry will only continue to grow stronger. That means more jobs, more opportunity, and a long future of spurring

growth nationwide. And thanks to hard work, sound policy, and effective partnership, Texas is on course to remain at the epicenter of that growth for many years to come.

**“Made in Texas” Energy Future**

In the past, Texas relied heavily on imported coal to generate electricity. Today, the state is transitioning to a cleaner, cheaper energy future, and, by leveraging highly complementary homegrown energy sources including renewable energy and the state’s natural gas resources, that future will be “Made in Texas”. Renewables and natural gas work in tandem to lower power prices, reduce emissions, and save water. Because the price of the wind is permanently fixed at zero, wind brings extraordinarily low-cost power to the market. Natural gas is highly reliable and capable of responding to variability in wind and solar output, but natural gas prices fluctuate in response to market conditions. Together, renewables and natural gas complement one another delivering lower prices, high reliability, and massive emissions reductions — all using the in-state resources with which Texas has been blessed.



## Working Together to Power Texas' Future

The trajectory of the wind energy industry in Texas is extremely promising. Strong corporate and public demand for wind energy, advancing technology, favorable market dynamics, and a capable workforce have positioned Texas' wind industry for a positive future—a future that will deliver ongoing benefits to the state of Texas.

Texas is a state that recognizes the value of the free market, and the state's grid operators are no different. Wind's merits—as a fuel source, an economic engine, and an environmental boon—speak for themselves. Texas officials should be mindful of the unforeseen consequences of ill-founded policy interventions on one of the state's most important and fastest growing economic drivers.

Policymakers and regulators should be proud of the policies they put in place that have helped this vital sector of the Texas economy. From the wind industry's early days in the state to today, the industry has benefitted from a pro-growth and efficient regulatory environment. As noted in a recent analysis published by the [Southern Legislative Conference](#),<sup>36</sup>

given a “centralized energy grid, streamlined permitting system, and a business-friendly siting environment, the development of wind energy projects is comparatively simple” in the Lone Star State. The Texas policy framework for wind energy is working.

Wind's success in Texas is founded on innovation, entrepreneurship, and thoughtful policy that has helped foster the development of wind energy and kept costs down for ratepayers. Thanks to this effective and visionary leadership, Texas' future is brighter than ever—and wind energy will continue to help light the path to that future.

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