

NEWS RELEASE

For Immediate Release



California Energy Commission

DOCKETED

13-IEP-1E

TN # 70683

MAY 09 2013

For release: April 2, 2013

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UW Study confirms how Wyoming wind energy complements and benefits Colorado *'Geographic diversity' leads to electric system improvements, cost savings for Colorado'*

CHEYENNE, Wyo., April 2, 2013 – A new study shows that incorporating Wyoming wind energy into the Colorado Electric Grid would both reduce system volatility and the need to supplement Colorado renewables with dispatchable generation, therefore saving money for utilities and their customers as well as mitigating emissions.

The Study, conducted by the University of Wyoming's (UW) [Wind Energy Research Center](#), examined the effects of combining 900 MW of Wyoming wind with existing wind in Colorado. Atmospheric data reconfirms that Wyoming's wind resources, with capacity factors exceeding 45 percent, are stronger than those in Colorado and strongest during the day, which correlates well with Colorado electricity demand. The Study is the second in a series of four analyses by UW. Later in 2013, diversity studies comparing Wyoming wind to Nebraska and intra-state Wyoming will be released.

Balancing Colorado's wind energy with the geographic diversity of Wyoming wind can provide significant benefits to the electricity grid in Colorado. Adding Wyoming wind to Colorado's renewable energy would:

- Reduce and smooth the variability of wind and solar energy on the grid;
- Improve the correlation of wind energy availability to the actual customer demand for electricity; and
- Reduce the requirement for the standby dispatchable generation during the day and which typically reflects the highest "peak power" pricing. Cost-effective and right-timed diverse Wyoming wind can mitigate the ramping events associated with the variable renewable energy on the Colorado grid.

UW researchers analyzed multiple scenarios and found that that utilizing a diverse portfolio of Colorado wind resources blended with wind from Wyoming would reduce the total requirement for dispatchable resources and ***yield significant savings in the \$10s of millions annually.*** Note that such savings do not consider the hours from 10:00 p.m. through 6:00 a.m. when the demand for power is low.

Another finding highlighted in the Study is the fact that ***Colorado wind sites tend to have very similar wind patterns as evidenced by unfavorable high correlation between such sites*** which makes the wind on the Colorado grid prime for the introduction of high capacity factor, diverse wind resources from Wyoming. Any Colorado wind added to the grid in Colorado will likely produce wind patterns similar to other wind energy currently on the network resulting in the grid not being as efficient as it might otherwise be with the inclusion of diverse wind. A table from the Study which reflects the correlation between all the sites in Wyoming and Colorado is as follows:

Table 1 – Correlation coefficients determined for pairs of Colorado sites with sites in Colorado and Wyoming.

	Cedar Creek	Peetz Table	Kit Carson	Cedar Point	Colorado Green	Wheatland/Chugwater	Laramie Valley	Casper	Medicine Bow	Rawlins
Cedar Creek	1.0000	0.9357	0.7532	0.7568	0.5503	0.4297	0.5245	0.3568	0.3421	0.3022
Peetz Table	0.9357	1.0000	0.7579	0.7490	0.5374	0.4121	0.4991	0.3501	0.3119	0.2796
Kit Carson	0.7532	0.7579	1.0000	0.8200	0.7715	0.2876	0.4099	0.3255	0.2852	0.3196
Cedar Point	0.7568	0.7490	0.8200	1.0000	0.7227	0.2739	0.4053	0.3288	0.2697	0.3074
Colorado Green	0.5503	0.5374	0.7715	0.7227	1.0000	0.2559	0.3855	0.3112	0.2957	0.3570

Following the review of the Study prior to release, one of WIA’s Board Members had this to say:

“This analysis shows that combining diverse renewable resources from Wyoming with those in Colorado would result in mitigating the amount of dispatchable generation required to address the variability of wind and solar” said J. M. Shafer, former Administrator at Western Area Power Administration, Lakewood, Colorado; and former General Manager of Tri-State Generation and Transmission. “Colorado has quality wind resources as does Wyoming. Given the significant amount of Colorado wind already connected to the grid, the time has come to consider blending it with a diverse resource with consideration afforded to the fact that Wyoming wind peaks during the day, correlating well with demand. Given the studies that the University of Wyoming has conducted to date, the topography in Wyoming and the corresponding wind regimes yield excellent geographic diversity when combined with renewable resources in California and now Colorado.”

The UW Study was commissioned by the WIA in early 2012. The study was led by Dr. Jonathan Naughton, professor of mechanical engineering and director of the UW [Wind Energy Research Center](#). A grant from the U.S. Department of Energy (DOE), made possible with the support of Wyoming’s State Energy Office, funded a majority portion of the Study’s cost.

The Study will be formally presented at the WIA's Spring Board Meeting in Cheyenne, Wyoming at the Little America Resort held May 15-16, 2013. *It is open to the public.* For details, visit <http://wyia.org> or contact holly.martinez@wyo.gov.

For Wyoming's wind resource to reach Colorado, new transmission infrastructure is required. Currently a transmission project originating in Wyoming is under development:

- **Wyoming-Colorado Intertie Project (WCI):** This 345 kV AC line would originate in the Wheatland/Chugwater area of Wyoming with an interconnection into the Colorado grid in northeast Colorado in Morgan County. The Project is being developed through a public/private partnership between the LS Power Group and the Wyoming Infrastructure Authority (WIA). The Project has a 2017 in-service date.
- Wyoming Wind and Power, a Wyoming company, applied to FERC in July 2011 to acquire 100 per cent of the capacity on WCI pursuant to a transmission service agreement (TSA) and was granted approval effective July 9, 2012.

Being released at the same time is a companion study intended to further quantify benefits to Colorado relative to Wyoming wind. The National Renewable Energy Laboratory (NREL) was commissioned by the WIA to report on the economic benefits and job creation relative to new transmission and generation infrastructure which would effectuate the delivery of electric power to the Front Range of Colorado from Wyoming.

Contact Information

Contact Loyd Drain, Wyoming Infrastructure Authority at 307.635.3573 or loyd.drain@wyo.gov ; or the study's author, Dr. Jonathan Naughton at 307.766.6284 or Naughton@uwyo.edu . For more information visit the WIA's website **to view/download the UW Study and the NREL Economic Benefits and Job Creation Study** at: <http://wyia.org/documents/reports> .

About the Wyoming Infrastructure Authority

The WIA, an instrumentality of the State, was created by the State Legislature in 2004 to diversify and expand the Wyoming economy through improvements in the state's electric transmission infrastructure and to facilitate the consumption of Wyoming energy. The authority is governed by a Board of Directors composed of five (5) members appointed by the Governor, with the advice and consent of the Senate. It is responsible for promoting the planning, development and financing of transmission facilities in the State including associated generation. In addition, the WIA has \$1 Billion in bonding authority relative to the financing of transmission and generation infrastructure in Wyoming. In 2005, the WIA closed its first successful financing, with a private placement of bonds to the State Treasurer of \$34.5 million and is actively pursuing additional financing opportunities.

WIA Board Members include:

- **Mike Easley (Chairman):** CEO of Powder River Energy Corporation in Sundance, WY
- **Kyle White (Vice-Chairman):** Vice President, Regulatory Affairs for Black Hills Corporation in Rapid City, SD
- **Bryce Freeman (Treasurer):** Director of the Wyoming Office of Consumer Advocate in Cheyenne, WY
- **J.M. Shafer (Member):** Professional Engineer in Windsor, CO and former executive with Western Area Power Administration and Tri-State Generation and Transmission
- **David Sparks (Member):** Executive Vice President, TransCore in Jackson, WY

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