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60°  44°
A chilly start, but oh,
so sunny. A14

150 YEARS  1867-2017

"I looked at what was happening and what will be happening for the next 30 years, and wind maintenance seemed win-win."

Will Osborn, lead wind technician at the Black Oak wind farm near Sauk Centre, Minn.



Photos by GLEN STUBBE • glen.stubbe@startribune.com

Wind technician Will Osborn perched outside a wind turbine's nacelle, a small room housing the gear box. He and Chris Berg, lower right, were 24 stories up servicing a Vestas wind turbine at the Black Oak wind farm, below, in Sauk Centre.

FOR CLEAN-ENERGY JOBS, SKY'S THE LIMIT

Wind technician is the fastest growing occupation in the nation

In Minnesota and U.S., renewable energy jobs are multiplying fast

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SAUK CENTRE, MINN. — Golden cornfields stretched out 24 stories below Will Osborn, the autumn landscape dotted with silos and farmhouses.

Of course, he didn't have much time to gaze. Planted atop a wind turbine — one of a few dozen here — Osborn was diagnosing a weather sensor.

Osborn's job, wind technician, is the fastest growing occupation in the nation. As utilities rapidly increase



6,200
renewable energy
jobs in Minnesota

475,545
similar jobs across
the United States

the amount of power they get from wind farms, workers willing and able to climb hundreds of feet to keep turbines running smoothly are in high demand. Students in wind power training programs in Minnesota are getting jobs as soon as they graduate or even before.

"I do what pays the bills, and I looked at what was happening and will be happening for the next 30 years, and wind maintenance seemed win-win," said Osborn, who works for Vestas, a global wind energy giant.

See **JOBS** on All ▶

◀ **JOBS** from All

As wind and solar energy have grown, they've created a tide of jobs nationwide in fields from construction to manufacturing. Renewable energy jobs, most of which are in wind and solar, grew by 16 percent to around 6,200 in Minnesota from 2015 to 2016, according to a recent study by Clean Energy Economy Minnesota, an industry-led nonprofit.

A wind building boom is expected to continue over the next five years. Solar should grow, too, even though its immediate future is clouded by threats of heavy U.S. tariffs on solar equipment imports, which would ratchet up the industry's costs.

The growth of wind and solar — along with a huge build-out of natural gas-fired power plants — is also eliminating jobs in some traditional energy sectors. U.S. coal mining jobs have plummeted as power companies move away from coal-based generation. In Minnesota, six coal-fired generators — two of them quite large — are set to close over the next decade.

"Yes, there will be job losses in some of those traditional employment centers like coal plants — it's happening now," said Bruce Peterson, executive director of the Minnesota State Energy Center of Excellence.

The state's community and technical colleges, which Peterson represents, have been beefing up wind and solar energy offerings.

"I think what we are seeing is an evolution," Peterson said.

State leads in wind power

Wind and solar energy have taken off because of a combination of falling costs for equipment, federal tax breaks and environmental concerns. Coal plants are a major emitter of greenhouse gases, while wind and solar produce none. And while President Donald Trump has been championing coal, utilities are expected to

keep moving to more renewable energy sources.

During 2017's first six months, wind accounted for 7 percent of all U.S. electricity generation, up from 3.5 percent five years ago and just under 1 percent in 2007, according to data from the U.S. Energy Information Administration. Solar has grown rapidly, too, but it still accounts for only 1.4 percent of U.S. electricity generation, and a bit less in Minnesota.

Minnesota is one of the nation's leading states for wind power, and wind made up 18 percent of the state's electricity generation last year, up from 13 percent from 2011.

Quick to find employment

Shane Keck, another Vestas wind technician, grew up with wind energy in Lambertton. "My grandpa owned a group of wind turbines in southwest Minnesota and that sparked my interest," he said.

Keck, 29, got a two-year degree in wind technology in 2008 from an Iowa community college, landing a job just a week after graduation. "It's definitely a career for me."

Osborn said the same. The 43-year-old Nebraska native served 12 years in the U.S. Marine Corps, and afterward got a wind turbine technical degree from Riverland Community College in Albert Lea. He's been working for Vestas since 2011 and is the company's lead technician at the Black Oak wind farm near Sauk Centre.

The wind farm, owned by San Diego-based Sempra Energy, opened in December with 39 turbines. Vestas, based in Denmark, manufactured the turbines used at Black Oak, and it has a crew of five there along with two Sempra workers. Vestas employs about 100 in Minnesota at almost 40 wind projects.

Wind service technician is by far the fastest-growing occupation in the country, with an expected growth rate

of 108 percent between 2014 and 2024, according to the U.S. Bureau of Labor Statistics (BLS). The agency says the median annual pay for a wind service technician in 2016 was \$52,260. At Vestas in Minnesota, technicians with no experience start at around \$19 an hour (around \$40,000 annually) and range to the upper \$30s per hour.

It's a physical job. To reach their workplace, Keck and Osborn climb a 262-foot ladder inside a hollow tower. Some Vestas towers at other wind farms are even taller — 489 feet, or 45 stories.

At a tower's top is the nacelle, a cramped room housing the turbine's gear box and loads of electrical equipment. It's a sauna in the summer, an icebox in the winter. There's outdoor work, too. On a recent day, Keck and Osborn flipped the ceiling hatches and climbed onto the nacelle's roof, tethering themselves with safety ropes. Their mission: to synchronize a weather sensor with a manual anemometer and a wind vane.

"I'd go stir crazy working in a factory all day," Osborn said.

Trying to tally jobs

Wind technician is one of many jobs in the renewable energy workforce, which is tricky to define.

"It's always been a very difficult concept to measure," said Steve Hine, director of labor market information at the Minnesota Department of Employment and Economic Development.

That's because so much of what's considered the renewable energy workforce is found outside of electric utilities, home to many jobs in coal and nuclear power generation.

For instance, Xcel Energy's coal power complex in Becker employs 300, while the company's coal-fired plant in Bayport has 200 workers. But Minneapolis-based Xcel, long the nation's leading wind energy utility and a major solar

player in Minnesota, has 420 renewable energy employees throughout the Upper Midwest.

Xcel doesn't own most of the wind farms from which it draws power. Plus, even large wind power plants may have only a couple dozen workers, solar projects even fewer.

Many energy job studies, however, look at a much broader spectrum.

Solar leads in jobs

The U.S. Energy Department's 2017 report concluded that solar generation employed 373,807 people nationwide — the most of any type of electric power production. Wind was second with 101,738 workers; coal generation was third with 86,035, not including 74,000 coal miners.

The Energy Department counted construction workers who spent a majority of their time on renewable energy projects. Thus, construction made up the highest proportion of employment in solar and wind. The manufacture of equipment for renewable energy projects also played a big role in solar and wind jobs.

For instance, Vestas employs about 3,400 in Colorado, where it produces wind turbines and towers at four factories.

Manufacturing accounts for a relatively small part of Minnesota's renewable energy employment, but that's not the case for construction. Plus, Minnesota is home to two of the largest wind and solar power plant contractors in the country: Golden Valley-based Mortenson and Blattner Energy in Avon, just west of St. Cloud.

Both have built renewable energy projects in their home state, hiring subcontractors and ultimately employing electricians, ironworkers, laborers, millwrights and heavy-equipment operators. A single construction site can require 50 to well over 100 workers depend-

ing on the project's size.

"If you look at the areas where wind is concentrated — like in southwestern Minnesota — it's a very big deal," said Kevin Pranis, marketing manager for the Laborers Union in Minnesota and North Dakota. Wind projects are a sought-after gig, providing laborers with six to eight months of work as the project is built out.

The outlook for wind farms in Minnesota and the rest of the Upper Midwest is sunny, as energy companies capitalize on federal tax incentives that phase out over the next few years. Several big projects are on the books.

"We expect wind will have a huge spike in activity between now and 2021," Pranis said.

"The next few years will be crazy."

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