Focus on Wind Energy

Wyoming

Opportunity Blowing in the *WIND.*

Wyoming is known as the "Energy State," and for good reason. With an abundance of natural resources, Wyoming consistently ranks high in traditional, and now emerging, energy sources including wind. The "Energy State" was named by the National Renewable Energy Laboratory (NREL) as first of 11 states in the Mountain West and Pacific Northwest regions for Developable Nameplate Wind Power Production by Class. That's something.

With a tax climate extraordinarily favorable for business, higher education programs to develop a workforce skilled in wind energy technology and wind resources consistent with utility-scale production, Wyoming is poised to be a leader in the wind power industry.

WYOMING WIND RANKINGS

- **8th – Wind Potential**
- **15th – Current Wind Energy Production (1,410 MW)**

Wind and ambient air

Wyoming's wind resource can offer great renewable energy opportunities for data centers. With areas of the state ranking as Superb Resource Potential by the National Renewable Energy Laboratories (NREL), Wyoming is one of the most favorable locations for wind power development in the country.

WyoRECs *Renewable Energy Credit Discount Program*

WyoRECs is a partnership formed in 2013 between the Wyoming Business Council and Powder River Energy Corporation (PRECorp) to offer discounted renewable energy credits (RECs) to companies interested in taking advantage of green energy to power their growing Wyoming operations.

Overview of Major Wind Areas

The National Renewable Energy Laboratory (NREL), ranked Wyoming first in the Mountain West and Pacific Northwest regions in Developable Nameplate Wind Power Productions Potential by Class.

- Wyoming has more than 40 percent of class 5,6, and 7 inland wind resources in the United States with the potential of producing 116,670 MW. (Source NREL).
- According to the American Wind Energy Association (AWEA), Wyoming has 1,410 MW of existing wind power capacity.
- More than 10,000 MW of wind capacity is in various stage of development. (Wyo Infrastructure Authority).
- The average wind farm size in approximately 250-500 MW.
- Wyoming's wind quality means more megawatts of electrical production per day per turbine with capacity factors typically exceeding 45 percent.

1,000 WIND TURBINE PROJECT

Power Company of Wyoming LLC, an affiliate of Denver-based The Anschutz Corporation, plans to build an up to 1,000-turbine wind energy project south of Rawlins, Wyoming. The project's long-term surface disturbance will be less than 2,000 acres of a 320,000-acre ranch owned and operated by an affiliate company.

With a potential to generate approximately 2,500 MW of clean energy, the proposed project would be the largest in Wyoming, and in the world.

Geographic Diversity Studies show how Wyoming Wind Energy can Benefit California

In 2011, the Wyoming Infrastructure Authority (WIA) commissioned the University of Wyoming to conduct a series of Geographic Diversity Studies comparing Wyoming's world class wind to wind and solar in California; wind in Colorado; wind in Nebraska; and wind at different locations in the State of Wyoming. The results showed, without exception, that Wyoming's wind is diverse to wind in other states which would mitigate the variability of wind and solar and result in a reduction in the requisite surplus dispatchable generation to address the integration issues. The Study shows savings in the $100's of million dollars for California electricity customers; 10's of million dollars for consumers in Colorado and Nebraska; and markets to the east of Nebraska.

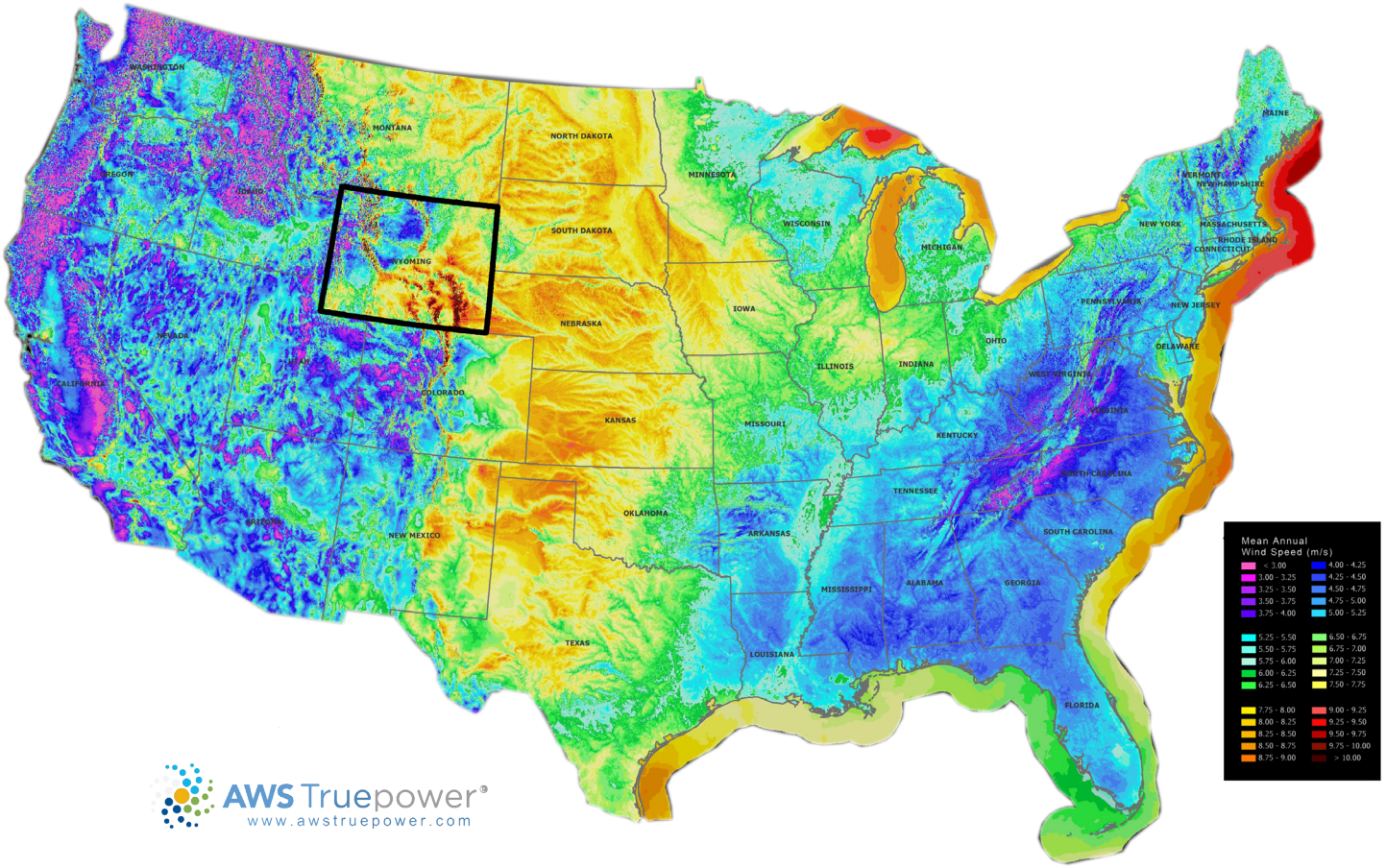
In addition, the studies showed that Wyoming wind peaks during the day, correlating well with electricity demand. Given the same amount of wind generation facilities, Wyoming wind would result in a greater amount of electricity production due to the fact that the wind capacity factors in Wyoming are greater than the different areas studied. The California Study was released on January 25, 2013. Both the California and Colorado Studies are available for viewing/download on the WIA website. The remaining studies will be posted later in 2013.

The majority funding for these studies came from a Department of Energy (DOE) Grant as a result of a collaborative effort between Wyoming's State Energy Office and the WIA.

"The analysis shows that the more coordinated our western grid becomes, the easier it will be to increase the amount of renewable energy available to us (California) while lowering energy costs for all utility customers," said Carl Zichella, Director of Western Transmission at NRDC in San Francisco.

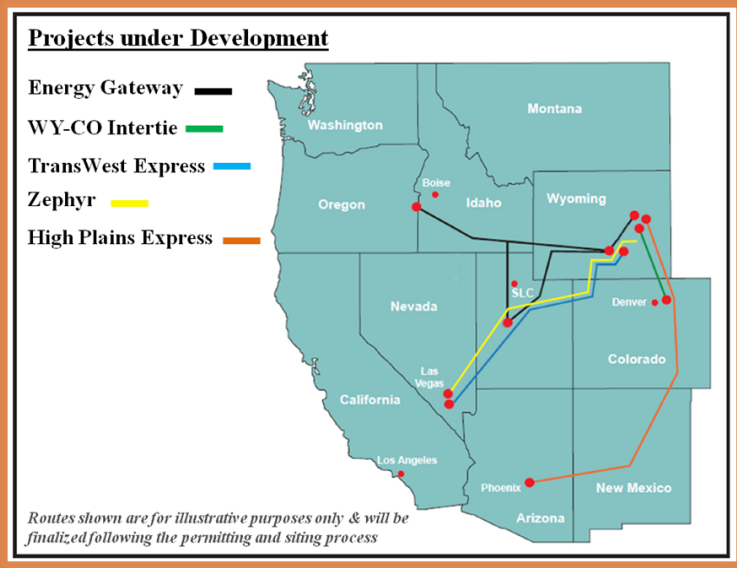
"Wyoming has some of the highest capacity wind on the continent. By integrating Wyoming wind energy, California can meet its renewable standard goals and reduce the amount of reserve energy utilities need to manage the variability of renewable energy."

Best Wind in the West



TRANSMISSION PROJECTS

- From Denver to Salt Lake City, Phoenix to Las Vegas and on to Southern California, the West is replete with markets in need of new sources of energy to keep up with the growing customer demand.
- Over 13,000 MW of transmission capacity, originating in Wyoming and connecting major population center in the west is under development, representing potentially more than $30 Billion in investments in transmission and an equivalent amount in generation facilities.
- In addition to an up to 1,000-turbine wind farm, The Anschutz Corporation separately is developing the proposed TransWest Express Transmission Project, a direct current power line to carry clean and sustainable electricity generated in Wyoming to markets in the Desert Southwest.



Wyoming

Education

University of Wyoming (UW) graduates approximately 200 students annually in engineering disciplines.

The University of Wyoming offers about 13,000 students more that 180 programs of study at the undergraduate, graduate and professional levels. The College of Engineering and Applied Science has approximately 1,300 undergraduate student enrolled in nine undergraduate programs, spanning seven departments. According to the American Society for Engineering Education, UW award 163 engineering degrees in 2011.

Bachelor's Degree Program(s)	Total
Architectural Engineering	18
Chemical Engineering	16
Civil Engineering	51
Computer Engineering	6
Computer Science, Business Option	2
Earth Systems Science	2
Electrical Engineering	23
Energy Systems Engineering	4
Mechanical Engineering	41
Petroleum Engineering	13
Totals	**176**

University of Wyoming

College of Engineering and Applied Science

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Wind Energy Research Center

The vision of the Wind Energy Research Center (WERC) is to establish an internationally-recognized program for conducting wind-energy-related research and education and to collaborate with other groups within and outside the university to provide service to the state and the nation. This center will provide experimental and computational capabilities as well as intellectual resources to carry out internationally-unique research that will aid in the nation's goal of enhancing energy security while reducing energy-related environmental impact. No single institution can address all areas of wind energy research, so the center will strategically partner with other academic institutions, federal laboratories, and companies with complementary capabilities. Coupled with this research mission will be the commitment to produce part of the workforce necessary to the large-scale penetration of wind into the energy market.