The Winds of Change

R. Nolan Clark

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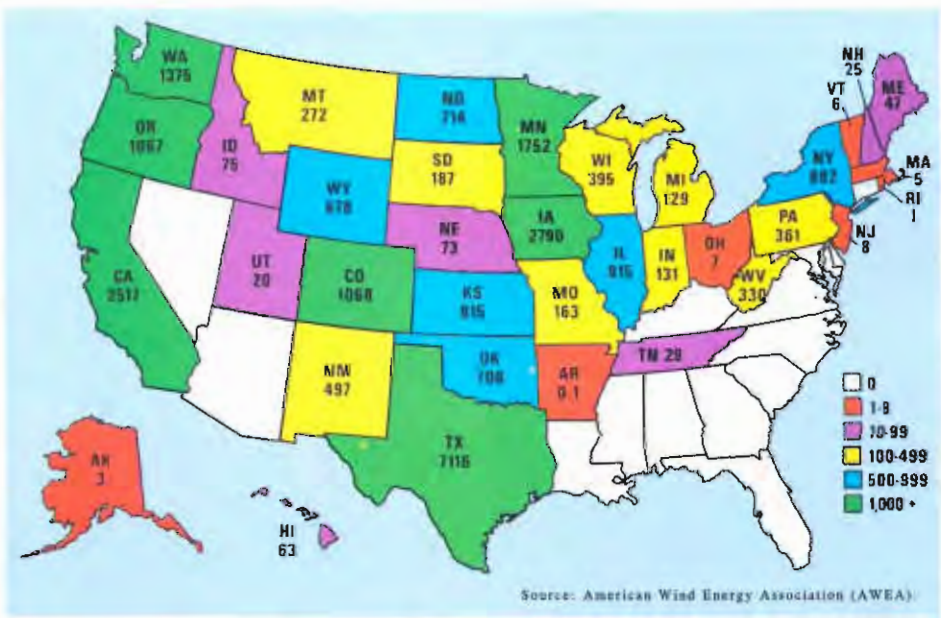
Wind-based power generation has been growing steadily in the United States and around the world, and this growth will continue—and accelerate—in the future, as the following background statistics demonstrate. The U.S. wind industry installed 8,358 megawatts (MW) of new wind generating capacity in 2008. This was enough generating capacity for over 2 million homes and increased the amount of wind power by 50 percent. The value of this investment was $17 billion, a big boost to the sluggish economy. In fact, these new wind projects accounted for about 42 percent of all new electric generating capacity installed in 2008. This new capacity will avoid nearly 44 million tons of carbon emissions, the equivalent of taking over 7 million cars off of the road.

In addition, according to the American Wind Energy Association (AWEA), 35 states host wind farms. Texas remains the leading state, with a capacity of 7,116 MW. That is an increase of 4,356 MW from 2007. Iowa with 2,790 MW moved to second place, surpassing California by adding 1,517 MW in 2008. California is third with 2,517MW, and Minnesota slipped to fourth with 1,752 MW. Washington (1,375 MW), Colorado (1,068 MW), and Oregon (1,067 MW) have over 1,000 MW of installed generation (see map below).

The U.S. total wind energy capacity at the end of 2008 was 25,170 MW, making the United States the world leader in wind energy production. The United States passed Germany (23,903 MW) for the number one position in 2008, and Spain remained in third position with 16,754 MW. China moved into the number four position with 12,210 MW, and



India dropped to fifth with 9,645 MW. These top five countries have 72 percent of the world's total wind capacity. The worldwide total is 120,800 MW (120.8 gigawatts), of which 27,000 MW was installed in 2008. More than half of the installations in 2008 occurred in the United States (8,358 MW) and China (6,300 MW).

The AWEA reports that the new wind projects in the United States created 35,000 new jobs, for a total of 85,000 people employed in the wind energy sector. In addition, about half of the components are made in the United States, thus creating 55 new or expanded manufacturing facilities and an additional 13,000 new jobs. This growing industry is creating new construction, manufacturing, and service jobs all across America.

Courtesy of ⊡ Nolan Clark

Incentives for future growth

The U.S. wind industry was poised to continue its growth in 2009, but as the economy slowed in the last months of 2008 and financing became harder to obtain, orders for turbines and components slowed to a trickle. However, industry watchers predict that about 5500 MW of new wind turbine capacity will be installed in 2009. The issue is how the financial crisis will affect future sales leading to delivery and installation in 2010. It is unclear how long this financial crisis will continue, but the economic stimulus package passed and signed into law on February 17, 2009, has several provisions that should help the wind industry be a vital player in revitalizing the economy. The American Recovery and Reinvestment Act of 2009 contains seven provisions that should help the wind industry. An extension of the production tax credit until December 31, 2012, will continue to assist new projects. (This credit is for energy produced and sold to a utility.) Another year of bonus depreciation for qualified equipment was extended through 2009. Also included was a new funding and loan guarantee for construction of new and replacement of transmission lines and infrastructure. This provides additional incentives for smart grids. State and local governments, as well as public power providers and electric cooperatives, are provided with renewable energy bonds to finance facilities to generate energy from wind.

One area that will potentially impact farmers and ranchers and all of agriculture is the removal of the $4,000 cap on the investment tax credit for individuals and businesses that purchase wind turbines for producing their own electricity. Owners can now receive the full value of the 30 percent investment tax credit for small wind turbines with rated capacities of 100 kilowatts (kW) or less. This 30 percent tax credit makes purchasing wind machines for home and business use more attractive, and it will open a whole new market for installers and maintenance workers in rural areas. Machines of 20 to 60 kW can easily supply much of the energy needed for most farms and ranches. Only large farms with animal feeding operations and irrigation systems need more power than can be provided by a 100 kW wind generator. In addition to this new investment tax credit, the USDA Rural Development Agency has funds for grants and loans for wind projects. These partially funded projects were continued through the 2008 Farm Bill. These new rules will help spur the industry to meet President Obama's goal of doubling renewable energy generation in the next three years.

ASABE agricultural engineer Nolan Clark (center) and technician Anthony May (kneeling) prepare a microturbine for operation with a wind-hybrid system for supplying electric power to remote villages while agricultural engineer Byron Neal measures emissions from a diesel generator. *(Courtesy of USDA-ARS, Stephen Ausmus photographer)*

Growth requires engineers

One area that is a critical constraint to future development is the availability of a trained work force. There are openings at all levels of work, from construction to operation. Engineers are in high demand because many trained engineers cannot acquire long-term work visas to remain in the United States. In addition, many projects will not allow international workers on sites for more than short construction periods. Engineers who understand electrical transmission, power generation, controls, foundation installation, and road maintenance are needed. Since most of these wind farms are going on farm and ranch lands, engineers who have knowledge of wind technology and agriculture are needed. It is estimated that about 30,000 new jobs will be available in the wind industry over the next two to three years.

Courtesy of R. Nolan Clark

Congress and the president are working together to pass two new pieces of legislation that could significantly boost wind power and renewable energy development. The first has already been drafted by the U.S. Senate Committee on Energy and Natural Resources and addresses major development of new electric transmission access. The proposed legislation defines any 345 kV or higher transmission line as a "national high priority" that will be given special emphasis for siting, planning, and cost allocations. This could expedite new transmission line construction. The other area that Congress is addressing is a national renewable energy standard (RES). Currently, at least three bills have been introduced that would set goals of 6 percent renewable energy by 2012 and 25 percent by 2025, as an example. The actual percentages are still being debated. If either or both of these concepts are passed, then wind energy development would greatly expand.

Many opportunities lie ahead for engineers in this developing technology and industry. Great changes are occurring daily, and this new power source is being integrated into our electrical generation mix that gives us clean, affordable electrical energy.

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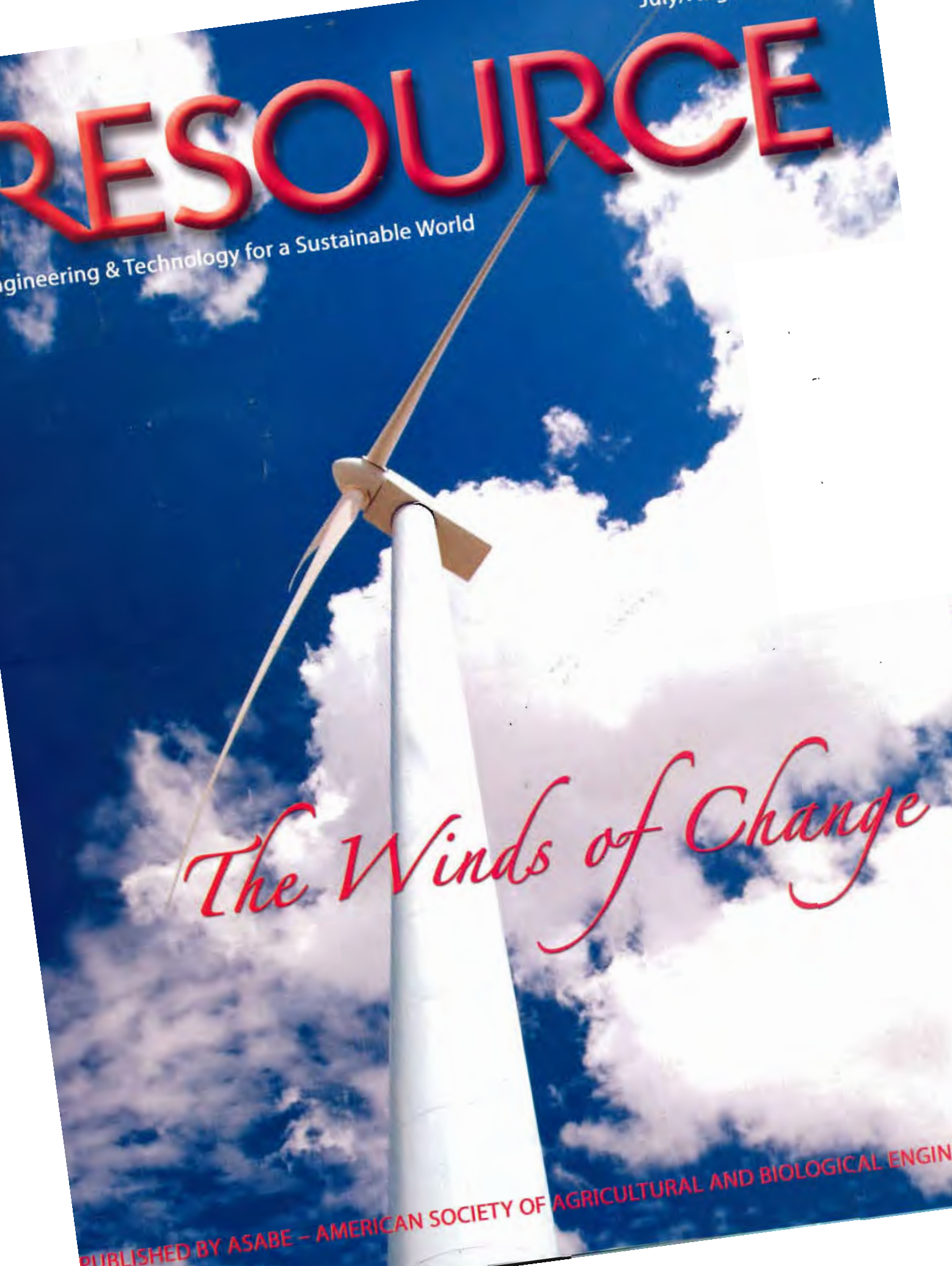
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