

# Renewable Energy: Wind and Solar

❖ Can Texans harness the wind and sun and even the jobs that go with these energy sources?

## Introduction

In late 2009, German utility giant E.ON constructed the world's largest wind farm in the tiny West Texas town of Roscoe. The Roscoe wind farm has the capacity to produce 781.5 megawatts — enough electricity for every home in Plano, McKinney and the rest of the 265,000 households in Collin County. The \$1 billion project in Roscoe took 21 months to complete and employed 500 construction workers, who built 627 wind turbines on the fields of 300 property owners — land that once pumped oil.

The wind turbines of West Texas spin at 7 miles per hour. And one turbine produces about as much electricity as 350 households consume in a year. These economics are attracting more wind turbines to the state, as Asian and European manufacturers of wind and solar technology push to sell their products in the growing Texas energy market. For example, Lubbock will soon be home to giant 2.5-megawatt wind turbines made by Samsung Heavy Industries of South Korea. These new wind turbines are more powerful than the 1.5-megawatt turbines that line the landscape of much of West Texas. Similar Asian-manufactured, high-powered wind turbines are part of a new wind farm in West Texas, which is being developed by Austin-based Cielo Wind Power, one of the first companies to join the Texas wind industry a decade ago. Cielo's projects include a new \$1.5 billion,

600-turbine development across 336,000 acres of West Texas. Financed by Chinese banks, the development will feature new turbines made in China and will bring 300 temporary construction jobs and 30 permanent jobs to the area. Renewable energy in Texas is new — and it has already been globalized.

These giant wind projects illustrate two key trends: Texas is emerging as the capital of renewable energy, and foreign companies are moving fast to take advantage. “People in Texas think it has got to be conventional energy or renewable energy. It's not. It's both,” said Michael Webber, an engineering professor at the University of Texas at Austin and associate director of the Center for International Energy and Environmental Policy.

Webber is one of a growing number of Texas energy industry observers and insiders who think the Lone Star State is now poised to dominate a new energy economy, as renewable energy sources become more evenly distributed alongside traditional sources, such as oil, coal and natural gas.

“We're poised better than any other state in a carbon-constrained world. Texas can have more wind, solar and natural gas than anywhere else. And we can make money from that the same way we made money from oil,” Webber said. “Change freaks people out. Change doesn't have to freak us out.”

---

**“We're poised better than any other state in a carbon-constrained world. Texas can have more wind, solar and natural gas than anywhere else. And we can make money from that the same way we made money from oil. Change freaks people out. Change doesn't have to freak us out.”**



## | What's Happening

The Texas renewable energy industries are growing as they work to leverage the benefits and limit the challenges presented by their energy sources. For instance, wind is a free fuel, it doesn't pollute and it doesn't consume water. The West Texas windy season is long, lasting from fall to spring. Two of the best locations for producing wind energy in America are the Texas panhandle and West Texas. Still, neither wind nor solar energy is a consistent energy source. The wind doesn't blow all the time. The sun doesn't shine all the time. And unlike portable and storable fuels, such as gasoline and coal, electricity is an instant fuel that is difficult to store.

Despite its challenges, the renewable energy sector is growing in Texas. Located about 200 miles west of Fort Worth, Nolan County is referred to as the wind industry capital of North America. The county not only has hundreds of wind turbines across its pastoral landscape, but it also has expertise in many facets of renewable energy: Nolan County boasts a critical mass of attorneys, technicians, title agents,

engineers, electricians, marketers and specially trained wind-energy workers.

Wind energy is also popular because it doesn't displace existing industry. Community leaders describe it as a value-added business. The turbines take up only 100 square feet of land — about the size of a living room. Cattle usually graze around the giant turbines. And natural gas and oil wells are often spotted pumping out the remaining fossil fuels near the turbines. As electricity transmission lines are developed, West Texas community leaders expect the number of wind turbines on the landscape to increase.

Solar energy also has benefits: it's plentiful, it's free and it doesn't cause pollution. Some Texas companies are trying to capitalize on solar energy by changing the economics of the industry. HelioVolt Corp. in Austin is trying to eliminate the long-distance transmission constraints by placing solar panels directly on consumers' homes, factories and offices.

B. J. Stanbery, cofounder and chief strategy officer of HelioVolt, readily acknowledges that current solar energy technology generates electricity only when

the sun is shining and that battery storage is expensive. To address this, HelioVolt is working to develop small solar panels that can be placed on any building to supplement other electricity sources. If the company's products become popular with the mainstream public, then the company can alter the business model of renewable energy and help make solar energy easy and affordable for consumers, he said.

HelioVolt recently opened an 85-worker factory in Austin to make thin glass panels filled with semiconductors that help convert rays of sun to electricity. The panels are about the size of a standard roof shingle and can attach to the outside surface of a building. "Ultimately, the supply chain for solar is going to change dramatically," Stanbery said. "Right now solar panels are installed by specialized technicians. In 5 to 10 years, solar panels will be part of the normal construction process. It will be plug and play."

Currently, HelioVolt is shopping for incentives to open its next factory, which will employ 200 workers. While HelioVolt's growth up to this point has been financed primarily through venture capital and equity investments, the national credit crunch has limited those resources. To continue expanding, HelioVolt is looking to the U.S. Department of Energy for loan guarantees to help the company borrow money at 4.75% interest to fund upcoming expansion.

Stanbery is confident about the growth prospects for the solar industry and companies such as HelioVolt as more consumers discover the advantage of a supplemental yet direct energy source during daylight hours. "Solar gives you energy during the peak demand hours," he said.

Having supplemental energy during working hours is attracting attention. In late 2009, the city of Austin and its utility company, Austin Power, contracted to build a private solar farm outside the city. Gemini Solar Development will build a 30-megawatt solar farm on 320 acres by the end of 2011. The farm will supply enough electricity to the city to power about 5,000 homes.

## | The Data

Texas, with its vast vistas of land over which wind blows under sunny skies, is attracting companies from the solar and wind energy industries. In 2009, Texas generated about 7,100 megawatts of electricity via wind — or about 30% of all wind energy in the nation. For Texans, about 5% of their electricity is coming from wind. All of this makes Texas the leading state for wind energy production, according to the American Wind Energy Association.

In solar energy production, Texas ranks sixth in the nation, generating about 1.7 megawatts of solar energy — less than 1% of the solar energy in the nation as of 2007. Though small, this amount has more than doubled each year since 1998, according to the Energy Information Administration.

## | So What?

"Here in Texas, we are still the central nervous system of the energy industry. Houston is still the energy capital of the world," said Skip York, lead consultant at Wood MacKenzie in Houston, a global energy industry company. "Texans know more about energy than anybody. If Texas does not become a major cog in the solar and wind industry, it's because Texas

---

**"Texans know more about energy than anybody. If Texas does not become a major cog in the solar and wind industry, it's because Texas screwed up."**

— Skip York, Wood MacKenzie



screwed up. Nobody is going to beat us to dominating the wind and solar industry; if we don't take advantage of it, then it's our fault."

While the business case for renewable energy is still being defined, the renewable energy industry is growing in Texas. Though California pioneered wind energy in the United States, Texas has used a "second mover advantage" to take advantage of technological improvements and now take a dominant position.

Much of the growth has been fueled by federal stimulus money and tax credits, as well as by curious investors and consumers, according to both supporters and detractors of renewable energy. The American Recovery and Reinvestment Act of 2009 (the stimulus plan) extended federal tax credits for alternative energy sources through 2012. The stimulus plan's 30% tax credit for wind investments built on the alternative energy tax incentives of the Bill Clinton and George W. Bush administrations, which helped continue the momentum in the renewable energy industries.

In February 2009, President Barack Obama said that renewable energy entrepreneurs need to play a significant role in leading the United States away from its dependency on oil imports. "We can remain the world's leading importer of foreign oil, or we can become the world's leading exporter of renewable energy," Obama said. "We can allow climate change to wreak unnatural havoc, or we can create jobs preventing its worse effects."

The cost of entering the renewable energy field is lower than the cost of entering traditional energy industries. The price tag to build a modern coal- or

natural gas-fired power plant starts at \$3 billion, whereas the price for a wind or solar farm starts in the tens of millions, according to the U.S. Energy Information Administration.

The low costs are thanks to newer technology, which has made wind turbines more durable, easier to erect, cheaper to maintain and less expensive than traditional power plants. Wind power now costs about \$2 million per megawatt to produce, according to studies by the American Wind Energy Association. For investors to see financial viability, a modern wind farm needs to generate at least 20 megawatts. The average single wind turbine can generate about 1.5 megawatts. So, to start a farm and achieve financial viability, investors need to fund at least 13 turbines at an initial cost of about \$40 million. With these lower barriers to entry, European and Asian companies are entering the Lone Star State's renewable energy market.

Among the nation's biggest buyers of wind-generated power are Texas utilities, including Luminant in Dallas, CPS Energy in San Antonio, Reliant Energy in Houston, Austin Energy and the Lower Colorado River Authority in Austin. More than 2,000 wind turbines are spinning in 40 communities across Texas to supply electricity to those utilities — with many more on the way. This number doesn't include the West Texas wind farms discussed earlier.

Texas has also been stepping up its incentives for utilities to use solar-generated power, including incentives for consumers who set up solar projects on their property. These incentives became available to most Texans in 2010.

---

**Much of the growth has been fueled by federal stimulus money and tax credits, as well as by curious investors and consumers, according to both supporters and detractors of renewable energy.**

---

# Chapter 19 | Suggested Strategies



## Think Globally, Plan Regionally

“As the rest of the nation drags its feet on renewable energy, Texas is moving forward,” said Webber at the University of Texas. “And Texas could sell renewable energy outside the state, but our electric grid is not hooked up outside the state. Texas is going to do for solar what we’re already doing for wind. Solar has been held back by high prices for its technology, but those prices are coming down really fast.”

Market forces, along with select state and local government policies, will certainly play a big role in determining which renewable energy sources, if any, will flourish.

A major focus of the alternative energy industry is expanding the infrastructure. Recently, construction began on electric transmission lines to link rural West Texas to San Antonio. The \$5 billion cost of this project — more than \$1 million a mile — will be passed along to Texas consumers for years. These new transmission lines will have a big impact on the Texas wind industry because they can transmit a whopping 18,500 megawatts of power, almost doubling the amount of wind-generated energy in the nation, according to the American Wind Energy Association.

This is a significant increase in the state’s wind power capacity, and even more dramatic growth is possible. The Texas Panhandle offers even better winds than West Texas. Yet the Panhandle still needs transmission line connections, as wind proponent T. Boone Pickens pointed out. Such infrastructure expansion is necessary for Texas utilities to diversify their electricity sources with more wind and solar energy in major metro areas.

A thriving wind and solar energy sector also can attract new investment in Texas. Components for the wind turbines in West Texas were built in factories in Round Rock,

Abilene, Dallas and many small towns around Sweetwater, as well as in Europe and Asia.

Creating sustainable jobs in the renewable energy field, particularly in Texas, remains a critical and unresolved issue. Executives at Applied Materials publicly lamented that the high-tech equipment the company designs in Texas is used inside solar panels that are manufactured in China — and later sold in the United States. As a result, American workers are not fully benefiting from rising American demand for renewable energy. To address this, Applied Materials has a plan called fab2farm, which calls for a city or an existing high-tech manufacturing company to set up a factory to build solar panels using components from Applied Materials. The solar panels, which can be installed in local solar farms, would provide power to nearby cities, or they could be sold in North America.

“We’ve lamented the loss of manufacturing jobs in this country,” said Steve Taylor, director of government affairs for Applied Materials. “But this concept is about creating large-scale solar panel manufacturing and solar power for communities in this country. This could be localized manufacturing. We’d like to see the ‘Made in Texas’ brand on solar panels.”

Federal and state incentives for wind and solar energy will expire in a few years. Executives in these industries say such incentives are vital to continued expansion in this country as well as in Texas. The Texas renewable energy market has been growing, thanks to sunny days, blowing winds and the creation of expertise in wind and solar energy. Continued growth of this industry depends on expansion of electric distribution, adoption of more renewable energy by more utility companies, expanded energy engineering programs in Texas universities and community colleges, creative economic development strategies and stepped-up talent development.