UW 'supercomputer' may aid future of wind energy

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A supercomputer destined for Cheyenne could someday help wind farm developers figure out the best places to put their turbines in Wyoming.

The National Center for Atmospheric Research computer is bound for a facility now under construction on the outskirts of the capital city.

While the supercomputer will crunch data related to atmospheric studies, University of Wyoming researchers plan to also use the computer to gain better understanding of Wyoming's winds.

"I think the supercomputer is going to have a huge impact," said Jonathan Naughton, director of the University of Wyoming Wind Energy Research Center, speaking before the Wyoming Infrastructure Authority board at its meeting in Laramie in October.

The wind models developed using the supercomputer could help companies fine-tune their proprietary modeling and make better choices about where to place turbines to promote Wyoming wind power as a partner to wind energy produced elsewhere.

"Things like, would it be a better idea to place this wind farm for diversity on this side of the hill or the other side of the hill?" Naughton said.

Naughton, who is also an associate professor of mechanical engineering, has worked on a number of studies to define Wyoming's wind resource and, lately, compare it to California's potential for wind energy production.

Recently, he presented his latest study to the authority board, which has helped fund the research. The latest research, based on weather forecasting models, will help Wyoming producers pitch the wind they harness as a complementary source of energy to wind projects in California.

Right now, Naughton and the others just use weather forecasting models, which aren't always highly accurate for predicting low-level wind in local areas, he said.

"We can get better estimation of the wind resource," Naughton told the authority board. "The whole problem with that is that it's an extensive process in computer time and cost."

Enter the supercomputer. By harnessing its power, Naughton said he and other engineering, math and atmospheric science researchers at the university can

combine those weather forecasts with maps of Wyoming's terrain.

Their work will help improve the models of companies that map out wind resources for wind farm developers, Naughton said Wednesday.

"As we gain better understanding, they can tune their modeling," he said.

Wind developers certainly value wind data and models that assist in turbine placement decisions. Kara Choquette is spokeswoman for Power Co. of Wyoming, a subsidiary of Denver-based Anschutz Corp. She said the company already has a thorough understanding of the wind resource at its 1,000-turbine Chokecherry and Sierra Madre wind energy project planned for south of Rawlins thanks to 36 meteorological monitoring towers and work with a wind consultant and turbine vendors.

But she said tools to measure and predict wind energy are getting better all the time, and the university's work with the NCAR computer could pay dividends for developers.

"We're aware of the UW concept with NCAR and will be watching with interest as the program evolves, and it may prove to be extremely valuable for future developers that are beginning a comprehensive wind resource study program," she said.

It's not yet known how powerful the new supercomputer will be. But the NCAR facility is built to handle a 1-petaflop supercomputer, or one that would handle one quadrillion computer operations a second. A quadrillion is the numeral 1 followed by 15 zeros.

The university is paying $1 million annually for the next 20 years for computer upgrades. In return, UW will have access to 20 percent of the supercomputer's operations.

Researchers will use the supercomputer to research climate change, understand severe storm systems and develop more accurate, farther-seeing weather forecasting models.

Naughton hopes to begin work on the Wyoming wind simulations shortly after the supercomputer begins operations next year.

"It's a good fit, and I think it fits well with the spirit of what the computer is going to be used for," he said.

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Information from: Casper Star-Tribune - Casper, http://www.trib.com

Source URL (retrieved on *05/05/2015 - 7:16am*):
http://www.chem.info/news/2011/11/uw-supercomputer-may-aid-future-wind-energy