State of Washington
Department of Fish and Wildlife
Habitat Program - Major Projects Division - Wind and Water Energy Section

Mailing Address: 2620 North Commercial Avenue (509) 543- 3319
Main Office Location: 2620 North Commercial Avenue – Pasco, WA 99301

MWR-07-09

May 18, 2009

Allen J. Fiksdal, EFSEC Manager
Energy Facility Site Evaluation Council
P.O. Box 43172
905 Plum Street SE
Olympia, WA 98504-3172

SUBJECT: Whistling Ridge Windpower Project, EFSEC Application No. 2009-01

Dear Mr. Fiksdal:

The Washington Department of Fish and Wildlife (WDFW) has reviewed the above-referenced documents and offers the following comments at this time. Other comments may be offered as the project progresses.

General Comments

Based solely on the data contained in the application, and subsequent data that will likely be presented in the EIS, the proposed Whistling Ridge Wind Energy Project could have adverse impacts to birds and bats. Therefore, WDFW is in full support of additional studies, as identified in section 2.17.2, specifically, northern goshawk and bat surveys. However, it is unlikely that the additional data on northern goshawks, northern spotted owls, and bats coupled with the existing avian and bat data will alleviate the concerns we have with potential impacts to birds and bats with this wind energy project. The habitat is predominately managed coniferous forests, a characteristic that has likely resulted in the high raptor, bat, and bird use/occurrence recorded at this site, and a habitat type that has little to none avian and bat data, impacts, and conclusions associated with wind energy development.

There is a lack of comparable wind power projects in coniferous forests any where in the U.S. from which we can assess preconstruction avian and bat data with operational fatality. However, based on the data and statements such as, "thus, based solely on the

presumed relationship between pre-construction bat activity and post-construction fatalities, bat mortality rates at SWRA may be higher than many other wind resource areas in the U.S" and "based on data collected during this study, raptor use of the Saddleback project area is...moderate to moderately high compared to most other WRAs evaluated throughout the western and Midwestern U.S" our approach to this project at this point in time is to proceed cautiously, carefully consider, protect, and conserve the natural resources of the site and adjacent lands, and slow down the incentivized green energy freight train that is barreling through the State of Washington.

Specific Comments

We recommend that the information presented on the Northern Goshawk, a State Candidate Species for listing and a Federal Species of Concern, be consistent throughout the application. For example, on Page 1-8 it states that "although no goshawks were detected during protocol surveys, individuals were spotted during general avian migration and breeding surveys." This is in contrast to the information in Section 2.17.2 that states "no goshawks were found on the project site, nor were any observed on any surrounding properties. It is highly unlikely that goshawks will be found on the project site..." However, the data in Appendices B-5 and B-6 indicate that northern goshawks were recorded during both the Fall 2004 and Summer 2006 surveys. Additionally, Section 2.17.2 states that goshawk, and other avian species surveys were conducted ion 2004, 2005, and 2008. The appendices indicate that these surveys were also conducted in 2006.

We recommend that any statements addressing raptor mortality of operational wind power projects in shrub-steppe and agricultural habitats with the anticipated raptor mortality of this site be removed from any future reports as they are misleading. They are misleading because "other new wind plants in the Pacific Northwest" are in shrub-steppe and agricultural habitats; not coniferous forest..." We appreciate that an attempt was made to suggest that raptor mortality "is expected to be low." However, based on information in the application, raptor use of the site is high. In fact, ..."raptor use of the Saddleback area in Fall is approximately 1.5 times higher than mean fall use at the other WRAs." (in east Oregon and Washington) and that..."raptor use of the Saddleback project area...is moderate to moderately high compared to most other WRAs evaluated throughout the western and Midwestern U.S."

Comprehensive auditory surveys were conducted for northern spotted owls and goshawks in 2004 and 2008. While the 2004 goshawk surveys appears to include the proposed turbine string to the east of the "Cedar Swamp" the 2008 survey does not. Interestingly, one bird species, the Barred Owl, was recorded frequently during the northern spotted owl surveys, but was not included in any of the avian reports. Additionally, while no spotted owls were recorded, we question the suitability of a wind farm within one of the few spotted owl special management areas in the State of Washington.

The bat data is extremely interesting and alarming in that "no data on bat mortality levels associated with wind energy developments in western coniferous forests are available to help predict risk to bats at the Saddleback Wind Resource Area." The data in Table 4 in Appendix B-8 should serve as warning that the Whistling Ridge Project could result in bat mortality 3-4 times higher than any other wind power project in the U.S. From Table 4, bat activity is a fairly good predictor of bat fatality. Fatality is presented in the number of bats/turbine. Using the Saddleback bat activity data from the table (138.4 bats) with the proposed 50 turbines, almost 7,000 bats would be killed on an annual basis. However, "bat fatality patterns may differ from those in open habitats as well as in eastern deciduous forests."

The Turbine Timber Buffer (Figure 2.3-4), may reduce the typical open turbine string corridor, thereby reducing its appearance as an avenue for bird and bat travel, but may also attract birds and bats as a roosting, foraging, and nesting habitat. At this point, we recommend that additional discussions occur to develop the most suitable management actions along the turbine strings.

We also recommend that sensitive features such as such as snags, water, Oregon white oak, and talus be identified as an aid to impact assessment.

We look forward to working with all interested parties through the development of this project.

Sincerely,

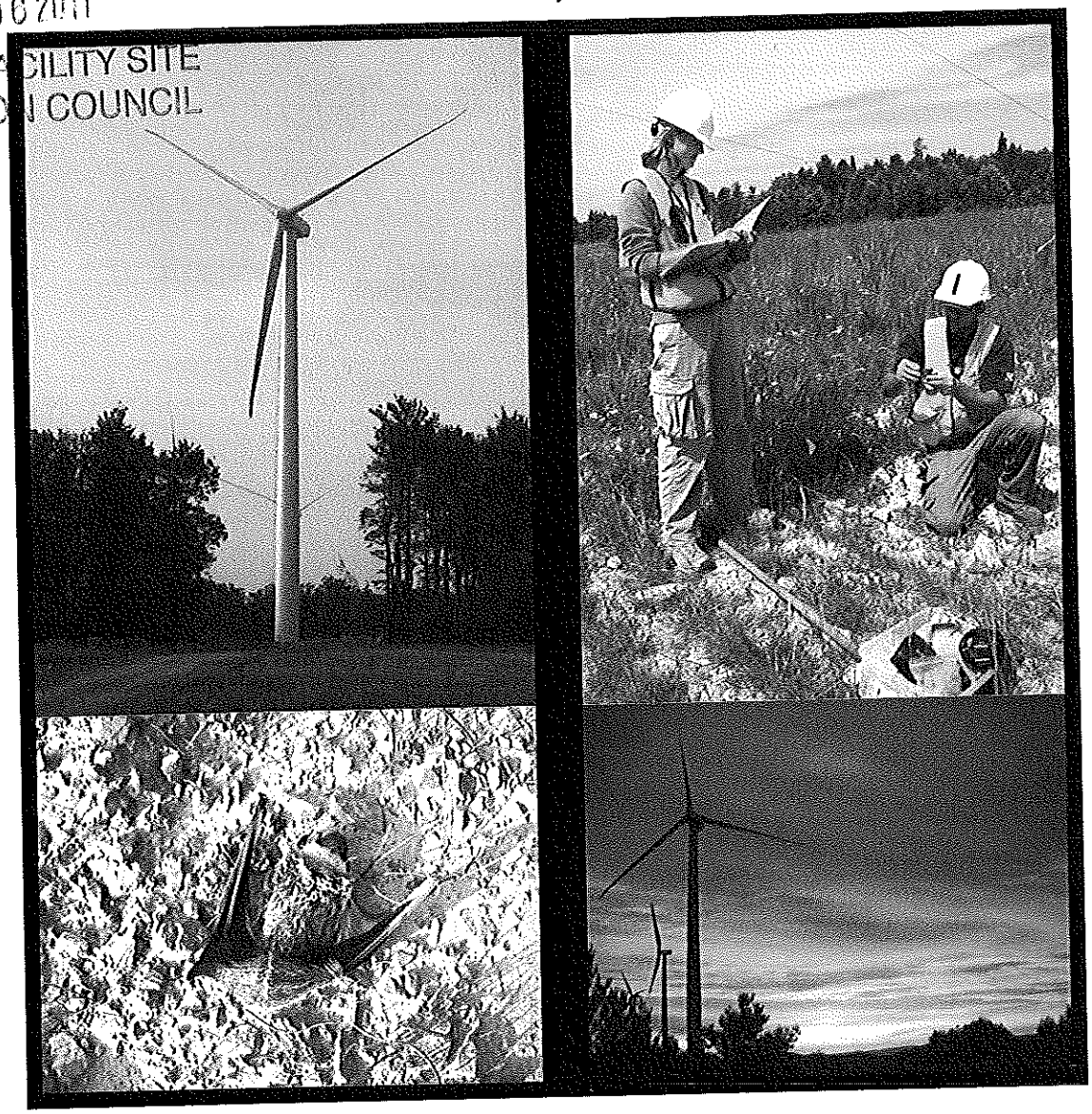
Michael Ritter

Michael Ritter
Wind Mitigation Biologist

partial Report - please see on line

Effectiveness of Changing Wind Turbine Cut-in Speed to Reduce Bat Fatalities at Wind Facilities

Final Report



Edward B. Arnett and Michael Schirmacher, Bat Conservation International

Manuela M. P. Huso
Oregon State University

John P. Hayes
University of Florida

Not a western study but in conjunction w/ western scientists

Annual Report Prepared for the
Bats and Wind Energy Cooperative and the Pennsylvania Game Commission

May 2010

REPORT CITATION

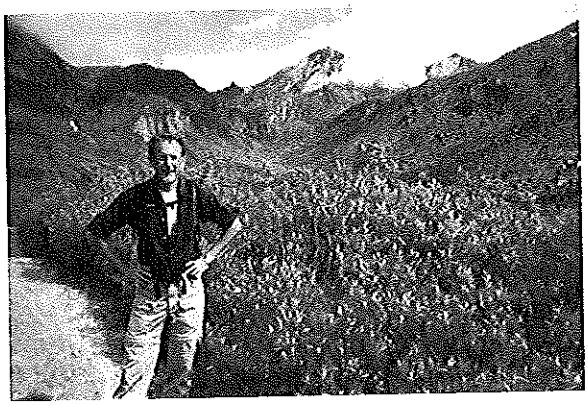
Arnett, E. B., M. M. P. Huso, J. P. Hayes, and M. Schirmacher. 2010. Effectiveness of changing wind turbine cut-in speed to reduce bat fatalities at wind facilities. A final report submitted to the Bats and Wind Energy Cooperative. Bat Conservation International. Austin, Texas, USA.

ACKNOWLEDGMENTS

This study was conducted under the auspices of the Bats and Wind Energy Cooperative. We wish to thank the American Wind Energy Association (AWEA), Bat Conservation International (BCI), the National Renewable Energy Laboratory-Department of Energy (NREL), and the U.S. Fish and Wildlife Service (USFWS) for partnering to form the Bats and Wind Energy Cooperative (BWEC). Tom Gray and Laurie Jodziewicz (AWEA), Alex Hoar (USFWS), Bob Thresher (NREL), and Merlin Tuttle (BCI) provided oversight for the BWEC project.

We wish to thank the U.S. Fish and Wildlife Service, donors to BCI, the National Renewable Energy Laboratory, and Iberdrola Renewables for funding the curtailment study at the Casselman Wind Project. We are indebted to Nicole Tatman, Holly McCready, Jeff Miller, Erica LaMore, Mario Desilva, Brian Farless, Paula Shover, Ryan Claire, Ann Zurbriggen, Justin Sharick, Brad Smith, Steven Tucker, Risa Wright, Jordan Rehar, Laura Tomlinson, Stephen Vito, and Jennifer Yantachka for their dedication in the field and collecting and managing the data throughout the study. We thank Iberdrola Renewables employees, in particular Andy Linehan, Chris Long, Jason Bell, Garth Ripton, Dave DeCaro, and Jerry Roppe for their support and efforts to make this study happen and run smoothly. We also thank former PPM Energy and Iberdrola Renewables employee Sam Enfield for his support and promotion of our cooperative research efforts. Zac Wilson (BCI) conducted all GIS analysis for the study. Finally, we appreciate the support and hospitality of the private landowners that graciously allowed access to their lands for this study; they should be commended for supporting proactive research for solving wildlife and wind energy issues.

This study is dedicated in memory of Andy Linehan, who left us far too soon.



BWEC
bats and wind energy cooperative

EXECUTIVE SUMMARY

We implemented an experiment testing the effectiveness of changing turbine cut-in speed on reducing bat fatality at wind turbines at the Casselman Wind Project in Somerset County, Pennsylvania in 2008 and 2009. Our objectives were to 1) determine the difference in bat fatalities at turbines with different cut-in-speeds relative to fully operational turbines, and 2) determine the economic costs of the experiment and estimated costs for the entire project area under different curtailment prescriptions and timeframes.

Twelve of the 23 turbines at the study site were randomly selected for the experiment and we employed three treatments at each turbine: 1) fully operational, 2) cut-in speed at 5.0 m/s (C5 turbines), and 3) cut-in speed at 6.5 m/s (C6 turbines), with four replicates on each night of the experiment. We used a completely randomized design and treatments were randomly assigned to turbines each night of the experiment, with the night when treatments were applied as the experimental unit. We re-randomized these treatments during the second year of the study. We conducted daily searches at the 12 turbines from 27 July to 9 October 2008, and 26 July to 8 October 2009. During this same period, we also conducted daily searches at 10 different turbines that were part of a complementary study to determine if bat activity data collected prior to construction with acoustic detectors can be used to predict post-construction fatalities, and to meet permitting requirements of the Pennsylvania Game Commission's (PGC) voluntary agreement for wind energy (herein referred to as "PGC" turbines). These 10 turbines formed an alternative 'control' to the curtailed turbines. We performed two different analyses to evaluate the effectiveness of changing turbine cut-in speed to reduce bat fatalities; for one we used 12 turbines to determine differences in fatality between curtailment levels and for another we used 22 turbines to determine differences in fatalities between curtailment and fully operational turbines. The experimental unit in the first analysis was the turbine-night and turbines were considered a random blocking factor within which all treatments were applied. In our first analysis, the total number of fatalities estimated to have been killed the previous night, herein referred to as "fresh" fatalities, in each treatment at each turbine was modeled as a Poisson random variable with an offset of the number of days a treatment occurred within a turbine (due to the slight imbalance of the design). For our second analysis, the turbine was the experimental unit, with 12 turbines receiving the curtailment treatment, 10 the control (fully operational at all times). We used all carcasses found at a turbine to estimate the total number of bat fatalities that occurred at each turbine between 27 July to 9 October 2008 and 26 July to 8 October 2009 and compared fatalities using one-way ANOVA.

In 2008, we found a total of 32 fresh bat fatalities at the 12 treatment turbines. At least one fresh fatality was found at each turbine, and 10 of the 12 turbines had at least 1 fatality during a fully operational night, indicating that fatalities did not occur disproportionately at only some turbines, but were well distributed among all turbines. There was strong evidence that the estimated number of fatalities differed among turbine treatments ($F_{2,33} = 7.36$, $p = 0.004$). There was no difference between the number of fatalities for C5 and C6 turbines ($\chi_1^2 = 0.68$, $p = 0.41$). Total fatalities at fully operational turbines were estimated to be 5.4 times greater on average than at curtailed turbines (C5 and C6 combined; $\chi_1^2 = 14.11$, $p = 0.0005$, 95% CI: 2.08, 14.11); in other words, 82% (95% CI: 52–93%) of all fatalities at curtailment turbines likely occurred when the turbines were fully operational. Estimated total bat fatalities per turbine (i.e., all

carcasses found and corrected for field bias) were 1.48–5.09 times greater (mean = 2.57) at PGC turbines relative to curtailed turbines, further supporting the contention that reducing operational hours during low wind periods reduces bat fatalities.

In 2009, we found a total of 39 fresh bat fatalities at the 12 treatment turbines. Similar to 2008, we found at least one fresh fatality at each turbine, and 11 of the 12 turbines had at least 1 fatality during a fully operational night, indicating that fatalities did not occur disproportionately at only some turbines and were well distributed among all turbines. We found strong evidence that the estimated number of fatalities over 25 nights differed among turbine treatments in 2009 ($F_{2,33} = 6.94$, $p = 0.005$). There was no difference between the number of fatalities for C5 and C6 turbines ($\chi_1^2 = 0.24$, $p = 0.616$). Total fatalities at fully operational turbines were estimated to be 3.6 times greater on average than at curtailed turbines (C5 and C6 combined; $\chi_1^2 = 12.93$, $p = 0.0003$, 95% CI: 1.79, 7.26); in other words, 72% (95% CI: 44–86%) fewer fatalities occurred when the turbines were curtailed than when the turbines were fully operational. Estimated total bat fatalities per turbine (i.e., all carcasses found and corrected for field bias) were 1.23–2.58 times greater (mean = 1.80) at PGC turbines relative to curtailed turbines, again providing further support for the contention that reducing operational hours during low wind periods reduces bat fatalities. Our comparisons between PGC and curtailed turbines in both years of the study are conservative estimates of the difference because treatment turbines were fully operational one-third of the time during the study.

The lost power output resulting from the experiment amounted to approximately 2% of total project output during the 75-day study period for the 12 turbines. Hypothetically, if the experimental changes in cut-in speed had been applied to all 23 turbines at the Casselman site for the study period (0.5 hour before sunset to 0.5 hour after sunrise for the 75 days we studied), the 5.0 m/s curtailment used would have resulted in lost output equaling 3% of output during the study period and only 0.3 % of total annual output. If the 6.5 m/s curtailment were applied to all 23 turbines during the study period, the lost output would have amounted to 11% of total output for the period and 1% of total annual output. In addition to the lost power revenues, the company also incurred costs for staff time to set up the processes and controls and to implement the curtailment from the company's offsite 24-hour operations center.

Our study demonstrated nightly reductions in bat fatality ranging from 44–93% with marginal annual power loss. Given the magnitude and extent of bat fatalities worldwide, the conservation implications of our findings are critically important. While more studies are needed to test changes in turbine cut-in speed among different sizes and types of turbines, wind regimes, and habitat conditions, we believe changing cut-in speeds to the levels we tested offers an effective mitigation strategy for reducing bat fatalities at wind facilities.

INTRODUCTION

Although wind-generated electricity is renewable and generally considered environmentally clean, fatalities of bats and birds have been recorded at wind facilities worldwide (Erickson et al. 2002, Durr and Bach 2004, Kunz et al. 2007, Arnett et al. 2008, Baerwald 2008). Bat fatalities at wind energy facilities generally received little attention in North America until 2003 when 1,400–4,000 bats were estimated to have been killed at the Mountaineer Wind Energy Center in West Virginia (Kerns and Kerlinger 2004). High bat fatalities continued at the Mountaineer facility in 2004 (Arnett 2005) and large kills also have been reported at facilities in Pennsylvania (Arnett 2005) and Tennessee (Fiedler 2004, Fiedler et al. 2007). These fatalities raise concerns about potential impacts on bat populations at a time when many species of bats are known or suspected to be in decline (Racey and Entwistle 2003, Winhold et al. 2008) and extensive planning and development of both onshore and offshore wind energy development is increasing worldwide (EIA 2008, Arnett et al. 2007a, Kunz et al. 2007).

Data previously collected at operating wind energy facilities indicate that a substantial portion of the bat fatalities occurs during relatively low-wind conditions over a relatively short period of time during the summer-fall bat migration period (Arnett et al. 2008). Curtailment of turbine operations under these conditions and during this period of time has been proposed as a possible means of reducing impacts to bats (Kunz et al. 2007, Arnett et al. 2008). Indeed, recent results from studies in Canada (Baerwald et al. 2009) and in Germany (O. Behr, University of Erlangen, unpublished data) indicate that changing turbine "cut-in speed" (i.e., wind speed at which wind-generated electricity enters the power grid) from the manufactured speed (usually 3.5–4.0 m/s for modern turbines) to 5.5 m/s resulted in at least a 50% reduction in bat fatalities compared to normally operating turbines. Altering turbine operations even on a partial, limited-term basis potentially poses operational and financial difficulties for project operators, but this mitigation may ultimately prove sufficiently feasible and effective at reducing impacts to bats at minimal costs to companies that operate wind energy facilities with relatively high incidence of mortality.

We implemented an experiment testing the effectiveness of operational curtailment on reducing bat fatality at wind turbines. Our objectives were to: 1) determine the difference in bat fatality at turbines with different changes in the cut-in-speed relative to fully operational turbines, and 2) determine the economic costs of the experiment and estimated costs for the entire project area under different curtailment prescriptions and timeframes. Our first year of research demonstrated a 52–93% reduction in bat kills at curtailed turbines (Arnett et al. 2009). This report presents our experimental design, methods, and results from 2 years of research findings.

STUDY AREA

The Casselman Wind Project is located near the town of Rockwood in Somerset County, Pennsylvania (Figure 1). The facility lies within the Appalachian mixed mesophytic forests ecoregion that encompasses the moist broadleaf forests that cover the plateaus and rolling hills west of the Appalachian Mountains (Brown and Brown 1972, Strausbaugh and Core 1978). Turbines at

Whistling Ridge
Public Comment
#167

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Washington State Energy Facility Site Evaluation Council
COMMENT FORM
Whistling Ridge Public Comment Meeting
Public Hearing and Comment Opportunity

Name: Jules Burton

Address: [redacted] Columbia St., Hood River
(Please include your Zip!)

Email Address: [redacted]@bendbroadband.com

☒ **Add me to the Mailing list**

Please write any comments you have with respect to the

Leave this sheet in the Comment Box today, or mail it to:
EFSEC, PO Box 43172, Olympia, WA 98504-3172.
Comment letters must be postmarked by Saturday, January 15, 2011.

I am submitting a copy of a letter from WDFW + a scientific study about wildlife mitigation techniques that I trust the project will be thinking about. As I understand it, the Forested land is a difficult presidence to make due to bats, birds, migratory animals and its important you will be mitigating trade offs for them. Thank you.

Use the back of this form if you need more room for your comments.

For more information, please contact:
Stephen Posner, Siting Specialist, PO Box 43172, Olympia, WA 98504-3172,
call (360) 664-1903, or e-mail efsec@utc.wa.gov.

Whistling Ridge
Public Comment
#168

1-6-2011

I'm writing a letter in opposition to the proposed Whistling Ridge wind turbine project. The National Scenic Act of the gorge is intended to protect its natural wonders, including the views. If we make exceptions, little by little the Act will become meaningless. Percy Mansur was a reknown artist of Hood River, who made famous the Washington hillsides of the Columbia River gorge. As turbines become a part of the landscapes, the natural scenery will be lost forever, and something of our past and our heritage gone too. William O. Douglas, a native of Washington State who later became a US Supreme Court Justice, spoke eloquently of the wild places he cherished in Oregon and Washington in his book My Wilderness and how money and so-called development are spoiling natural wonders and systems.

Other factors to consider include the cost effectiveness of the construction of turbines to the energy produced, destruction and death of wild birds and bats, the noise and sight factor, declined property values, and other complex considerations.

'Bankrupt Europe has a lesson for Congress about wind power....The mysterious sounds are "Na leo o Kamaoa"-- the disembodied voices of 37 skeletal wind turbines abandoned to rust on the hundred-acre site of the former Kamaoa Wind Farm. The ghosts of Kamaoa are not alone in warning us. Five other abandoned wind sites dot the Hawaiian Isles -- but it is in California where the *impact of past mandates and subsidies is felt most strongly.* Thousands of abandoned wind turbines littered the landscape of wind energy's California "big three" locations -- Altamont Pass, Tehachapi, and San Gorgonio -- considered among the world's best wind sites. California's wind farms -- then comprising about 80% of the world's wind generation capacity -- ceased to generate much more quickly than Kamaoa. In the best wind spots on earth, over 14,000 turbines were simply abandoned. Spinning, post-industrial junk which generates nothing but bird kills.

Altamont's turbines have since 2008 been tethered four months of every year in an effort to protect migrating birds after environmentalists filed suit. According to the Golden Gate Audubon Society, 75 to 110 Golden Eagles, 380 Burrowing Owls, 300 Red-tailed Hawks, and 333 American Kestrels (falcons) are killed by Altamont turbines annually. A July, 2008 study by the Alameda County Community Development Agency points to 10,000 annual bird deaths from Altamont Pass wind turbines.

Ben Lieberman, a senior policy analyst focusing on energy and environmental issues for the Heritage Foundation, is not surprised. He asks:

"If wind power made sense, why would it need a government subsidy in the first place? It's a bubble which bursts as soon as the government subsidies end." (From American Thinker, February 15, 2010, Wind Energy's Ghosts, by Andrew Walden) I would suggest you read this entire article before deciding on Whistling Ridge.

"To understand the lopsided nature of how Washington's energy is generated, consider these numbers: The Bonneville Dam near Portland can produce 1,050 megawatts of power at maximum capacity, and the Columbia Generating Station nuclear reactors can provide 1,150 megawatts. By contrast, 454 wind turbines near Walla Walla can create just 104 megawatts. A proposed major solar power site near Cle Elum would produce a maximum 73 megawatts." Hydropower also is currently the cheapest resource, at $60 per megawatt-hour, according to the Northwest Power and Conservation Council's Sixth Northwest Conservation and Electric Power Plan.

Wind power costs $89 to $129 per megawatt-hour. But its production is erratic because it

depends on winds blowing. Puget Sound Energy (PSE) has two wind turbine complexes and a third on the drawing board. The two existing ones generate electricity 30 to 35 percent of the time, said PSE spokesman Roger Thompson. (Crosscut.Com December 28, 2010 by John Stang)
(Whistling Ridge's 50 turbines would produce 75 megawatts)

INCENTIVE:

"How much subsidies do wind power developers get?

At the federal level, the production or investment tax credit and double-declining accelerated depreciation can pay for two-thirds of a wind power project. Additional state incentives, such as guaranteed markets and exemption from property taxes, can pay for another 10%." (National Wind Watch)

"Unless the Legislature makes changes to I-937, utilities warn that electric rates will skyrocket. Dean Sutherland, government affairs manager for Clark Public Utilities, said the impact will be different for every utility. But his utility, which covers customers in Southwest Washington, analyzed its own finances last week and concluded that customers would pay 20 percent more for power in the year 2020 if Initiative 937 is unchanged. That's in addition to rate increases that might come for any other reason....Utilities say the result will be that they will be forced to buy costly new forms of alternative power that they don't need, driving up electricity bills....Without changes, Initiative 937 will become a "windfall for windpower act," said Ed Brost, general manager of Franklin Public Utility District." (Washington State Wire)

"A diverse group of stakeholders and legislators worked closely throughout the legislative session to identify reasonable changes that could be made to I-937 while still maintaining the strength and intent of the law. *The key bills introduced to amend I-937 ultimately died with neither house taking action.* " (NW Energy Coaliton, May 7, 2010)

WILDLIFE:

"Especially vulnerable are large birds of prey that like to fly in the same sorts of places that developers like to construct wind towers. Fog -- a common situation on mountain ridges -- aggravates the problem for all birds. Guidelines from the U.S. Fish and Wildlife Service (FWS) state that wind towers should not be near wetlands or other known bird or bat concentration areas or in areas with a high incidence of fog or low cloud ceilings, especially during spring and fall migrations. IT IS ILLEGAL IN THE UNITED STATES TO KILL MIGRATORY BIRDS....."

"The president of Bat Conservation International, Merlin Tuttle, has said, "We're finding kills even in the most remote turbines out in the middle of prairies, where bats don't feed." At least 2,000 bats were killed on Backbone Mountain in West Virginia in just 2 months during their 2003 fall migration. Continuing research has found that rate to be typical all year, or even low, for wind turbines on forested ridges." (Eric Rosenbloom, The Problem with Windpower.)

Michael Fry of the American Bird Conservancy estimates that U.S. wind turbines kill between 75,000 and 275,000 birds per year. Yet the Justice Department is not bringing cases against wind companies. "Somebody has given the wind industry a get-out-of-jail-free card," Mr. Fry told me. "If there were even

one prosecution," he added, the wind industry would be forced to take the issue seriously. (Wall Street Journal opinion by Robert Bryce) (An exception to this is the above mentioned suit filed against Altamount by environmentalists.)
(The land in question here is a sensitive area for protecting the endangered spotted owl in Washington. Bats (mammals) and important bird species are also being killed by turbines. In the eastern part of the U.S. white nose syndrome is wiping out bat colonies. Bats play an extremely valuable role in eating millions of insects that carry diseases or eat crops.)

COST OF TURBINES GREATER THAN MERE CONSERVATION MEASURES IN REDUCING CO2 EMISSIONS:

"A German Energy Agency study released in February 2005 stated that increasing the amount of wind power would increase consumer costs 3.7 times more than otherwise and that the theoretical reduction of greenhouse gas emissions could be achieved much more cheaply by simply installing filters on existing fossil-fuel plants.
In Germany, utilities are forced to buy renewable energy at sometimes more than 10 times the cost of conventional power, in France 3 times. In the U.K., the *Telegraph* has reported that rather than providing cheaper energy, wind power costs the electric companies £50 per megawatt-hour, compared to £15 for conventional power. The wind industry is worried that the U.K., too, is starting to see that it is only subsidies and requirements on utilities to buy a certain amount of "green" power that prop up the wind towers and that it is a colossal waste of resources." (Eric Rosenbloom, The Problem with Windpower)
(In Syracruse, N.Y. Crouse Hospital received $360,000 in stimulus money. They replaced 4,000 light fixtures and 8,000 light bulbs. This alone saves 1.6 million kilowatt hours of electricity and $100,000 annually. We need to think of alternatives to wind turbines in the big picture and repercussions of hastily made decisions. Many wind turbines around the world are becoming 'dinosaurs.' There are less costly and less invasive ways to meet our energy demands, without following the masses. I would like to see the Pacific NW take a more progressive road less travelled that will prove most economical and sustainable.

NOISE:

The European Union (E.U.) published the results of a 5-year investigation into wind power, *finding noise complaints to be valid and that noise levels could not be predicted before developing a site.*
The National (U.S.) Wind Coordinating Committee (NWCC) states, "wind turbines are highly visible structures that often are located in conspicuous settings ... they also generate noise that can be disturbing to nearby residents." The NWCC recommends that wind turbines be installed no closer than half a mile from any dwelling. German marketer Retexo-RISP specifies that turbines not be placed within 2 kilometers (1.25 miles) of any dwelling. (Eric Rosenbloom, The Problem with Windpower)
To quote, "wind turbines are highly visible structures that often are located in conspicuous settings." We should honor the National Scenic Act of 1986 and protect the natural beauty the gorge scenery offers. Besides the noise, the turbines would also alter the night skyline with blinking lights.

TRADE OFFS:

Especially around Goldendale, he said, people have told him, "I drive up there, and all of a sudden I'm

seeing something I'm not sure I like anymore." Lawrence and Ada Ruth Whitmore are among those who have mixed feelings. The farm couple, who are in their 80s, lease some of their ranch property north of Roosevelt to Iberdrola Renewables. Thanks in part to revenue from the seven wind turbines on their farm, their five children will inherit the land.
It's an uneasy trade-off, Ada Ruth Whitmore admits.

"We have a daughter who told us we've sold our soul."

(The Columbian, Kathy Durbin)

In closing, the negative effects of Whistling Ridge would be, eroding the National Scenic Act of the gorge by allowing turbines within visual sight of the protected area by day, and with blinking lights at night. Also the threat to the endangered spotted owl, birds of prey, and bats that inhabit the area.
Unfortunately the government enforced mandates and tax incentives are creating the boom that may in the future prove to be a boondoggle. The landscapes are being permanently altered, with mixed emotions and immediate monetary gratifications, but at what longer term expense. Thank you for considering the points made in this letter, comments gleaned from a variety of reputable sources. Certainly there is lot to be said, and a lot to learn, from the history in this short lived industry.

Sincerely

Richelle (Ricki) Duckwall
[redacted] Miller Rd.
Mt. Hood, OR 97041-8721

Members of the board, thank you for your time

and commitment to this endeavor. my name is don morby, retired navy chief, retired state highway maintenance supervisor within the columbia gorge, and disabled veteran. I was born and raised in Underwood and still maintain family and property there. I currently live in Mill-A and will have the best view in the gorge of the new windmills that I Support. Because of my past employment as a highway supervisor and a life time member of this community I have a full understanding of the Gorge and all the regulations that entail.

I have attended each and every meeting and listened

to the complaints filed by the opposition to these

windmills. every complaint always includes wildlife habitat disruption, noise polution, traffic tie ups, industrial disasters to mention a few. The very same people who bring up these complaints (and you can see an example of the misleading type of info in todays pioneer newspaper letter to the editor section)

It appals me that there is so much money spent on opposing

something they voted for (renewable energy). money that

could have been spent on the community schools, health, and

education. The agriculture industry in underwood alone has done more

to disrupt the environment and wildlife habitat over the years and

continues to do so more than any of the

proposed windmills could ever do. they talk about the traffic tie

ups that may occur in Underwood during windmill installation

and then turn around and tout the Agri tour business

and all the tourists that will bring by the BUS loads.

These windmills will offer good jobs to a community

desperately needing jobs. What jobs do the agriculteral people

offer the community that doesnt involve illegal aliens ?

This community has suffered enough over the years

fighting these

so called outside friendly groups starting with the spotted owl, and continuing

through dam removals and in my opinion they do it for personal
gain and pleasure despite the smoke and mirrors they put up front.

So I beseach you as a committee to once and for all

put a stop to this nonsense and strike one for the little people by approving this plan and getting it into the installation phase.

Don Morby RMC, USN, retired DAV, WSDOT retired
[redacted]jessup road
cook wa 98605
[redacted]@hughes.net

509 281 [redacted]

Whistling Ridge
Public Comment
#170

Energy Facility Site Evaluation Council
P.O. Box 43172
Olympia, WA 98504-3172

January 7, 2010

RECEIVED
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ENERGY FACILITY SITE
EVALUATION COUNCIL

RE: Whistling Ridge Energy Project Adjudication

Dear Council Members:

In recognition of the information overload and intensity of the job you have at hand, we will keep this short and to the point.

We have carefully followed this entire process, and attended the first 4 days of the adjudicatory hearing, noting significant and substantial holes and inadequacies in the methodologies used, the data collected and conclusions forwarded by the applicant for this proposed project. "Only data available" (due to poor study design and data collection) does **not** equate to "best science".

Our amply identified concerns regarding this application have not been allayed, only verified and exacerbated. The parameters set by the applicant for the proposed project defy any meaningful mitigation of the deleterious impacts. Monitoring is **not** mitigation. To put a "laboratory" or "test site" along the ridgeline of the middle of the National Scenic Area would be unconscionable and do irreparable harm.

Please recommend outright denial of this project to Governor Gregiore.

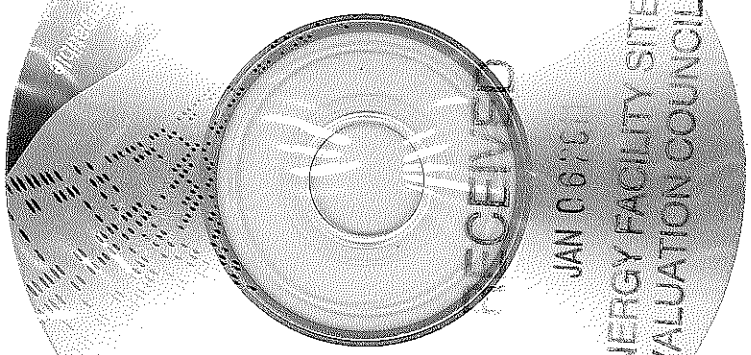
Respectfully submitted,

Keith Brown Teresa Robbins

Keith Brown, Ph.D. and
Teresa Robbins
[redacted] Malfait Tracts Road
Washougal, WA 98671

NW Council Draft Paper

Whistling Ridge
Public Comment
#171



The Effects of an Increasing Surplus of Energy Generating Capability in the Pacific Northwest

January 3, 2011 | document 2011-01

Comment on this paper

Send comments by
Monday, January 31, 2011 to:

Mark Walker
Public Affairs Division Director
Northwest Power & Conservation Council
851 SW 6th Avenue, Suite 1100
Portland, Oregon 97204-1348
or email

read full document > (310k)

The Council seeks comments on the paper *Effects of an Increasing Surplus of Energy Generating Capability in the Pacific Northwest*. This paper and the accompanying analysis were prepared in response to Action GEN-10b of the Sixth Northwest Conservation and Electric Power Plan. Action GEN-10b calls for the Council to assess the potential extent of the future unbundled REC market, the resulting benefits and costs, and actions needed to remedy significant impacts.

A consequence of the rapid development of Northwest wind projects to serve regional and California renewable portfolio standards is an increasing surplus of low variable cost energy generating capability. This surplus appears to be contributing to lower electricity market prices, reduction in the value of surplus hydropower energy, and an increasing frequency and severity of excess energy events, such as occurred during June 2010.

The purpose of this paper is to assess the significance of these effects and to stimulate discussion of possible mitigating measures. The paper includes a forecast of the effects of wind resource development on the frequency of excess energy events, on market prices and on resource value. The paper also identifies measures that could help resolve adverse effects of a surplus of low-cost energy.

Specifically, the Council is seeking comments on the following:

- What additional analysis should be undertaken regarding these issues?
- What additional issues, if any, should be addressed?
- What additional assessment of mitigating measures should be undertaken?

Your feedback and suggestions will help to further inform this discussion. Comments are requested by close of business on Monday, January 31st.

Sincerely,

Mark Walker, Public Affairs Division Director

The Effects of an Increasing Surplus of Energy Generating Capability in the Pacific Northwest

DRAFT

Council Document 2011-01

SUMMARY

The Northwest is experiencing an increasing surplus[1] of energy generating capability. Because the resources contributing to the surplus consist largely of low variable-cost resources like wind, which must operate to provide qualifying energy for state renewable portfolio standards (RPS), the surplus will tend to reduce average electricity market prices and increase the frequency and severity of excess energy events.[2] Stagnant and declining loads due to the economic recession have contributed to the surplus in the near-term. Over the longer term, resource development to meet Northwest state RPS, and the development of Northwest resources to serve the California RPS, are the principal contributors to this surplus.

While loads are expected to recover over the next several years, RPS resource development is expected to continue in advance of load growth until the ultimate Northwest RPS targets are met in 2020 through 2025. The extent of additional Northwest wind power development to serve the California RPS will depend on currently unresolved California RPS policy and the availability and cost of competing resources, especially solar. Retiring Boardman and other thermal units could offset the tendency of the surplus to reduce average market prices, but it is unlikely to significantly affect the frequency and severity of excess energy events and accompanying low or negative energy prices.

[1] Throughout this paper, the term "surplus" is used to refer to the growth of energy generating capacity in excess of reliability requirements.

[2] The term "excess energy events" refers to periods of high water, low loads, and high wind that can lead to difficulty in maintaining acceptable levels of dissolved gas.

Concerns regarding the use of unbundled renewable energy credits (RECs[3]) from Northwest wind projects to serve California RPS led to inclusion of Action GEN-10b in the Sixth Northwest Conservation and Electric Power Plan. Action GEN-10b calls for the Council to assess the potential extent of the future unbundled REC market, the resulting benefits and costs, and actions needed to remedy significant impacts. This paper describes a forecast of the effects of RPS resource development on the frequency of excess energy events, and on market prices and resource value. The paper also identifies measures that could help resolve issues stemming from the growing surplus. The focus is on longer-term strategic measures rather than shorter-term system operational measures. The latter are discussed in the Bonneville Power Administration (BPA) Columbia River high water operations paper.[4]

The analyses of this paper were carried out using an economic model of the power system with a simplified representation of hydropower system operation. The results should be viewed as relative, rather than as an absolute indication of frequency and magnitude. The Council's Resource Adequacy Forum is working with the Pacific Northwest Utilities Conference Committee (PNUCC), BPA, and Northwest utilities on a more refined analysis of the operational effects of increased wind power penetration.

The principal findings of this assessment are the following:

- Development of resources to serve Northwest state RPS tends to increase the frequency of excess energy events and accompanying low electricity market prices, until final RPS targets are met. After meeting the final RPS penetration targets, in the early to mid-2020s, the frequency of excess energy events is expected to slowly decline.

- Additional wind development for export of unbundled RECs is likely to further increase the frequency of excess energy events.

- The probability of excess energy events increases during good water years and declines during poor water years. This analysis also suggests that the severity of excess energy events is less sensitive to moderate variation around average water conditions. As demonstrated in June 2010, unusual runoff patterns can create excess energy conditions even in average water years.

- Aggressive RPS targets and financial incentives tend to result in the growth rate of RPS-qualifying energy production exceeding load growth. This will drive down the average market price of non-RPS qualifying electricity.

- The average impact of depressed market prices on the energy value of Northwest generating capacity will be moderate, but the value of hydropower will be disproportionally reduced.

[3] Renewable energy credits (RECs) represent the environmental and renewable attributes of renewable energy production. RECs can be transacted as "fully bundled" (delivered with the associated energy), "partially bundled" (the associated energy can be delivered within a specified time), or "fully unbundled" (marketed separately from the associated energy). As states, particularly California, move toward more aggressive and challenging renewable portfolio standards, interest in meeting RPS requirements with partially or fully unbundled RECs has increased.
[4] Bonneville Power Administration. *Columbia River high water operations (June 1-14 2010).* September 2010

- Measures are available to reduce the frequency of excess energy events, to alleviate the economic and operational issues associated with excess energy events, to reduce energy market impacts, and to more productively use available low-cost, low-carbon energy. Policy-related measures are generally low-cost and quickly effective, but may be politically difficult to implement. Structural measures tend to be capital-intensive, of limited effectiveness, and slow to implement.

BACKGROUND

Historically, the combination of high springtime runoff and low electrical loads has led to episodes of excess energy in the Pacific Northwest. Typically, these episodes occur during the spring runoff when loads are low and total dissolved gas water quality standards constrain spill, thereby limiting the ability to reduce hydropower generation levels.

The dissolved gas content of stream flow is naturally increased by entrainment of air as water passes through rapids and over waterfalls. Gas entrainment also occurs at spillways at the Columbia and Snake rivers and some tributary dams as water plunges over the spillway into the stilling basins. At high levels, dissolved gas can be harmful for fish and other aquatic life by causing gas bubble trauma; so voluntary spill is limited by gas super saturation "gas caps" required under the federal Clean Water Act.

Hydro-rich utilities have aggressively marketed surplus hydropower during high runoff periods by offering power at low prices, making it attractive for thermal plant operators to curtail operation to save fuel costs and substitute hydropower to serve their loads. Because the dispatch cost of even the lowest cost thermal resources is $10 - $20 per megawatt hour, single-digit hydropower offers have been sufficient to displace thermal generation both in the Northwest and in California. Load would shift to hydropower, thus minimizing involuntary spill.

Large-scale wind development adds a new variable to this equation. Wind operators receive value in the form of renewable energy credits (REC) for producing qualifying energy. Variable (production-related) financial incentives and RECs lower the cost of wind plant operation to negative values. Published data is sketchy, but the market value of renewable energy credits appears to be $20 to $35 per megawatt-hour (MWh). In addition, many wind projects receive the federal renewable production tax credit, currently about $22 per MWh.[5] Though wind projects typically have a small positive variable operating cost, the RPS value and the production tax credit, if present, can create a negative variable cost, -$15/MWh, or less. Owners of PURPA Qualifying Facilities may see even greater losses from curtailment, up to the avoided cost of new generating facilities. These are economic disincentives for wind project operators to curtail operation in favor of hydropower during excess energy events, resulting in a potential conflict with total dissolved gas standards.

[5] Not all renewable energy projects receive the production tax credit. The amount of credit varies by type of resource and has a limited life. Moreover, most owners of projects completed in 2009 and 2010 are reported to have taken the option of converting to the federal business energy investment tax credit or U.S. Treasury grant as provided in the American Recovery and Reinvestment Act of 2009.

EFFECTS OF AN ENERGY SURPLUS

Large-scale wind development in the Northwest has been driven by state renewable portfolio standards (RPS) and various federal and state financial incentives. Twenty-seven states, including Montana, Oregon, Washington, and California, have adopted renewable portfolio standards, which mandate that a specified percentage of retail sales be met using electricity from certain qualifying sources. These sources may include various renewable energy resources, new technologies and in several states, energy efficiency. Because the objective is to encourage development of new capacity, energy from existing renewable resources, including hydropower, is largely excluded. Penetration targets vary by the type and size of utility, and increase by prescribed schedule until ultimate penetration levels are achieved.[6] Penetration levels remain constant thereafter as a percentage of loads. The purpose of RPS and the various financial incentives include reducing carbon dioxide production and other environmental impacts of electricity production, commercializing new technologies, job creation, and energy security.

Several characteristics of RPS resource development tend to lower energy market prices. First, RPS resources have, and at expected rates of load growth, are likely to continue to be developed in advance of load growth until the final RPS targets are achieved. Second, RPS resources must operate to produce the qualifying energy. Finally, the variable costs of resource operation are typically low. Developing renewable energy to export unbundled RECs will further depress energy prices since the associated energy enters the Northwest market. This can lead to the loss of revenue on the part of utilities holding an abundance of non-RPS resources. Resource-short utilities, on the other hand, may benefit from lower market prices.

Adding low variable-cost resources in advance of load growth can lead to an increasing frequency of excess energy events. Excess energy events are manifested by low market prices, as asking prices are lowered in an effort to market the excess. Periods of low market prices, indicating the availability of large amounts of energy relative to load, occur during nearly every spring runoff period. As shown in Figure 1, episodes of zero or negative market prices have occurred in six of the past 11 runoff periods, and appear to be increasing in frequency in recent years. Though the increased frequency of zero or negative price episodes corresponds with the rapid growth in Northwest wind capacity, other factors are at play, including water conditions, runoff patterns and, since 2008, declining loads due to the economic recession.

[6] The ultimate penetration targets for Montana and the west coast states are as follows: California - 33% by 2020, Montana - 15% by 2015, Oregon - 25% by 2025 and Washington - 20% by 2020. RPS provisions are complex and vary by state. Detailed information concerning the RPS of individual states is provided in the Database of State Incentives for Renewables and Efficiency (DSIRE), www.dsireusa.org.

Figure 1: Mid-Columbia daily low off-peak prices - 2000-2010

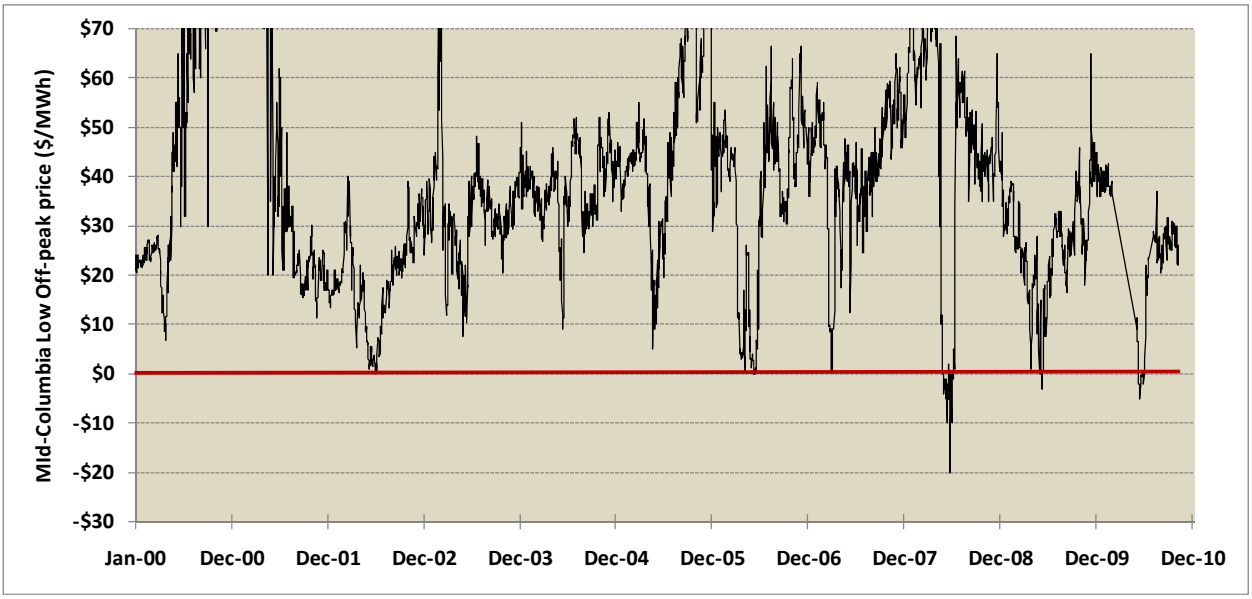


Figure 2 provides a closer look at the June 2010 episode. Bonneville balancing authority loads and resources are plotted on the left axis for the first half of June 2010. Bonneville load, consisting of native load plus exports net of imports is shown as the shaded area. Load varied between 8,300 and 18,100 megawatts in the typical daily pattern and increased slowly through the period as the warm season advanced. Wind output (green) varied from zero to 2,650 MW in response to the periodic storm fronts typical of spring. Hydropower (blue) followed load net of wind. Hydropower generation increased, on average, through the first two thirds of the period as runoff increased. Thermal generation (red) was operating at low levels at the beginning of the period, and was reduced to minimum operating levels as runoff increased and dissolved gas levels restricted spill.[7] Slow-response thermal units, such as the Columbia Generating Station, remained in service at minimum power because of the need to be able to serve loads resulting from any unexpected warm spell.

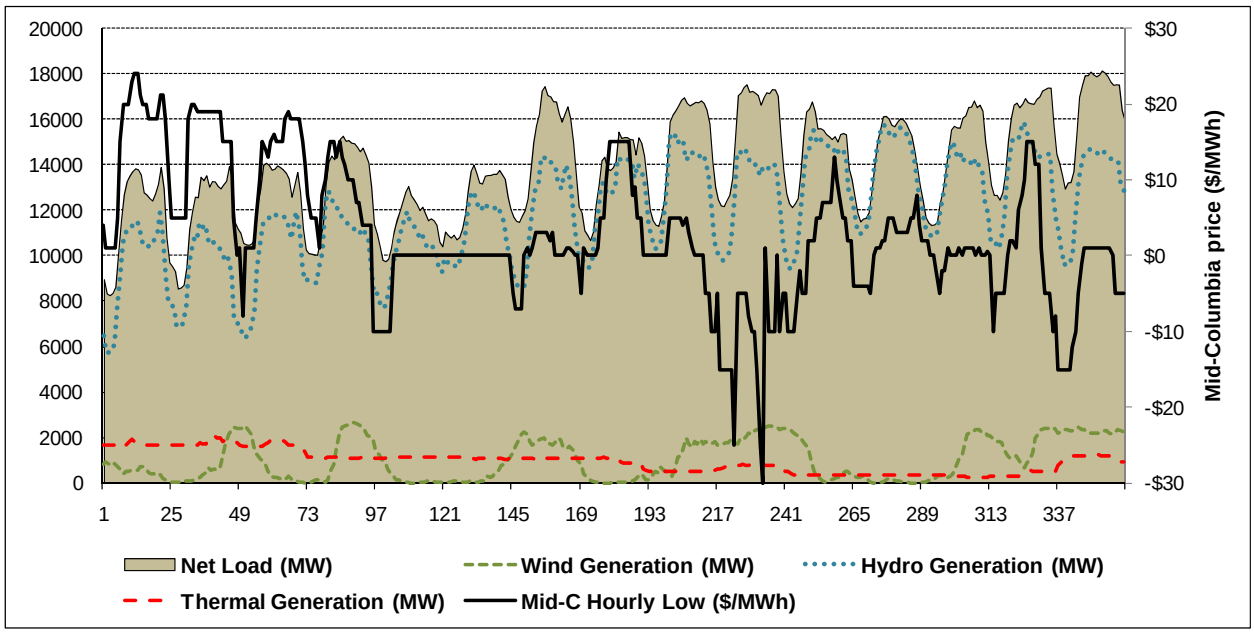
Mid-Columbia market prices are plotted on the right axis. Note that the zero point of the right axis lies halfway up the axis. Most of the negative price excursions coincide with low load, low hydro, and high wind hours. Exceptions appear, including the extreme low of -$30 during hour 233.[8] This low, while coinciding with high wind output, also coincides with the daily peak load and high hydro output. Finally, it should be noted that zero or negative prices did occur during some hours of low wind activity, for example, hours 265 through 272, and 292 through 297.

An extensive discussion of the June 2010 episode is provided in BPA's Columbia River high water operations paper.

[7] During the period of minimum thermal operation, only 3% to 8% of the 7,500 MW of thermal generation interconnected to the BPA balancing area was operating.

[8] The negative Mid-Columbia spot prices shown in Figure 2 did not result from BPA trading activity. BPA states in *Columbia River high-water operations* that at no point during June 2010 did it offer to sell power at negative prices.

Figure 2: BPA balancing authority loads and resources and Mid-Columbia market prices: June 1 - 15, 2010



FORECAST EFFECTS OF A GROWING SURPLUS OF LOW VARIABLE COST RESOURCES

The frequency of excess energy events, and resulting effects on wholesale energy prices and resource values were forecast for three cases of future resource development:

Frozen RPS: This case assumes no further development of qualifying resources to meet the RPS obligations of Northwest utilities, or for the purpose of supplying RECs to meet California RPS, beyond currently committed resources. Some committed resource development continues through 2012.

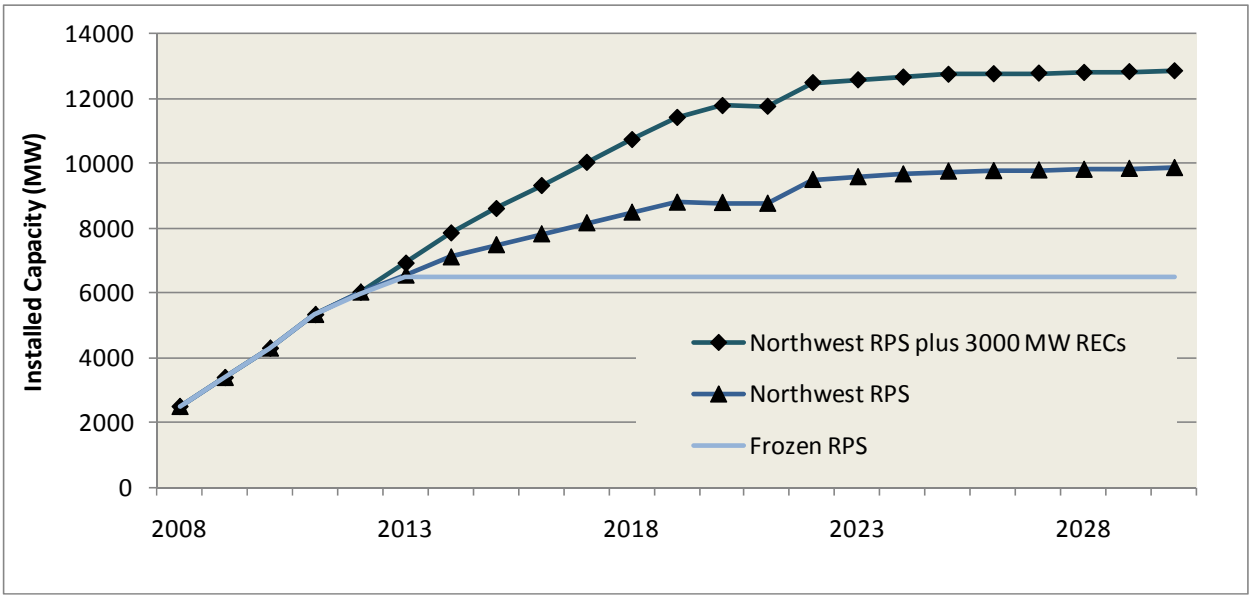
Northwest RPS: This case assumes continued development of a mix of qualifying resources as needed to meet the RPS obligations of Northwest utilities, but no additional development of wind power for the purpose of supplying RECs to meet California RPS. Adding new capacity to meet Northwest RPS begins in 2013 and continues through the end of the forecast period.

Northwest RPS plus 3000 REC: This case assumes continued development of a mix of qualifying resources as needed to fully meet the RPS obligations of Northwest utilities, plus development of an additional 3,000 MW of wind capacity for export to California in the form of unbundled RECs. The capacity to serve California is developed at the rate of 375 MW per year from 2013 through 2020.

Figure 3 illustrates the build-out of Northwest wind capacity for the three cases. The peak penetration of wind capacity as a percentage of Northwest peak hourly load for the three cases is

as follows: *Frozen RPS*: 20 percent; *Northwest RPS*: 29 percent; *Northwest RPS plus 3000 REC*: 38 percent.

Figure 3: Build-out of Northwest wind capacity for the three cases

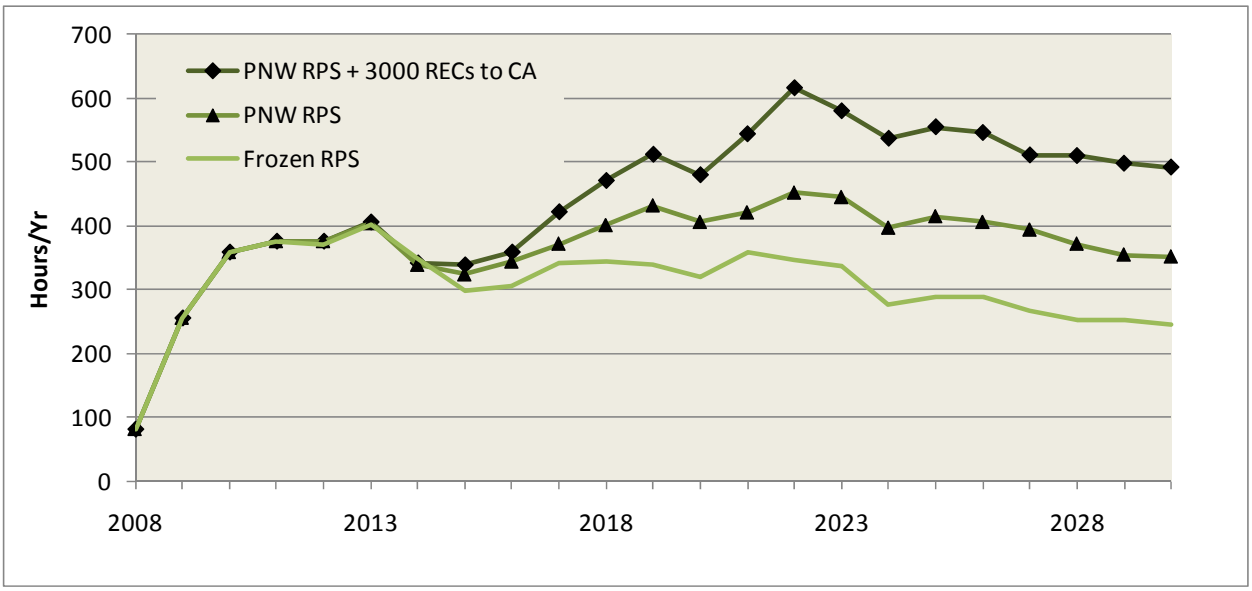


The analysis was performed using the AURORA^{xmp}™ Electric Market Model, using the input data, capacity expansion schedules and principal assumptions of the final wholesale power price forecast of the Sixth Power Plan. Key assumptions included average water conditions, the Council's medium case forecast of natural gas prices, the Council's mean value CO_2 allowance cost trajectory, the energy efficiency targets of the Sixth Power Plan, and the capacity forecast (absent RPS resources in the *Frozen RPS* case) used for the final wholesale power price forecast of the Sixth Power Plan. This capacity forecast includes retiring Boardman and several other coal and older natural gas combined-cycle units between 2016 and 2022.

Frequency of Excess Energy Events

Annual hours during which regulated Pacific Northwest hydropower output is at or below minimum levels was used as an index of the expected frequency of excess energy events. The forecast annual frequency of excess energy events is shown in Figure 4 for the three cases.

Figure 4: Forecast annual hours of excess energy



Regional load growth and resource additions through 2012 are the same for all cases, hence the frequency of excess energy events is identical through 2012. In all cases, the frequency of potential excess energy events grows rapidly from 2008 through 2010, and then continues at a slower rate through 2013. The rapid expansion of wind capacity and stagnant load growth extends from 2008 through 2010. Committed wind development declines in 2011 and 2012 and loads are forecast to recover from the recession. These factors probably lead to the declining rate of increase of excess energy events from 2010 through 2013. Declines continue in 2014, the likely result of load growth exceeding the relatively modest resource additions for this year.

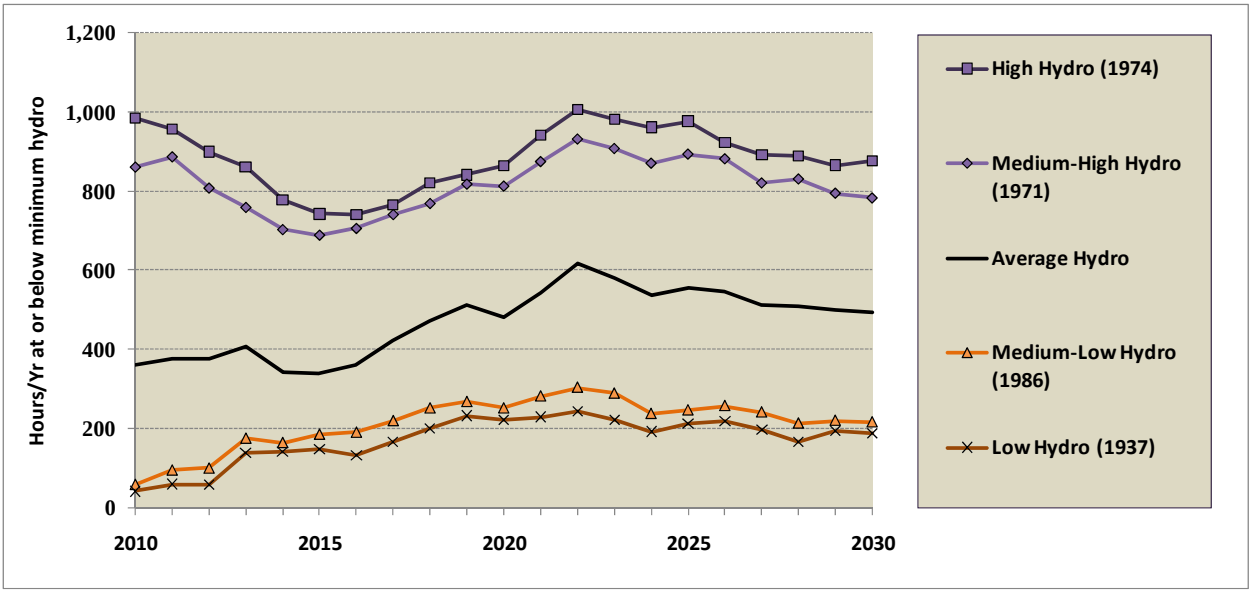
The resource mix of the cases diverges in 2015, as do the frequency of excess energy events. In the *Frozen RPS* case, excess energy events decline through the remainder of the forecast period. This is expected, since new firm resources are added only as needed to accommodate load growth, variable wind and hydropower represent a diminishing share of all capacity, and the production tax credits expire for individual plants following 10 years of operation[9]. Wind penetration continues to increase through 2025 in the *Northwest RPS* case. Excess energy events peak in 2022 at 26 percent greater frequency than 2010. Thereafter, the frequency of excess energy events declines as RPS targets are achieved, wind penetration is held constant, and hydropower penetration declines as a percentage of load. The *Northwest RPS plus 3000 REC* case follows a similar pattern but with a more rapid increase, peaking in 2022 at a 72 percent increase over 2010 levels.

The probability of excess energy events should be lower during poor water years and higher in good water years. Sensitivity to water conditions was tested for the *Northwest RPS plus 3000 RECs* case with a range of historical water years from low to high water conditions. Years with seasonal profiles representing the average were selected. The effect on expected instances of excess energy is shown in Figure 5. As expected, the frequency of excess energy events declines

[9] The availability of production tax credits for new plants are assumed to expire as currently scheduled.

during poor water years and increases during years of abundant water. Modeling results not shown in Figure 5 suggest that the frequency of excess energy events is less sensitive to mid-range water conditions, though more testing is required to confirm this observation.

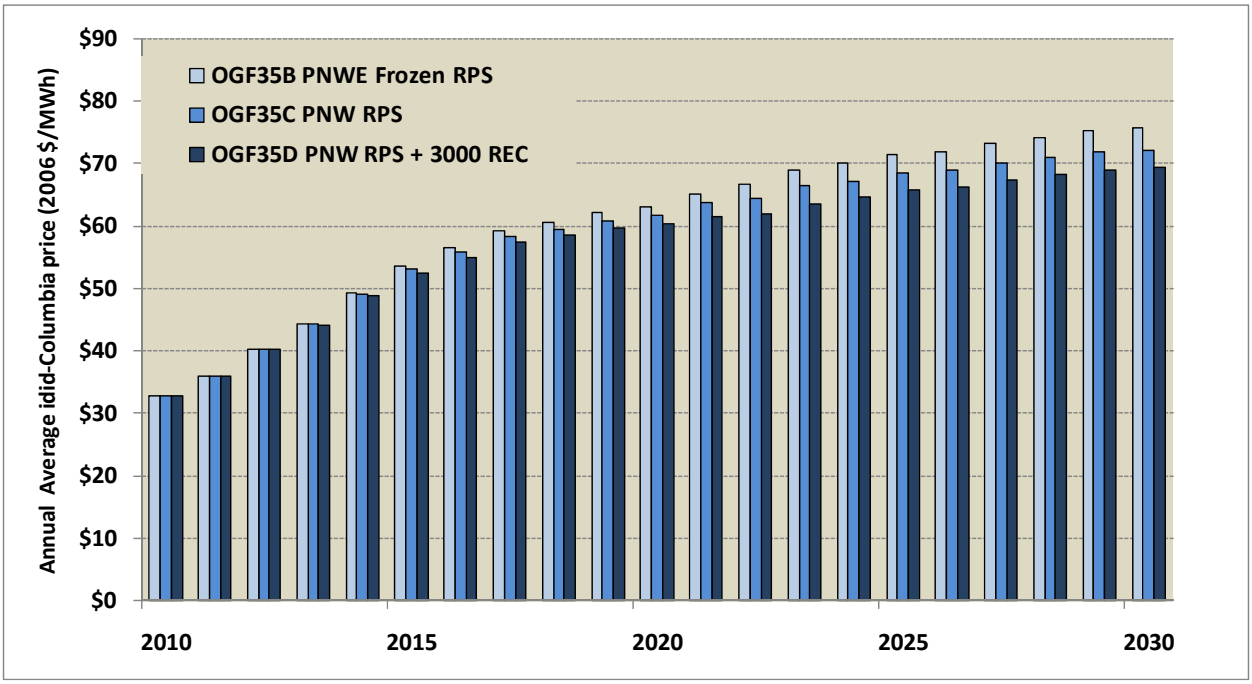
Figure 5: Frequency of excess energy hours under a range of water conditions



Market Price Effects

Forecast average annual Mid-Columbia prices, in constant 2006 dollars, are shown in Figure 6 for the three cases. The overall shape of the forecast is consistent with the electricity price forecast of the Sixth Power Plan. Prices rise fairly rapidly through 2017 as loads recover from the economic recession, natural gas prices rise, and CO_2 allowance costs phase in. Price increases flatten thereafter as the rate of increase of CO_2 allowance costs declines. Prices are further flattened following 2013 for the two cases involving the addition of new resources in excess of load growth. By 2020, the average annual average price in the *Northwest RPS* case is 2 percent below the price of the *Frozen RPS* case and the annual average price for the *Northwest RPS + 3000 REC* case is 4 percent below the *Frozen RPS* case. By 2030, the differences have grown to 5 percent and 8 percent, respectively.

Figure 6: Forecast average annual Mid-Columbia spot prices



The energy value of a resource is the difference between energy revenue and the variable cost of resource operation. As shown in Figure 7, there is little difference in the forecast energy value for the aggregate of Northwest resources among the three cases. Lower market prices in the *Northwest RPS* and *Northwest RPS plus 3000 REC* cases appear to be offset by the added volume of low-cost electricity from the additional capacity present in these cases.

The energy value of hydropower, however, is reduced by the additional resource development of the *PNW RPS* and *PNW RPS plus 3000 REC* case, as shown in Figure 8. Though some additional energy is assumed to come from upgrades to existing hydropower resources and new hydropower additions, the volume of additional hydro energy is insufficient to offset reduced energy market prices. Because the frequency of low prices increases during the spring runoff when large quantities of surplus hydropower are typically marketed, the value of hydropower is more sensitive to surplus energy events.

Figure 7: Energy value of all Northwest resources

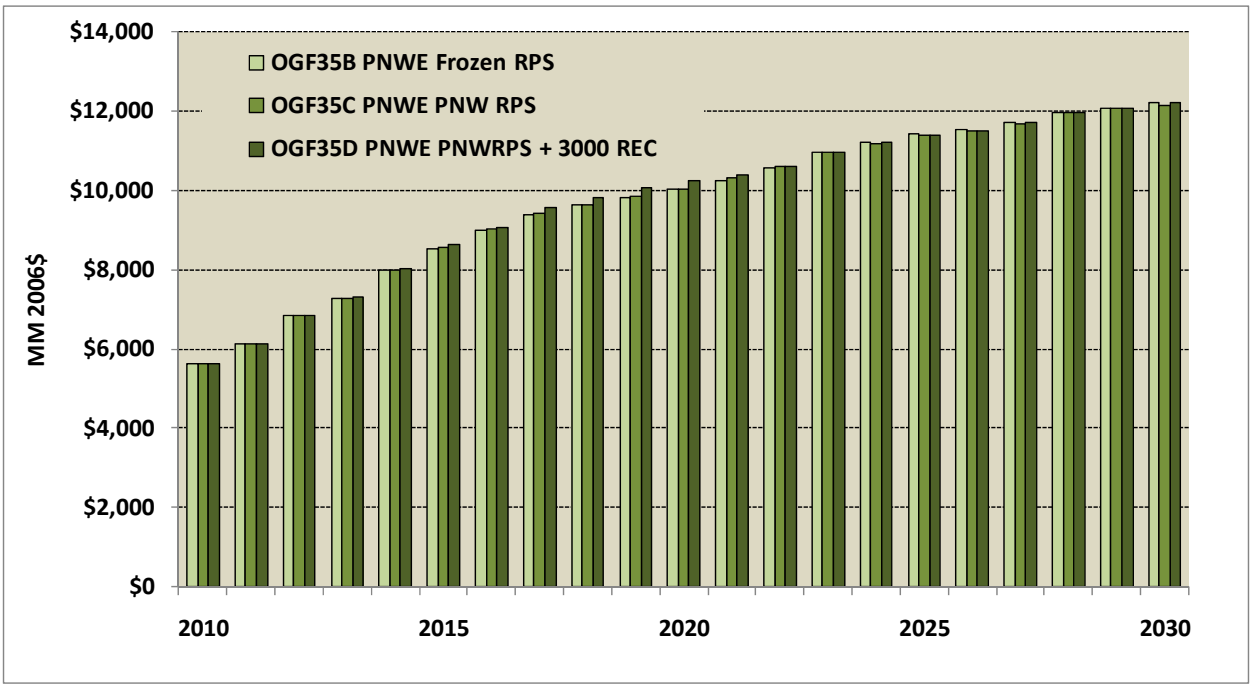
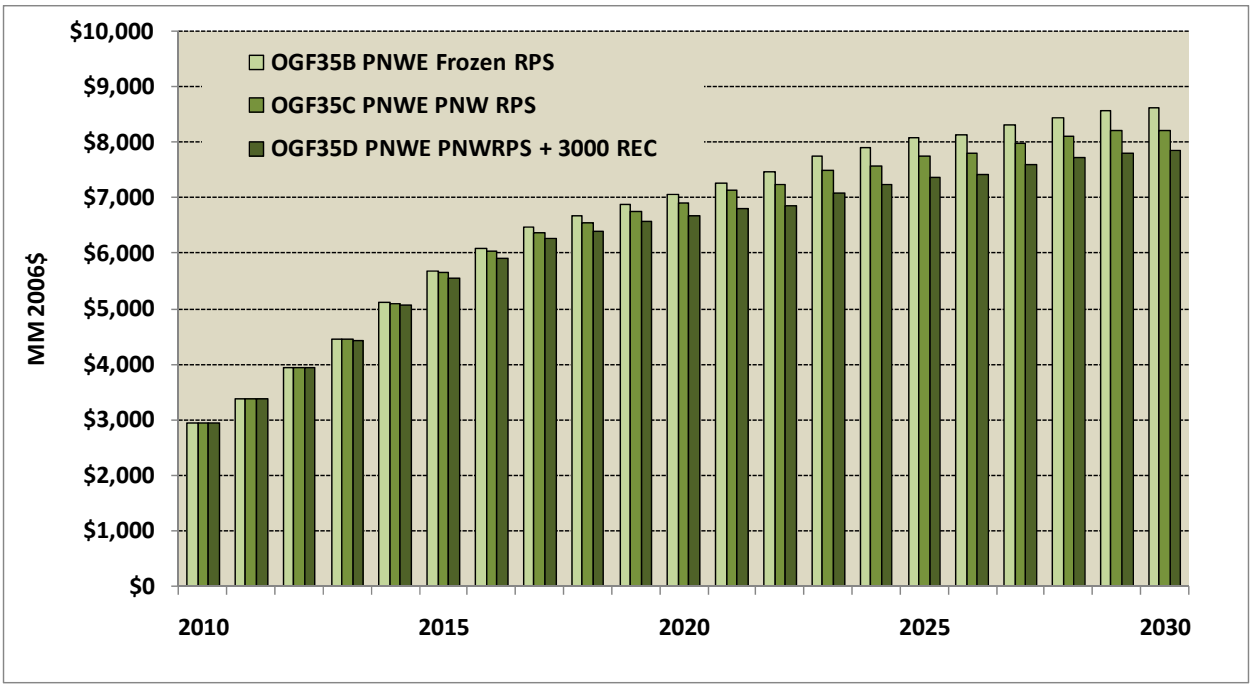


Figure 8: Energy value of Northwest hydropower resources



Not shown in Figures 7 and 8 is the capacity value of hydropower and other firm resources. The bilateral capacity transactions typical for the Northwest limit the ability to capture resource capacity value. It is likely that the capacity value of firm and flexible resources, including hydropower, will become increasingly significant as the penetration of non-firm resources and

resources needing balancing reserves increases. A liquid capacity market would facilitate capture of resource capacity value.

MITIGATING MEASURES

This section introduces measures that could help mitigate the issues presented by a growing energy surplus. These are not analyzed in depth, nor are they exhaustive. Short-term operational actions described in the Bonneville paper *Columbia River high water operations* are not included. The intent is to identify actions deserving further investigation.

Numerous actions are available to alleviate the economic and operational issues associated with excess energy events, to reduce energy market impacts, and to more productively use available low-cost, low-carbon energy. In terms of effects, these actions generally fall into the following categories: curtailing wind output during excess energy events, reducing wind output peaks, reducing hydro output peaks, increasing loads during excess energy events, augmenting energy dump capability, and reducing thermal output during excess energy events. No one action is a panacea and the cost, time to implement, and feasibility varies widely. In terms of feasibility, the actions can be broadly classified as policy-related and structural. Policy-related actions include those such as amending state RPS to allow credit for hydropower substituted for curtailed wind. Policy-related actions can in theory be quickly implemented at relatively low cost, however they may encounter political resistance. Structural measures, on the other hand, such as expanding intertie capacity, are generally slow to implement and costly. Moreover, few of the structural measures, as individual actions, would contribute significantly to resolving the issues associated with surplus energy.

Measures Facilitating Displacement of Wind during Excess Energy Events

Bonneville has stated[10] that it will not pay purchasers to take federal hydropower and that it will curtail the operation of other resources, if necessary, to maintain system reliability and avoid violating environmental standards during excess energy events. Because of the complexity of circumstances associated with excess energy events, the variety of operational measures available to help resolve the conflict between hydropower and wind generation, and the prospect of economic loss to wind operators, it is prudent for Bonneville, or any other balancing authority (BA) asserting this policy, to clearly identify the conditions under which it will curtail, and the actions it will take prior to curtailment. In fact, Bonneville has proposed to do this. This policy, however, does not resolve the economic concerns associated with this matter, since curtailments will not leave wind operators economically whole, unless their power sales agreements are negotiated with an expectation of occasional curtailment. Several options for reducing the financial disincentive for wind plant operators to curtail operation during over-generation events are available. These include crediting substitute hydropower as a RPS and PTC qualifying resource; substituting fixed payment for variable payment incentives and compensating wind operators for curtailment losses.

[10] Bonneville Power Administration. *Statement on Environmental Redispatch and Negative Pricing*. December 3, 2010.

Qualify substitute hydropower as a RPS/PTC resource: Wind operators receive value in the form of RECs for producing qualifying RPS energy. Many also receive revenues from the federal production tax credit. Because these revenues are a function of energy production, the net variable cost of operation is negative. If the wind plant owner received an equivalent production tax credit and RPS credit during defined conditions under which hydropower was substituted for wind power to maintain environmental requirements, wind power would then carry a slight positive variable cost. If the resulting variable cost of wind were higher than the variable cost of hydropower, wind operators would curtail in advance of hydro. Because the "true" variable cost of wind plant operation is low, it may also be necessary to levy a portion of its integration costs as variable to ensure that the dispatch cost of wind is higher than that of hydro. Reducing costs associated with displacing wind would help alleviate excess energy events and reduce downward pressure on market prices while potentially reducing dissolved gas problems. The efficacy of this action may be limited by existing wind power purchase contracts prohibiting substitute energy, and by PURPA contracts.

Implementing this concept would require changes to federal production tax credit statutes and to California, Oregon, and Washington RPS statutes. Though in theory these changes could be enacted quickly, the political challenges of re-opening incentive legislation may make it difficult to quickly implement these changes.

Substitute fixed for variable financial incentives: Many early renewable resource incentives were fixed, including front-end grants and investment tax credits. Because some of the resulting projects performed poorly, and to encourage plant owners to maximize energy production, fixed incentives were largely abandoned for the production tax credit, a variable payment based on energy production. State renewable portfolio standards also create variable incentives, since the premium paid for qualifying energy is based on energy production. Some fixed incentives remain, such as the sales tax credit that Washington provides for certain renewable energy equipment, the federal investment tax credits for solar and certain other renewable energy projects, the Oregon business energy tax credit, Energy Trust of Oregon grants, and federal construction loan guarantees. Moreover, Section 1603 of the American Recovery and Reinvestment Act (ARRA) of 2009 allows wind project developers to forego tax credits for an up-front grant equal to 30 percent of the capital investment. Projects completed during 2009 and 2010, or under construction as of the end of 2010 are currently eligible for this grant.[11] The grant option has been very popular and extension would likely result in the majority of new projects opting for the grant. Extending the grant option, combined with the gradual expiration of the production tax credit for existing projects could, over time, eliminate the production tax credit as a negative price signal.

Compensate wind plant owners for losses due to curtailment: A balancing authority could compensate wind operators for losses from curtailment; however, revenue to cover the cost of compensation would have to be secured. One approach is for the balancing authority to secure an inventory of curtailment options to cover anticipated curtailment needs. Revenues to finance acquiring the options could be rolled into wind integration costs. This approach would leave

[11] The Tax Relief, Unemployment Insurance Reauthorization and Job Creation Act of 2010 extended the eligibility to December 31, 2011.

individual wind plant owners economically whole by spreading the cost of lost incentives among all wind plants. The cost to wind plant owners could then be passed to wind energy customers.

Measures Reducing Wind Output Peaks

The average annual capacity factor of Columbia Basin wind projects is approximately 28 to 32 percent. The relatively low capacity factor of wind power leads to peak output events up to three times the average energy output. Developing higher capacity factor resources and resources with output better coinciding with load would reduce the probability of excess energy events for a given amount of RPS-qualifying energy. Several approaches to accomplishing this are described below. These are long-term measures, requiring years to become effective. They might also reduce the impact of RPS development on the value of hydropower to the extent that the peak resource output would shift to seasons other than spring.

Encourage commercialization and development of higher capacity factor resources and resources with better load-resource coincidence: Biomass, geothermal, hydropower, and offshore wind power typically operate at a higher capacity factor than terrestrial wind power, and could help reduce peak output relative to average energy production. Solar photovoltaic facilities, on the other hand, have an even lower average capacity factor and a higher peak to average output ratio than terrestrial wind power. Solar resources, however, do not produce during low-load nighttime hours. Wave power, though having a low average capacity factor, has a strong winter peak that coincides with Northwest loads.

Expand the scope of RPS-qualifying resources to include additional high-capacity factor low-carbon resources: Washington's Renewable Energy Standard (RES) and Oregon's Renewable Portfolio Standard are relatively inclusive, and opportunities for expanding the set of qualifying resources with favorable operating characteristics are limited. Crediting energy efficiency on par with renewable energy would encourage developing an abundant, fixed-cost, zero-carbon resource with "output" nearly coincident with load. The Washington RES prohibits new hydropower, except from irrigation pipes and canals that do not result in new diversions or impoundments. Expanding the definition of qualifying hydropower to include projects involving new water control structures outside of protected stream reaches might increase hydropower development potential. Though such potential within the U.S. Northwest appears to be limited, British Columbia offers substantial undeveloped hydropower potential. Another avenue would be expanding qualifying cogeneration capacity. For example, Washington's RES currently prohibits energy from cogeneration facilities fueled by black liquor.[12] Expanding eligibility to new or upgraded black liquor cogeneration facilities could expand the availability of high-capacity factor qualifying resources at no increase in air emissions since the black liquor must be burned to recover the pulping chemicals whether or not power is produced from the resulting energy.

[12] Black liquor is the spent cooling liquor of the Kraft wood pulping process. It contains lignin residues, hemicellulose, and the inorganic chemicals used in pulping process. The lignin and hemicellulose residues impart high energy content to black liquor, allowing it to be concentrated and burned in a chemical recovery boiler to recover the pulping chemicals for recycling.

Increase the geographical diversity of wind projects: Over 70 percent of committed Northwest wind capacity is located in areas strongly influenced by Columbia Gorge winds. This concentration leads to peaks in wind output approaching full installed wind capacity, which contributes to the frequency and magnitude of excess energy events. Good quality wind resources are found elsewhere in the Northwest and in adjacent regions; however it would be necessary to strengthen or extend the transmission grid to tap large amounts of new resources in outlying areas. New long-distance high voltage transmission is expensive, requires many years to develop, and encounters public resistance. Moreover, because of the relatively low capacity factor of wind and the need to secure transmission capacity to accommodate a large proportion of the interconnected wind capacity, transmission interconnection is more expensive for wind than for higher capacity factor resources. A recent study by the Columbia Grid and Northern Tier Transmission Group Wind Integration Study Team (WIST) found that continued development near existing transmission, though incurring higher integration costs because of geographic concentration, is likely to be more cost-effective than constructing new long-distance transmission to tap remote wind resources. Exceptions to this may be remote development that could access existing transmission with the potential for relatively low-cost upgrades of transfer capacity.

Measures Reducing Hydro Output Peaks

Several measures have been proposed that would reduce the volume of stream flow during over-generation events. These measures could reduce spill. Because some of these measures would require pumping, they would also increase electrical loads during surplus energy periods. These measures include on-stream pumped storage, increased irrigation withdrawals, and managed aquifer recharge. With the exception of increased irrigation withdrawals, these measures would require several years to implement and could require significant capital investment. These measures would reduce the severity of excess energy events, expand the productive use of low-cost, low-carbon hydro and wind energy and help curtail negative electricity market prices.

Add On-stream pumped storage: The John W. Keys (Banks Lake) pumped-storage project is an on-stream project where water is pumped directly from Roosevelt Lake behind Grand Coulee Dam. At full load, this project draws about 600 MW and can pump about 18,000 cfs of water up to Banks Lake. Six of the 12 units are reversible, and can generate about 300 MW when discharging to Roosevelt Lake. The original and primary purpose of this plant is to supply water to the Columbia Basin Irrigation Project via Banks Lake. Peak flows at Grand Coulee during the June 2010 surplus energy episode were about 195,000 cfs, so the Keys plant in pumping mode could divert about 9 percent of the peak in-stream flow during the June 2010 event while consuming about 9 percent of the full output of Grand Coulee. Moreover, diversion above Grand Coulee would reduce flow at all downstream projects. The combined effect is estimated to be equivalent to about 2,100 megawatts of load. Banks Lake storage capacity and ability to discharge to the Columbia Basin Irrigation Project could ultimately limit the period of withdrawal; however, the active storage capacity of Banks Lake represents about 480 hours of pumping at full capacity.

According to operational data received from BPA, the pumps at Grand Coulee typically came on for about nine hours during the night through this period, but never at full capability. Operational constraints may limit the ability to operate the pumps over more hours, and

maintenance may have limited the maximum capability level. The data also indicate that the pump/generators actually generated a total of almost 5,000 MWh during the first two weeks of June. It is possible that more could be done to optimize the operation of the pumps and pump/generator units during these events.

As of October 2010, 10 preliminary permits had been issued by FERC for proposed pumped storage sites in the Northwest and four more preliminary permit requests were pending. None of the 14 proposed projects would pump directly from in-stream sources, so they would not directly reduce in-stream flows. One, the proposed Banks Lake project, however, would use Banks Lake as a lower reservoir and could indirectly augment withdrawal by increasing the effective upper reservoir capacity of the existing Keys pumped storage facility.

Increase irrigation withdrawals: The irrigation season in the Northwest runs from early April to mid-October. The season overlaps the April through June period during which excess energy events most frequently occur. Increasing irrigation withdrawal rates during this period will reduce in-stream flow. Electrical loads would increase to the extent pumping is used to lift irrigation water. The feasibility of this option would depend on crops, crop growing status, soil characteristics and moisture content, and other factors. Water withdrawal rights might complicate the feasibility of this measure. This measure could be implemented quickly and without significant capital investment.

Develop recharge capability for depleted aquifers: Managed recharge of depleted aquifers could increase upstream water withdrawals and productively employ surplus electrical energy. Groundwater pumping for irrigation has resulted in declining groundwater levels in several areas of the Northwest, including the Odessa area of eastern Washington and the eastern Snake River Plain. A 1999 feasibility study of managed recharge of the Eastern Snake River Plain aquifer suggests that relatively little capital investment would be required for the recharge facilities themselves - they would essentially consist of ponds located in natural depressions fed by controlled discharges from existing irrigation diversions. Issues include withdrawal rights, conflict with in-stream hydropower, fisheries and other in-stream environmental issues, and control of injection water quality. The eastern Snake study assumed use of existing irrigation diversions and canals during the off season and considered the cost of constructing new facilities to be “prohibitive.” Because recharge during the spring freshet season to mitigate surplus energy events would compete with irrigation use of the existing diversion and conveyance structures, a scheme intended partly to alleviate surplus energy events would require expanding the capacity of the existing irrigation conveyance system or constructing new conveyance facilities.

Expand in-river storage: Additional in-river storage could be gained by raising high water reservoir elevations. This has been proposed for at least one Mid-Columbia project. An assessment of this potential was not located for this paper.

Refine flood control management: Flood control operations require reserving storage capacity to accommodate flood flows. This can restrict storage capacity during high flows not approaching flood-level. Improved forecasting, control, and communication techniques may provide opportunities for refining flood control management and creating additional upstream storage during surplus energy events. Flood control operations are under review as part of the Columbia River Treaty negotiations.

Measures Increasing Loads during High Runoff Periods

Measures that would increase loads during high runoff periods could reduce the incidence of excess energy events and expand productive use of available low-carbon hydro and wind energy. Strategies to increase loads during high runoff periods include fuel shifting, load shifting, producing alternative fuels using electricity, and increasing export capability. These measures could reduce the incidence and severity of excess energy events, expand the productive use of low-cost, low-carbon hydro and wind energy and help curtail negative electricity market prices.

Fuel shifting: Fuel shifting measures include electric vehicles, auxiliary electric boilers, hot water heaters, and dual-fuel boilers and hot water heaters. These examples of fuel shifting would increase loads and could also provide energy storage. This could help dampen price volatility, increase the export potential by facilitating transfers during off-peak periods, and possibly reduce the severity of excess energy events. Though additional load would increase the need for RPS-qualifying energy, the proportion of hydro capacity to load would diminish, reducing the frequency of excess energy events. With some exceptions, fuel-shifting options would require many years to achieve significant penetration and would require considerable capital investment.

Synthetic fuel or chemical production: Surplus electricity could be used to produce hydrogen or ammonia. Synthetic fuel production options would require many years to achieve significant penetration and would require considerable capital investment. Because of the magnitude of the capital investment, year-round operation would be required to achieve economic viability, and a facility could not depend solely on low-cost surplus energy

Expand export capacity: Expanding out-of-region export capacity could increase loads without increasing Northwest state RPS obligations. Intertie capacity to California was not fully utilized during the June 2010 surplus energy episode. Reasons cited for this include line deratings, illiquid intertie capacity release markets, and pricing differentials resulting from California ISO congestion pricing (raising the cost of imports from the perspective of California utilities). Some increase in export capability could be secured relatively quickly and at low cost by resolving these issues. Over the longer term, and at much greater cost, expanding intertie transfer capacity could be undertaken. Current California RPS policy that only requires the equivalent of REC-associated energy to be imported within the calendar year provides little incentive for California utilities to support expanding intertie capacity. Policies encouraging transfer of associated energy nearer the time of production would provide incentive for expanding intertie capacity. Efficient operation of the interties could be compromised unless this policy was carefully designed. In-state development of RPS-qualifying resources within California could increase the incidence of excess energy events within California itself, possibly compromising the value of increasing intertie transfer limits, depending upon the daily and seasonal output of in-state RPS resources.

Energy storage: Energy storage facilities could shift surplus energy to periods when useful load may be available. Available technologies include pumped-storage hydropower, batteries, flow batteries, compressed air storage and, to a limited extent, demand response measures such as hot water management. These storage technologies are typically employed to shift energy between light and heavy load hours, and can become economically infeasible if cycled less frequently. Storage could expand productive use of hydro and wind energy and could ease the severity of

excess energy events through load-shifting and more efficient use of intertie transfer capacity to access California loads. Because springtime high wind periods are typically of several days duration, storage technologies may not be an economic means of leveling wind output. Storage economics have not been favorable in the Northwest because of modest heavy load and light load price differentials; however this analysis suggests that heavy and light load differentials may become more pronounced in the future. This, plus a growing need for capacity services, may improve the economic prospects of storage. Storage developed for other purposes may be able to provide some useful shifting of energy during excess energy events.

Measures Augmenting Energy Dump Capability

These measures would increase the ability to release surplus energy in an environmentally acceptable manner, thereby reducing the need to displace wind or hydro. Although these measures effectively waste potentially useful low-cost, low-carbon energy, the effect is similar to the historical spilling of water at the dams prior to establishment of total dissolved gas (TDG) limits.

Improved dissolved gas abatement: Gas entrainment occurs as spill plunges into the stilling basins below the spillway. A variety of structural and operational measures for reducing dissolved gas levels have been proposed, including spillway flow deflectors, raised stilling basins, raised tailrace channels, additional spillway bays, tailrace/stilling basin separation walls, submerged conduits, baffled spillways, side channel spillways, pool and weir channels, and submerged spillway gates. The most feasible structural alternatives, primarily spillway flow deflectors, have been installed at all Lower Snake and Lower Columbia Corps projects with the exception of The Dalles,[13] thereby increasing gas-limited spill capacity.

Relaxed dissolved gas standards: Currently, exceeding TDG water quality standards is only permitted for voluntary spill for fish passage purposes through the waiver process in Oregon and the exemption built into Washington's water quality standards. An effort to obtain a similar waiver or statutory provision that pushes allowable spill even higher during periods of excess energy would not likely prove feasible since water quality standards must be stringent enough to protect all the designated uses of the Columbia and Snake rivers and aquatic life is generally the most sensitive of those designated uses.

While scientists and policymakers may not necessarily agree on the specific point where the risks of gas bubble trauma to aquatic life outweigh the benefits of spill for juvenile fish, it is generally agreed that there exists some level at which the risks of gas bubble trauma outweigh the benefits of assisting migrating smolts. Given that excess energy events are likely to occur in June when the TDG 115/120 percent waiver cap is in effect, getting Oregon's Environmental Quality Commission or Washington's Department of Ecology to go even further, at significant risk to salmon and other aquatic life, in order to deal with a surplus energy event seems highly improbable. Past review processes to obtain the waivers have proven both lengthy and contentious. Moreover, the EPA's review of any changes to state water quality standards that would allow TDG standards to be exceeded during times of excess energy would likely take a long time, and the outcome uncertain.

[13] Stilling basin bathymetry at The Dalles would compromise the effectiveness of spillway flow deflectors.

One other possibility may be to create an exemption in the state water quality laws for excess energy events similar to what is provided for 7Q10 flood flows.[14] While surplus energy events may not necessarily be considered "involuntary" in the traditional sense, it may be difficult if not impossible to get the states to adopt, and EPA to approve, an exception to state water quality standards given the existing restrictions on spill required to protect aquatic life.

Resistive Load Banks: Resistive load banks are devices designed to absorb electric energy, providing a load with desirable characteristics (unity power factor). Load banks are in common use for generator testing. The Northwest's 1,400 MW Chief Joseph substation "dynamic brake" is an example of a load bank used to maintain power system stability. This facility may have no practical application for the envisioned need as it is designed to operate for less than a second at a time.

While BPA's dynamic brake demonstrates the scale feasibility of load banks, commercially available load banks are designed for continuous service. A quick internet search found a handful of providers of megawatt-scale units.[15] The cost for the units, absent installation and interconnection, appears to range from about $20-40/kW. Spill rates during the June event were approximately 875 MW at Grand Coulee and 325 MW at Chief Joseph. If the total 1,200 MW were matched by load banks, the equipment cost of accommodating the generation and avoiding spill would be on the order of $25-50 million. Additional costs for land, installation, and interconnection could increase this two to three times.

Although finding more constructive uses for the energy would be desirable, load banks could insulate BPA from negative pricing events by expanding zero price options for generation, provide an alternative to spill that would otherwise raise nitrogen levels, and provide additional system reliability to the balancing area to reduce the risk of over-frequency events. Perhaps the highest value of load bank technology is in providing a cost yardstick against which other solutions can be compared.

Measures Facilitating Curtailment of Thermal Output during Excess Energy Events

During the height of the June 2010 excess energy episode, several hundred megawatts of thermal generation remained in operation in the BPA balancing authority area. Because this generation may have been required to maintain system stability or to provide balancing reserves it is not apparent that further reduction in thermal output was possible. Slow response capacity such as the Columbia Generating Station was held at minimum operating levels to serve unanticipated loads as the warm season approached. Westwide, however, there may be opportunities to further reduce thermal operation during excess energy events. Plants can be retrofitted to reduce minimum operating levels. This can also increase the ability of these plants to provide balancing reserves. Replacing slow response thermal capacity, such as steam boiler units with faster-responding units like gas turbines, can reduce the need to keep capacity in operation to respond to unanticipated loads. Fast response units are also better-suited to provide balancing reserves.

[14] 7Q10 is the average peak annual flow for seven consecutive days that has a recurrence interval of 10 years.
[15] Avtron, Mosebach Manufacturing, Power House Manufacturing, Sephco, and Simplx.

Further curtailing thermal output would help use more low-cost, low-carbon hydro and wind energy, ease the severity of excess energy events, mitigate negative market price pressure, and facilitate more optimal dispatch. The process of replacing aging coal and gas-fired boiler-steam units is likely to lead to a more agile fleet of thermal units, but it will require many years and substantial capital investment to achieve this.

Michelle, Kayce (UTC)

From: [redacted]@gorge.net
Sent: Thursday, January 06, 2011 12:14 PM
To: EFSEC (UTC)
Subject: FW: Whistling Ridge Windmall Proposal

------- Original Message -------
From : [redacted]@gorge.net[mailto:jdtyl@gorge.net]
Sent : 1/6/2011 12:12:39 PM
To : efec@utc.wa.gov
Cc :
Subject : FW: Whistling Ridge Windmall Proposal

Dear Washington Energy Facility Site Evaluation Council Members

The Whistling Ridge proposal clearly violates the intent of The Columbia River Gorge National Scenic Area Act. While its easy to lose one's way in the massive legalistic detail of the document, there is no way to mistake the purpose of the Act. It is designed to protect the natural beauty of the Gorge Scenic Area for the enjoyment and benefit of all Americans present and future.

The actual language of the document does not protect against all possible threats. Can any legislative act anticipate all future possibilities? Not surprisingly it was not anticipated that someone would actually consider erecting 400 foot windmill towers on mountain sites in one of the most scenic areas of the Gorge. But given all of the other protective rules and constraints within the Act can any rational person believe that Act designers and supporters intended to allow such a destructive exception.

Please put above other interests the long term interest of Washingtonians and other Americans in preserving this national treasure and deny the Whistling Ridge windfarm proposal. There are much more appropriate sites for windfarms.

Sincerely,

John Tyler
[redacted] Highland Orchards Road
Underwood Washington

Michelle, Kayce (UTC)

From: Planet Glassberg [[redacted]@yahoo.com]
Sent: Thursday, January 06, 2011 1:37 PM
To: EFSEC (UTC)
Subject: I oppose Whistling Ridge Energy Project

Dear Washington Energy Facility Site Evaluation Council,

I am opposed the poorly planned Whistling Ridge Energy Project. Please recommend that Governor Gregoire deny the project.

The project itself is the most controversial and problematic wind project ever proposed in Washington State and be highly visible along the 2,000-foot elevation ridgeline boundary of the Columbia River Gorge National Scenic Area near White Salmon, Washington.

The Whistling Ridge Project is also proposed within a designated "Special Emphasis Area" protecting the Northern Spotted Owl, listed as an endangered species in Washington.

I am not alone in my opposition; multiple agencies -including the United States Forest Service and the National Park Service - have recommended substantial modifications to the project. Other groups who have raised concerns or oppose the projects include: Friends of the Columbia Gorge, Save Our Scenic Area, Skamania County Agri-Tourism Association, Seattle Audubon Society, Gifford Pinchot Task Force, Columbia Gorge Audubon Society and Friends of the Historic Columbia River Highway.

I urge you to recommend to Governor Gregoire that the Whistling Ridge Project be denied.

Sincerely,

Planet Glassberg
P.O. Box [redacted]
Eugene, OR 97440

Whistling Ridge
Public Comment
#174

Michelle, Kayce (UTC)

From: Steve Castles [redacted]@embarqmail.com]
Sent: Thursday, January 06, 2011 2:17 PM
To: EFSEC (UTC)
Subject: Whistling Ridge wind farm

To whom it may concern:

The location of the proposed Whistling Ridge wind farm is not rational. There are other excellent sites for wind farms further east along Columbia River that will not impact an area with a large commercial interest in tourism. The proposed wind farm may well have a negative economic impact on the State of Washington because of the loss of tourism in the region encompassing the Columbia River National Scenic Area. Furthermore, the density of population surrounding the proposed site that will be negatively affected by the wind farm is unusually high relative to other wind farm sites. It is not reasonable to locate a wind farm in such a densely populated area when there are alternative locations available with very low population densities.

In summary, the State of Washington should consider what is in the best interest of its citizens living in the area of the proposed wind farm and in the state's overall economic best interest.

Respectfully,
Stephen Castles

Michelle, Kayce (UTC)

From: [redacted]@embarqmail.com
Sent: Thursday, January 06, 2011 3:00 PM
To: EFSEC (UTC)
Subject: I support Whistling Ridge

Hello Energy Facility Site Evaluation Council,

Climate change is the number one issue facing our environment today. With the help of wind farms like Whistling Ridge, we can fight back. Wind is pollution-free, local and sustainable. It does not get much better than that!

With Condit Dam coming down and the Boardman coal plant scheduled for closing, it is crucial to support new renewable development. Wind energy is a clean way to help fill our ever-increasing need for power, contribute to state renewable energy mandates, and reduce our dependence on fossil fuels. We need more alternative energy sources, and Whistling Ridge is a great place to start.

Sincerely,
Peggy Ohlson
po box [redacted]
Undrewood, Wa. 98651

Whistling Ridge
Public Comment
#176

Michelle, Kayce (UTC)

From: dell goldsmith [[redacted]@gmail.com]
Sent: Thursday, January 06, 2011 3:29 PM
To: EFSEC (UTC)
Subject: Opposed to Whistling Ridge Energy Project

Dear Energy Facility Site Evaluation Council, I support wind energy in the right place but not here. We need to protect areas for owls, bats, raptors and other birds which are chewed up by turbines.

I am opposed to the Whistling Ridge Energy project and am writing to recommend that you deny the project going forward to Governor Gregoire.

This project is immediately adjacent to the Columbia River Gorge National Scenic Area and at least 25 turbines would be highly visible from designated key viewing areas. Up to 25 of the 415-foot-tall turbines would be visible from State Route, 14 a state scenic byway in addition to being a designated key viewing area. The turbines would be visible for two miles of the highway, with westbound travelers looking directly at strings of turbines atop prominent ridges.

Whistling Ridge, if completed, would harm important aspects of our national heritage, including natural, historic and cultural resources of the Columbia River Gorge National Scenic Area, the Lewis and Clark National Historic Trail, the Historic Columbia River Highway, the Oregon Pioneer National Historic Trail, the Ice Age Floods National Geologic Trail and the SR14 scenic byway.

I am not alone in my opposition; both the National Park Service and the United States Forest Service have concluded that the project will harm important national resources.

Protect our heritage; recommend to Governor Gregoire that the Whistling Ridge Project be denied.

Sincerely,

dell goldsmith
[redacted] sw newton pl
portland, OR 97225

Michelle, Kayce (UTC)

From: benjamin ignatowski [redacted]@hotmail.com]
Sent: Thursday, January 06, 2011 3:53 PM
To: EFSEC (UTC)
Subject: Opposed to Whistling Ridge Energy Project

Dear Energy Facility Site Evaluation Council,

I am writing today to recommend that you deny the Whistling Ridge Energy Project to Governor Gregoire.

The Whistling Ridge Energy Project is within three miles of the Lewis and Clark National Historic Trail, the Oregon Pioneer National Historic Trail, the Columbia River Highway, the Ice Age Floods National Geologic Trail and the Columbia River Gorge National Scenic Area.

25 of the projects 50 turbines would be highly visible from key viewing areas of the Columbia River Gorge National Scenic Area and each turbine would be more than 420 feet tall and equipped with blinking lights that would be visible for miles in all directions. The project would be highly visible from State Route 14, a designated scenic byway in Washington.

Please recommend denial of the Whistling Ridge project to Governor Gregoire and protect our historic trails and scenery in the Columbia Gorge.

Sincerely, Ben Ignatowski

benjamin ignatowski
pob [redacted]
portland, OR 97211

Whistling Ridge
Public Comment
#178

Michelle, Kayce (UTC)

From: Barbara Tombleson [redacted]@coho.net]
Sent: Thursday, January 06, 2011 5:54 PM
To: EFSEC (UTC)
Subject: Opposed to Whistling Ridge Energy Project

Dear Energy Facility Site Evaluation Council,

I am opposed to the Whistling Ridge Energy project and am writing to recommend that you deny the project going forward to Governor Gregoire.

This project is immediately adjacent to the Columbia River Gorge National Scenic Area and at least 25 turbines would be highly visible from designated key viewing areas. Up to 25 of the 415-foot-tall turbines would be visible from State Route, 14 a state scenic byway in addition to being a designated key viewing area. The turbines would be visible for two miles of the highway, with westbound travelers looking directly at strings of turbines atop prominent ridges.

Whistling Ridge, if completed, would harm important aspects of our national heritage, including natural, historic and cultural resources of the Columbia River Gorge National Scenic Area, the Lewis and Clark National Historic Trail, the Historic Columbia River Highway, the Oregon Pioneer National Historic Trail, the Ice Age Floods National Geologic Trail and the SR14 scenic byway.

I am not alone in my opposition; both the National Park Service and the United States Forest Service have concluded that the project will harm important national resources.

Protect our heritage; recommend to Governor Gregoire that the Whistling Ridge Project be denied.

Sincerely,

Barbara Tombleson
[redacted] SW Capitol Hill Rd.
Portland, OR 97219

Whistling Ridge
Public Comment
#179

Michelle, Kayce (UTC)

From: Cari Reeves [[redacted]@yahoo.com]
Sent: Friday, January 07, 2011 12:11 PM
To: EFSEC (UTC)
Subject: No to Whistling Ridge

To the Energy Facility Site Evaluation Council,

I oppose the Whistling Ridge Energy Project. I am writing to recommend that you deny the project in your recommendations to Governor Gregoire.

The project would contain 50 highly visible turbines along the 2,000-foot elevation ridgeline boundary of the Columbia River Gorge National Scenic Area. Up to 25 of the 50 turbines would be highly visible from key viewing areas of the scenic area and each turbine would be more than 420 feet tall and equipped with blinking lights that would be visible for miles in all directions. These key viewing areas include State Route 14, which is also designated as a state scenic byway.

Whistling Ridge would produce less than 20 megawatts of energy a year, while Washington and Oregon have over 40,000 megawatts of wind energy development potential that can easily meet growing demands without sacrificing our national heritage. Whistling Ridge is simply not worth the cost.

The adverse impacts of the project on one of the most scenic regions in the United States far outweigh the projects minimal benefits. I urge you to recommend denial of the Whistling Ridge Energy Project.

Sincerely,

Cari Reeves
[redacted] NE Clackamas St
Portland, OR 97230

Whistling Ridge
Public Comment
#180

Michelle, Kayce (UTC)

From: FHCRH [[redacted]@comcast.net]
Sent: Friday, January 07, 2011 1:22 PM
To: EFSEC (UTC)
Cc: Marie Miller; Gayle Rothrock; Natalie Perrin; Maya Foty; Kristen Minor; Christopher Bell; Bob Cogan; Gary Brannan; Dick Weber; Rick Kuehn; Jerry Smith; Rick Till
Subject: FHCRH comments on Whistling Ridge Energy Project
Attachments: Whistline Ridge comments.doc.docx; CRH district Mitchell Pt.jpg; Section F.pdf

Please find attached comments from the Friends of the Historic Columbia River Highway concerning the Whistling Ridge Energy Project.
Thanks
Jeanette Kloos
President
FHCRH

Friends of the Historic Columbia River Highway

PO Box 50, Bridal Veil, Oregon 97010
http://www.hcrh.org

January 7, 2011

Energy Facilities Site Evaluation Council
P.O. Box 43172
Olympia, WA 98504-3172

RE: Whistling Ridge Energy Project

To Whom It May Concern:

The Friends of the Historic Columbia River Highway wishes to provide additional comments on the Whistling Ridge Energy Project, beyond those sent on the Draft Environmental Impact Statement. In particular, these comments are to correct inaccuracies in information provided by the applicant's witness, Tom Watson, concerning the Historic Columbia River Highway.

The Historic Columbia River Highway Historic District was placed on the National Register of Historic Places December 12, 1983. The district includes all extant portions of the highway, including the portions at Mitchell Point and Ruthton Point (see attached maps from the nomination.) (Portions of the Historic Columbia River Highway are now a National Historic Landmark district, but that designation did not change the original historic district boundaries.) All of the original historic district is included in the CRGNSA Management Plan as a Key Viewing Area.

In 1986 Congress directed the Oregon Department of Transportation to "prepare a program and undertake efforts to preserve and restore the continuity and historic integrity of the remaining segments of the Old Columbia River Highway for public use as a Historic Road, including recreation trails to connect intact and usable segments" and authorized $2.8 million for this work (Public Law 99-663 - the Columbia River Gorge National Scenic Area Act). In 1987 the Oregon Legislature declared that "it is the public policy of the State of Oregon to preserve and restore the continuity and historic integrity of the remaining segments of the Historic Columbia River Highway for public use and enjoyment." Since that time, efforts have resulted in construction of eleven miles of the Historic Columbia River Highway State Trail and designation of the Trail as a National Recreational Trail and Oregon's Millennium Legacy Trail. Oregon Department of Transportation has received funding within the last six months for construction of two additional sections of the Historic Columbia River Highway State Trail.

Considerable work has been completed on the sections of the Historic Columbia River Highway State Trail between Viento and Hood River. Quatrefoil, Inc. has recently completed a year-long study for the Oregon Department of Transportation and the Oregon Parks and Recreation Department, titled "The Historic Columbia River Highway State Trail Plan - Wyeth to Hood River." This document includes considerable detail on the proposed projects, including maps with contours, detailed maps of trailhead

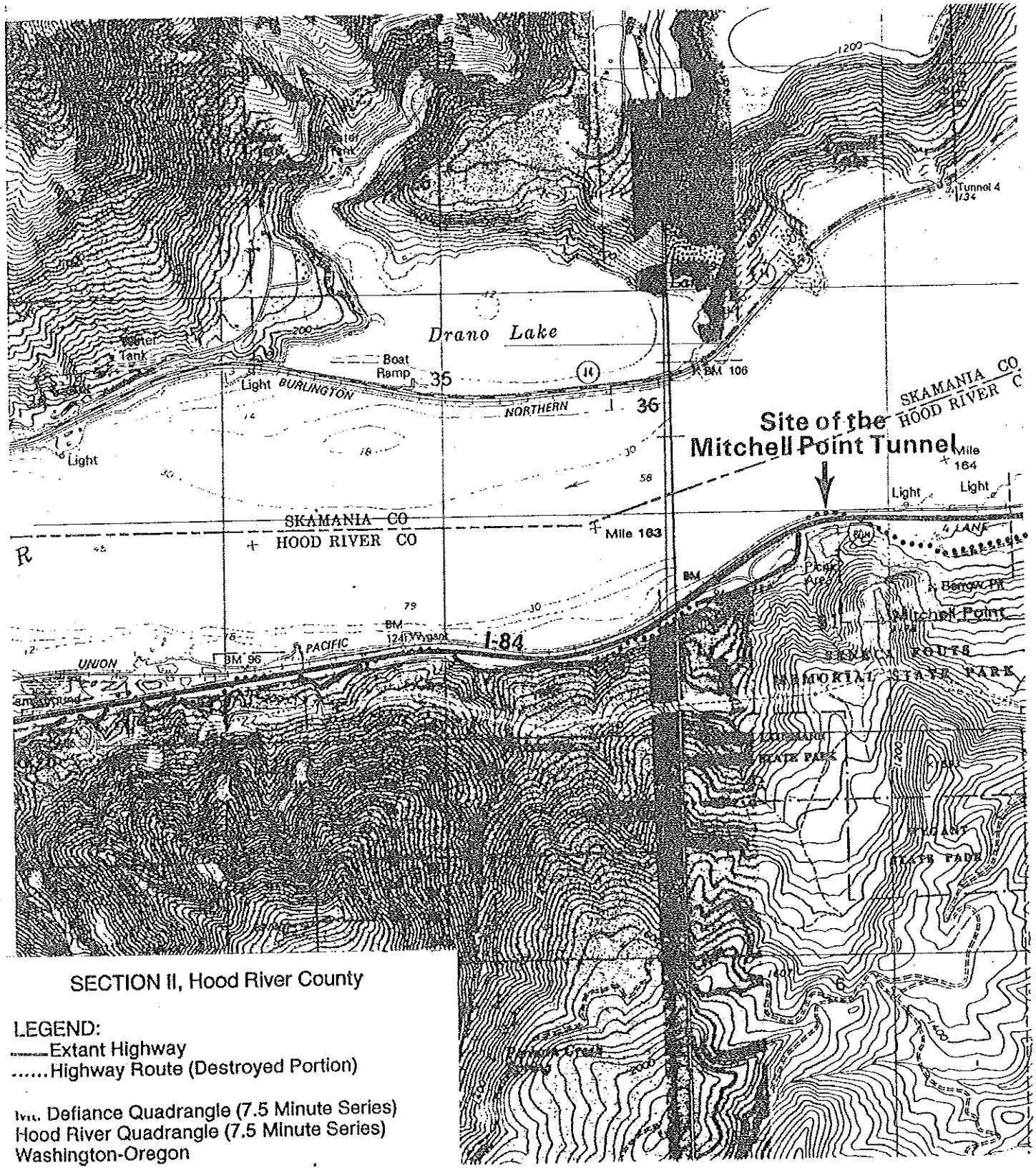
proposals and cost estimates (see attached example pages 34-35 for Mitchell Creek to Mitchell Point Tunnel). Oregon Department of Transportation has submitted to Congress a request for a High Priority Project that, if funded, would include construction of the Mitchell Point Tunnel and parking areas. In addition, the Mitchell Point Enhancement Project currently has funding for construction.

We urge the Council to consider the importance of the Historic Columbia River Highway historic district and potential visual impacts to users of the district during the decision-making process on the Whistling Ridge Energy Project.

Sincerely,

Jeanette B. Kloos
President

MAP 11 of 18
COLUMBIA RIVER HIGHWAY HISTORIC DISTRICT



SECTION II, Hood River County

LEGEND:
_____Extant Highway
.....Highway Route (Destroyed Portion)

Defiance Quadrangle (7.5 Minute Series)
Hood River Quadrangle (7.5 Minute Series)
Washington-Oregon

LENGTH OF TRAIL SECTION:

.7 MILES

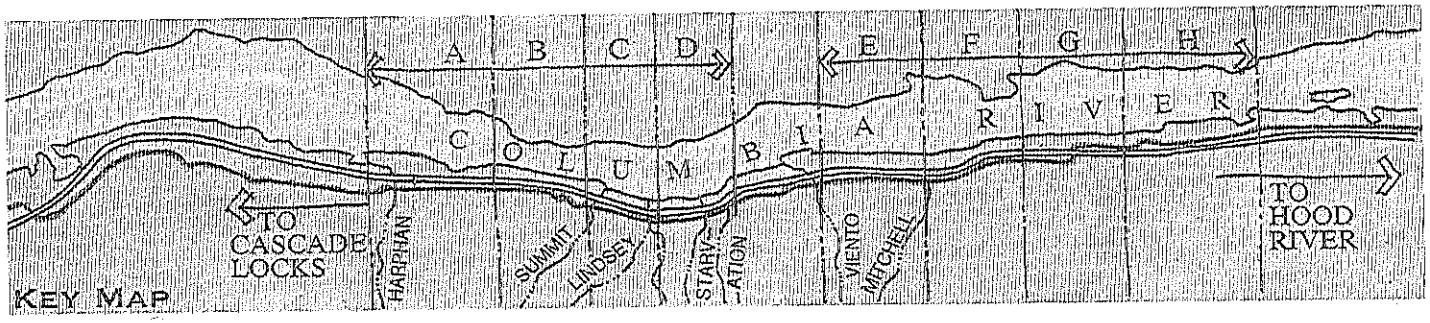
LEVEL OF DIFFICULTY:

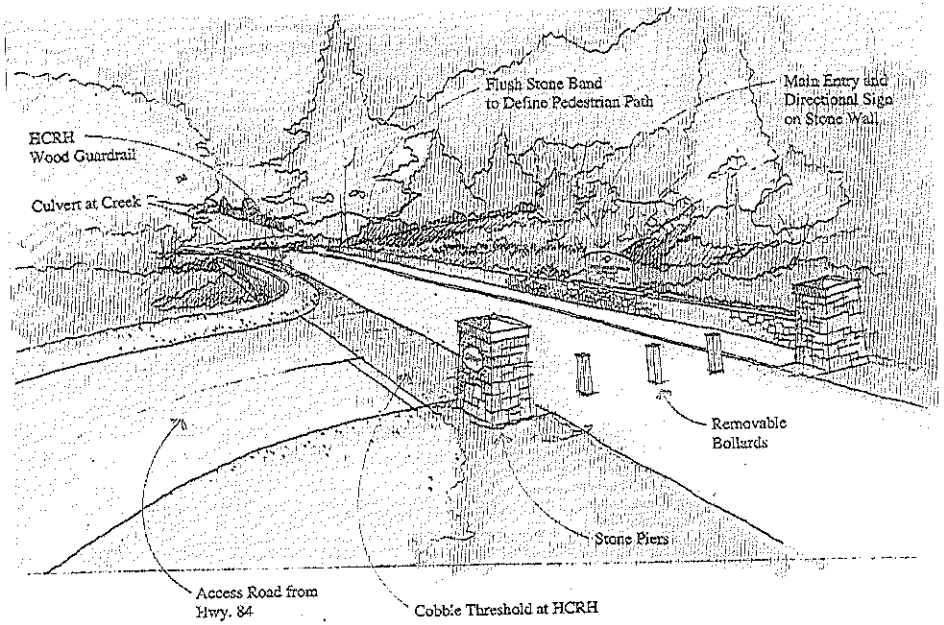
EASY TO MODERATE

SLOPES NOT EXCEEDING 5%

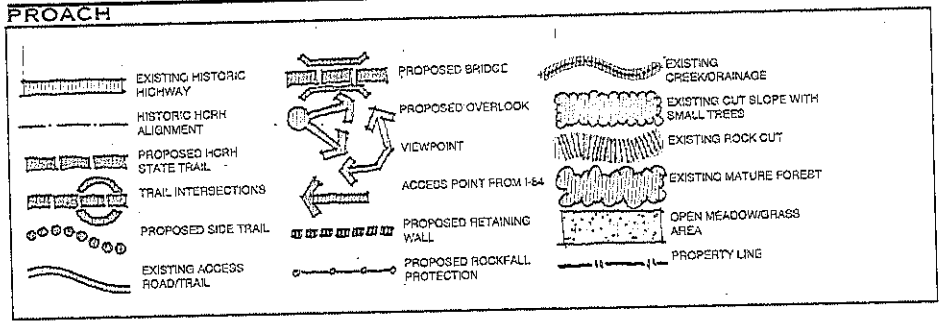
DESCRIPTION:

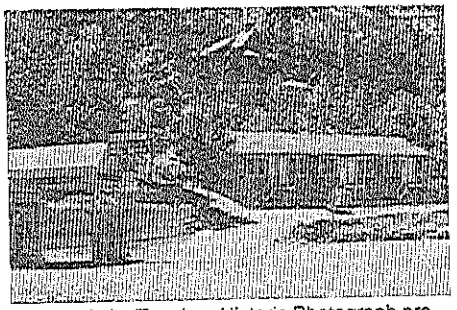
- **Section 420+60 – 526+50:** The section starts at the new bridge crossing Mitchell Creek. In this area, Mitchell Creek was diverted into a new channel when I-84 was constructed. The new channel cut through the Historic Highway, leaving a small piece of intact road on the north side of the creek. A new bridge is proposed to cross Mitchell Creek and reconnect the Historic Highway. A new section of trail will traverse the top of a cut slope created during the construction of I-84. Along this section of trail, the historic Mitchell Creek Channel is visible.
- **Section 526+50 – 444+44:** The next portion of the trail follows an existing section of Historic Highway passing I-84 Exit 58 and running through the Mitchell Point West Trailhead. This section of trail also provides access to the Wygant Trail. New overlooks are proposed north of the parking area to allow better access to viewing the original alignment of the Historic Highway. The existing Historic Highway alignment will be preserved through this area and will be better defined by the redesigned parking area.
- **Section 444+44 – 457+00:** A new 1200 foot tunnel will recreate the passage through Mitchell Point.The tunnel will feature windows carved through its side to allow views of the Columbia River and recall the original Mitchell Point Tunnel, "Tunnel of Many Vistas" that had five windows carved in its side. This Section ends at the East Portal of the Tunnel.



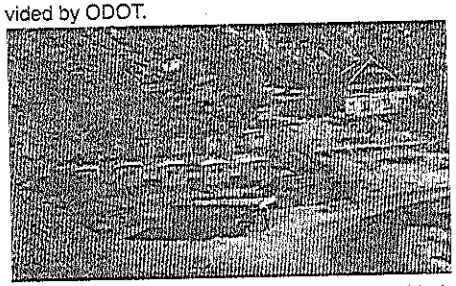


MITCHELL POINT TRAILHEAD APPROACH

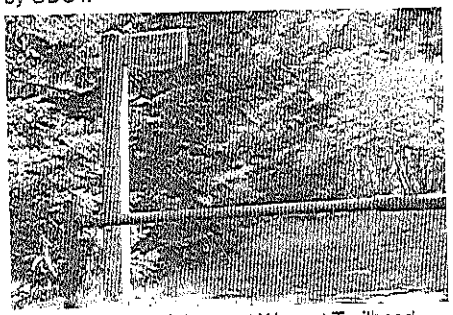




Mitchell Point Tour Inn. Historic Photograph provided by ODOT.



Mitchell Point Villa. Historic Photograph provided by ODOT.



Existing historic highway at Wygant Trailhead.

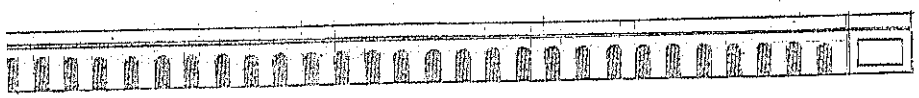
West approach to Mitchell Point Tunnel. Historic Photograph provided by ODOT.

TRAIL SEGMENT HIGHLIGHTS:

- 1,200 foot tunnel.
- Viewpoints at Mitchell Point West.
- Viewpoint at center of viaduct.
- Viewpoint at Mitchell Point East.
- Quarry floor restoration area.
- Peregrine Falcon Habitat.

DESIGN/PERMITTING ISSUES:

- Recreation Intensity Class 2.
- Site visible from several Key Viewing Areas: I-84, Columbia River, Highway 14.
- Mitchell Point potential Native American sacred site.
- Limited site area, constrained by existing topography, creek and roads.
- Conflict with vehicular and bike/hike users.
- Allow for future expanded use if RIC is changed.
- Restore alignment of HCRH, possible location of historic milepost sign.



Whistling Ridge
Public Comment
#181

Michelle, Kayce (UTC)

From: elena efoli [[redacted]@yahoo.com]
Sent: Friday, January 07, 2011 1:22 PM
To: EFSEC (UTC)
Subject: Deny Whistling Ridge Energy Project

Dear Energy Facility Site Evaluation Council,

I am writing to urge the Council to recommend that Governor Gregoire deny the Whistling Ridge Energy Project for the following reasons:

- It's the most controversial and problematic wind energy development ever proposed in Washington State.

- It would permanently convert hundreds of acres of forested land to industrial development.
- The project is proposed within a state-designated "Spotted Owl Special Emphasis Area" where suitable habitat for the recovery of this endangered species must be protected and enhanced. The project would adversely affect many species of birds, including Northern Spotted Owls, listed as endangered in Washington.

Wind energy projects should be an important part of our energy future in Washington, but poorly planned projects like Whistling Ridge should not be allowed to sacrifice our national heritage like the Columbia River Gorge and the Lewis and Clark Trail and state scenic byways like State Route 14.

For these reasons, I urge you to recommend to Governor Gregoire that the Whistling Ridge Project be denied.

Sincerely,
Elena.Efoli

elena efoli
[redacted] Shattuck Way #404
Gresham, OR 97030

Michelle, Kayce (UTC)

From: Francis Zilla [[redacted]@yahoo.com]
Sent: Friday, January 07, 2011 6:10 PM
To: EFSEC (UTC)
Subject: No to Whistling Ridge

To the Energy Facility Site Evaluation Council,

I oppose the Whistling Ridge Energy Project. I am writing to recommend that you deny the project in your recommendations to Governor Gregoire.

The project would contain 50 highly visible turbines along the 2,000-foot elevation ridgeline boundary of the Columbia River Gorge National Scenic Area. Up to 25 of the 50 turbines would be highly visible from key viewing areas of the scenic area and each turbine would be more than 420 feet tall and equipped with blinking lights that would be visible for miles in all directions. These key viewing areas include State Route 14, which is also designated as a state scenic byway.

Whistling Ridge would produce less than 20 megawatts of energy a year, while Washington and Oregon have over 40,000 megawatts of wind energy development potential that can easily meet growing demands without sacrificing our national heritage. Whistling Ridge is simply not worth the cost.

The adverse impacts of the project on one of the most scenic regions in the United States far outweigh the projects minimal benefits. I urge you to recommend denial of the Whistling Ridge Energy Project.
Besides that, the noise is horrendous. The people living in the general area of this project will be devastated. Please don't ruin this part of the Gorge.
Sincerely, Francis Zilla.

Francis Zilla
Box [redacted]
Mt. Hood-Parkdale, OR 97041

Michelle, Kayce (UTC)

From: Heather Henderson [redacted@comcast.net]
Sent: Friday, January 07, 2011 8:18 PM
To: EFSEC (UTC)
Subject: Opposition to Whistling Ridge

Dear Sirs/ Mmes. at the Energy Facility Site Evaluation Council,

I am writing to urge you to deny this potentially disastrous wind project when you send your recommendations to Governor Gregroire.

I am a native Oregonian who has been exploring the Columbia Gorge since I was born in Portland in 1956. I have watched -- and helped with -- continual, exhaustive citizen and agency efforts to protect the scenic beauty and natural resources of the Gorge. It is truly one of the wonders of the world, and I urge you to continue to help protect it by opposing the Whistling Ridge wind turbine project.

The project would contain 50 highly visible turbines along the 2,000-foot elevation ridgeline boundary of the Columbia River Gorge National Scenic Area. Up to 25 of the 50 turbines would be highly visible from key viewing areas of the scenic area and each turbine would be more than 420 feet tall and equipped with blinking lights that would be visible for miles in all directions. These key viewing areas include State Route 14, which is also designated as a state scenic byway.

Whistling Ridge would produce less than 20 megawatts of energy a year, while Washington and Oregon have over 40,000 megawatts of wind energy development potential that can easily meet growing demands without sacrificing our national heritage. Whistling Ridge is simply not worth the cost.

The adverse impacts of the project on one of the most scenic regions in the United States far outweigh the projects minimal benefits. I urge you to recommend denial of the Whistling Ridge Energy Project.

Sincerely,
Heather Henderson
Eugene, Oregon

Heather Henderson
4501 Shadow Wood Dr
Eugene, OR 97405

Michelle, Kayce (UTC)

From: Linda Morningstar [redacted]@gorge.net]
Sent: Friday, January 07, 2011 8:21 PM
To: EFSEC (UTC)
Subject: Whistling Ridge

I was unable to attend the public hearing at Rock Creek Center this last Thursday, January 6 but wanted to voice my opinion about the Whistling Ridge Energy Project. I support Whistling Ridge because it will create jobs and bring in needed tax revenues. It lies completely outside the National Scenic Area and visual impacts were found to be insignificant. Wildlife populations will not be affected by the project. We need more alternative energy sources, and Whistling Ridge is a great place to start!

Linda and Gary Morningstar

Whistling Ridge
Public Comment
#185

Michelle, Kayce (UTC)

From: Kevin Head [redacted]@ekit.com]
Sent: Friday, January 07, 2011 9:34 PM
To: EFSEC (UTC)
Subject: Deny Whistling Ridge Energy Project

Dear Energy Facility Site Evaluation Council, I supported I-937. I was the seventh highest signiture in the state and went around to every corner of the state to get our state alternative energy. So with that in mind:

I am writing to urge the Council to recommend that Governor Gregoire deny the Whistling Ridge Energy Project for the following reasons:

- It's the most controversial and problematic wind energy development ever proposed in Washington State. I protested Enron's wind project in the early 90's also.

- It would permanently convert hundreds of acres of forested land to industrial development.
- The project is proposed within a state-designated "Spotted Owl Special Emphasis Area" where suitable habitat for the recovery of this endangered species must be protected and enhanced. The project would adversely affect many species of birds, including Northern Spotted Owls, listed as endangered in Washington.

Wind energy projects should be an important part of our energy future in Washington, but poorly planned projects like Whistling Ridge should not be allowed to sacrifice our national heritage like the Columbia River Gorge and the Lewis and Clark Trail and state scenic byways like State Route 14.

For these reasons, I urge you to recommend to Governor Gregoire that the Whistling Ridge Project be denied.

Sincerely,

Kevin Head
[redacted] 38th Ave NE
OLYMPIA, WA 98506

Michelle, Kayce (UTC)

From: Charles Crosman [[redacted]@gmail.com]
Sent: Saturday, January 08, 2011 12:50 AM
To: EFSEC (UTC)
Subject: Re: my comment on Whistler Ridge Energy LLC

On NO level am I in favor of the Whistling Ridge Energy LLC moving forward and being approved.

Signed sincerely,
Charles Crosman
White Salmon resident

Whistling Ridge
Public Comment
#187

Michelle, Kayce (UTC)

From: [redacted]@hotmail.com
Sent: Saturday, January 08, 2011 12:38 PM
To: EFSEC (UTC)
Subject: I support Whistling Ridge

Hello Energy Facility Site Evaluation Council,

I am in support of the Whistling Ridge Energy Project for both environmental and economic reasons. Wind energy is clean and sustainable and this project will bring much needed jobs to the local community.

Sincerely,
Barbara Saulie
[redacted] SW Cherry Blossom
White Salmon, WA 98672

Michelle, Kayce (UTC)

From: repar [[redacted]@saw.net]
Sent: Saturday, January 08, 2011 12:41 PM
To: EFSEC (UTC)
Subject: Whistling Ridge--Comments--Repar
Attachments: Surplus energy_NWEC_Draft_2011-01_Attachment 1.pdf; False and misleading wind claims_Attachment 2_06Jan2011.docx; Insidious Renewable Electricity Standard_Attachment 4_06Jan2010.docx; The True Cost of Electricity from Wind Power_Schleede_Attachment 3.docx; Schleede-High-Cost-Low-Value-Electricity-from-Wind_Attachment 3a_06Jan2011.pdf; Neighbors of wind cash out_02Jan2011_Attach. 2a.tif; Comments_Whistling Ridge_ 05Jan2011.doc

Dear EFSEC,
Attached, please find my comments for Whistling Ridge. Thank you. I will be submitting more comment by the January 15th deadline.

Regards,

Mary J. Repar
[redacted]E. Loop Rd.[redacted]
Stevenson, WA 98648
Tel: 509.427.[redacted]
E-mail: [redacted]@saw.net
"Life is not measured by the number of breaths we take but by the moments that take our breath away."

The Effects of an Increasing Surplus of Energy Generating Capability in the Pacific Northwest

DRAFT

Council Document 2011-01

SUMMARY

The Northwest is experiencing an increasing surplus[1] of energy generating capability. Because the resources contributing to the surplus consist largely of low variable-cost resources like wind, which must operate to provide qualifying energy for state renewable portfolio standards (RPS), the surplus will tend to reduce average electricity market prices and increase the frequency and severity of excess energy events.[2] Stagnant and declining loads due to the economic recession have contributed to the surplus in the near-term. Over the longer term, resource development to meet Northwest state RPS, and the development of Northwest resources to serve the California RPS, are the principal contributors to this surplus.

While loads are expected to recover over the next several years, RPS resource development is expected to continue in advance of load growth until the ultimate Northwest RPS targets are met in 2020 through 2025. The extent of additional Northwest wind power development to serve the California RPS will depend on currently unresolved California RPS policy and the availability and cost of competing resources, especially solar. Retiring Boardman and other thermal units could offset the tendency of the surplus to reduce average market prices, but it is unlikely to significantly affect the frequency and severity of excess energy events and accompanying low or negative energy prices.

[1] Throughout this paper, the term "surplus" is used to refer to the growth of energy generating capacity in excess of reliability requirements.

[2] The term "excess energy events" refers to periods of high water, low loads, and high wind that can lead to difficulty in maintaining acceptable levels of dissolved gas.

Concerns regarding the use of unbundled renewable energy credits (RECs[3]) from Northwest wind projects to serve California RPS led to inclusion of Action GEN-10b in the Sixth Northwest Conservation and Electric Power Plan. Action GEN-10b calls for the Council to assess the potential extent of the future unbundled REC market, the resulting benefits and costs, and actions needed to remedy significant impacts. This paper describes a forecast of the effects of RPS resource development on the frequency of excess energy events, and on market prices and resource value. The paper also identifies measures that could help resolve issues stemming from the growing surplus. The focus is on longer-term strategic measures rather than shorter-term system operational measures. The latter are discussed in the Bonneville Power Administration (BPA) Columbia River high water operations paper.[4]

The analyses of this paper were carried out using an economic model of the power system with a simplified representation of hydropower system operation. The results should be viewed as relative, rather than as an absolute indication of frequency and magnitude. The Council's Resource Adequacy Forum is working with the Pacific Northwest Utilities Conference Committee (PNUCC), BPA, and Northwest utilities on a more refined analysis of the operational effects of increased wind power penetration.

The principal findings of this assessment are the following:

- Development of resources to serve Northwest state RPS tends to increase the frequency of excess energy events and accompanying low electricity market prices, until final RPS targets are met. After meeting the final RPS penetration targets, in the early to mid-2020s, the frequency of excess energy events is expected to slowly decline.

- Additional wind development for export of unbundled RECs is likely to further increase the frequency of excess energy events.

- The probability of excess energy events increases during good water years and declines during poor water years. This analysis also suggests that the severity of excess energy events is less sensitive to moderate variation around average water conditions. As demonstrated in June 2010, unusual runoff patterns can create excess energy conditions even in average water years.

- Aggressive RPS targets and financial incentives tend to result in the growth rate of RPS-qualifying energy production exceeding load growth. This will drive down the average market price of non-RPS qualifying electricity.

- The average impact of depressed market prices on the energy value of Northwest generating capacity will be moderate, but the value of hydropower will be disproportionally reduced.

---

[3] Renewable energy credits (RECs) represent the environmental and renewable attributes of renewable energy production. RECs can be transacted as "fully bundled" (delivered with the associated energy), "partially bundled" (the associated energy can be delivered within a specified time), or "fully unbundled" (marketed separately from the associated energy). As states, particularly California, move toward more aggressive and challenging renewable portfolio standards, interest in meeting RPS requirements with partially or fully unbundled RECs has increased.

[4] Bonneville Power Administration. *Columbia River high water operations (June 1-14 2010).* September 2010

- Measures are available to reduce the frequency of excess energy events, to alleviate the economic and operational issues associated with excess energy events, to reduce energy market impacts, and to more productively use available low-cost, low-carbon energy. Policy-related measures are generally low-cost and quickly effective, but may be politically difficult to implement. Structural measures tend to be capital-intensive, of limited effectiveness, and slow to implement.

BACKGROUND

Historically, the combination of high springtime runoff and low electrical loads has led to episodes of excess energy in the Pacific Northwest. Typically, these episodes occur during the spring runoff when loads are low and total dissolved gas water quality standards constrain spill, thereby limiting the ability to reduce hydropower generation levels.

The dissolved gas content of stream flow is naturally increased by entrainment of air as water passes through rapids and over waterfalls. Gas entrainment also occurs at spillways at the Columbia and Snake rivers and some tributary dams as water plunges over the spillway into the stilling basins. At high levels, dissolved gas can be harmful for fish and other aquatic life by causing gas bubble trauma; so voluntary spill is limited by gas super saturation "gas caps" required under the federal Clean Water Act.

Hydro-rich utilities have aggressively marketed surplus hydropower during high runoff periods by offering power at low prices, making it attractive for thermal plant operators to curtail operation to save fuel costs and substitute hydropower to serve their loads. Because the dispatch cost of even the lowest cost thermal resources is $10 - $20 per megawatt hour, single-digit hydropower offers have been sufficient to displace thermal generation both in the Northwest and in California. Load would shift to hydropower, thus minimizing involuntary spill.

Large-scale wind development adds a new variable to this equation. Wind operators receive value in the form of renewable energy credits (REC) for producing qualifying energy. Variable (production-related) financial incentives and RECs lower the cost of wind plant operation to negative values. Published data is sketchy, but the market value of renewable energy credits appears to be $20 to $35 per megawatt-hour (MWh). In addition, many wind projects receive the federal renewable production tax credit, currently about $22 per MWh.[5] Though wind projects typically have a small positive variable operating cost, the RPS value and the production tax credit, if present, can create a negative variable cost, -$15/MWh, or less. Owners of PURPA Qualifying Facilities may see even greater losses from curtailment, up to the avoided cost of new generating facilities. These are economic disincentives for wind project operators to curtail operation in favor of hydropower during excess energy events, resulting in a potential conflict with total dissolved gas standards.

[5] Not all renewable energy projects receive the production tax credit. The amount of credit varies by type of resource and has a limited life. Moreover, most owners of projects completed in 2009 and 2010 are reported to have taken the option of converting to the federal business energy investment tax credit or U.S. Treasury grant as provided in the American Recovery and Reinvestment Act of 2009.

EFFECTS OF AN ENERGY SURPLUS

Large-scale wind development in the Northwest has been driven by state renewable portfolio standards (RPS) and various federal and state financial incentives. Twenty-seven states, including Montana, Oregon, Washington, and California, have adopted renewable portfolio standards, which mandate that a specified percentage of retail sales be met using electricity from certain qualifying sources. These sources may include various renewable energy resources, new technologies and in several states, energy efficiency. Because the objective is to encourage development of new capacity, energy from existing renewable resources, including hydropower, is largely excluded. Penetration targets vary by the type and size of utility, and increase by prescribed schedule until ultimate penetration levels are achieved.[6] Penetration levels remain constant thereafter as a percentage of loads. The purpose of RPS and the various financial incentives include reducing carbon dioxide production and other environmental impacts of electricity production, commercializing new technologies, job creation, and energy security.

Several characteristics of RPS resource development tend to lower energy market prices. First, RPS resources have, and at expected rates of load growth, are likely to continue to be developed in advance of load growth until the final RPS targets are achieved. Second, RPS resources must operate to produce the qualifying energy. Finally, the variable costs of resource operation are typically low. Developing renewable energy to export unbundled RECs will further depress energy prices since the associated energy enters the Northwest market. This can lead to the loss of revenue on the part of utilities holding an abundance of non-RPS resources. Resource-short utilities, on the other hand, may benefit from lower market prices.

Adding low variable-cost resources in advance of load growth can lead to an increasing frequency of excess energy events. Excess energy events are manifested by low market prices, as asking prices are lowered in an effort to market the excess. Periods of low market prices, indicating the availability of large amounts of energy relative to load, occur during nearly every spring runoff period. As shown in Figure 1, episodes of zero or negative market prices have occurred in six of the past 11 runoff periods, and appear to be increasing in frequency in recent years. Though the increased frequency of zero or negative price episodes corresponds with the rapid growth in Northwest wind capacity, other factors are at play, including water conditions, runoff patterns and, since 2008, declining loads due to the economic recession.

[6] The ultimate penetration targets for Montana and the west coast states are as follows: California - 33% by 2020, Montana - 15% by 2015, Oregon - 25% by 2025 and Washington - 20% by 2020. RPS provisions are complex and vary by state. Detailed information concerning the RPS of individual states is provided in the Database of State Incentives for Renewables and Efficiency (DSIRE), www.dsireusa.org.

Figure 1: Mid-Columbia daily low off-peak prices - 2000-2010

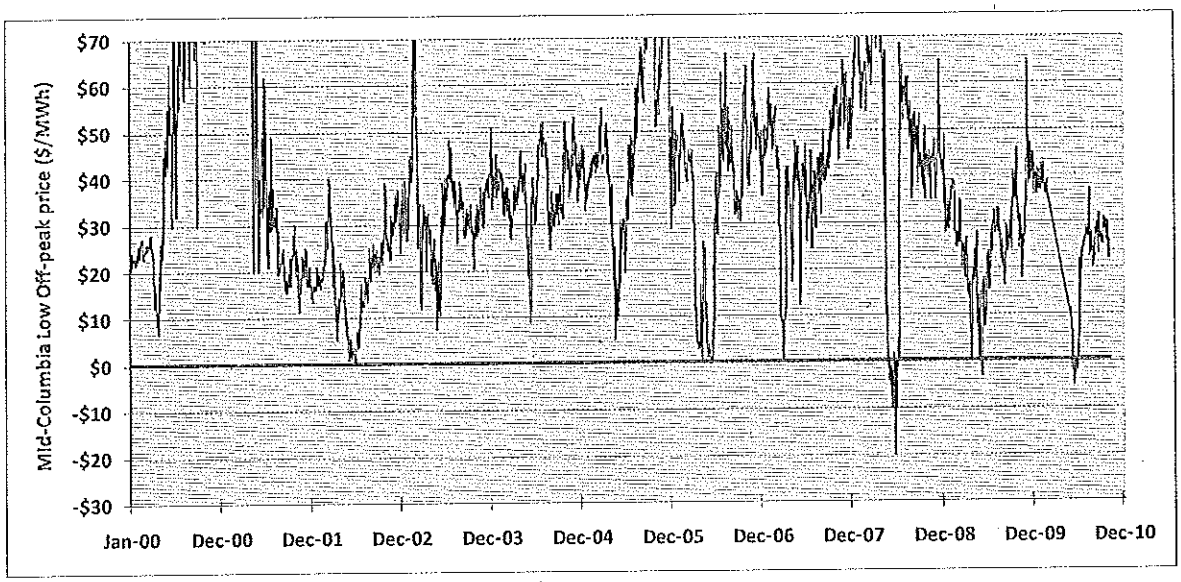


Figure 2 provides a closer look at the June 2010 episode. Bonneville balancing authority loads and resources are plotted on the left axis for the first half of June 2010. Bonneville load, consisting of native load plus exports net of imports is shown as the shaded area. Load varied between 8,300 and 18,100 megawatts in the typical daily pattern and increased slowly through the period as the warm season advanced. Wind output (green) varied from zero to 2,650 MW in response to the periodic storm fronts typical of spring. Hydropower (blue) followed load net of wind. Hydropower generation increased, on average, through the first two thirds of the period as runoff increased. Thermal generation (red) was operating at low levels at the beginning of the period, and was reduced to minimum operating levels as runoff increased and dissolved gas levels restricted spill.[7] Slow-response thermal units, such as the Columbia Generating Station, remained in service at minimum power because of the need to be able to serve loads resulting from any unexpected warm spell.

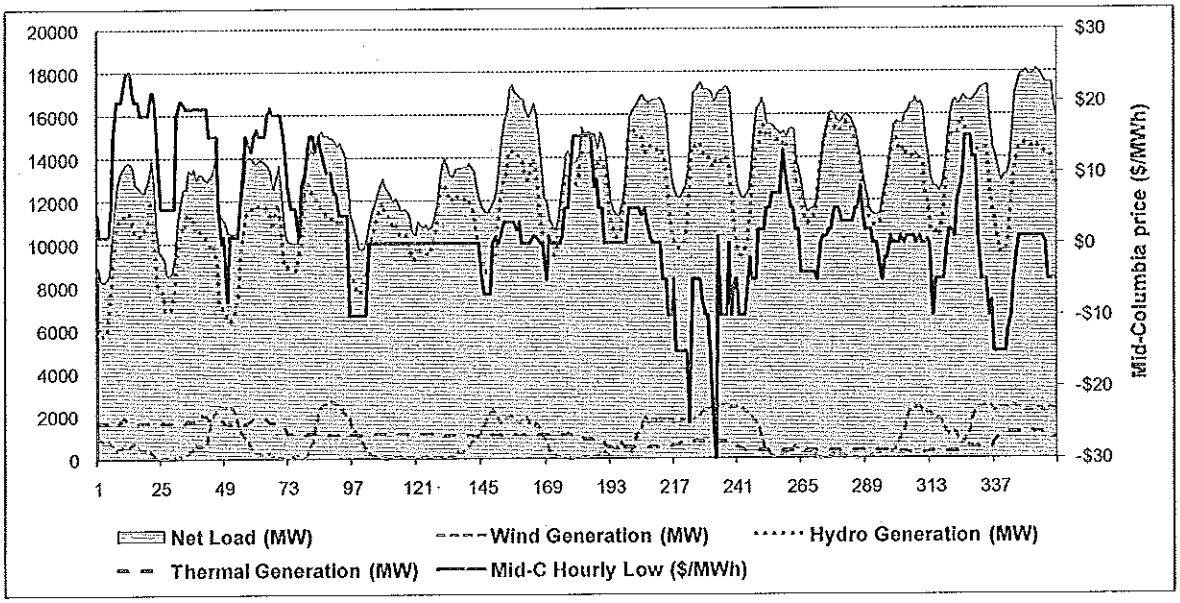
Mid-Columbia market prices are plotted on the right axis. Note that the zero point of the right axis lies halfway up the axis. Most of the negative price excursions coincide with low load, low hydro, and high wind hours. Exceptions appear, including the extreme low of -$30 during hour 233.[8] This low, while coinciding with high wind output, also coincides with the daily peak load and high hydro output. Finally, it should be noted that zero or negative prices did occur during some hours of low wind activity, for example, hours 265 through 272, and 292 through 297.

An extensive discussion of the June 2010 episode is provided in BPA's Columbia River high water operations paper.

[7] During the period of minimum thermal operation, only 3% to 8% of the 7,500 MW of thermal generation interconnected to the BPA balancing area was operating.

[8] The negative Mid-Columbia spot prices shown in Figure 2 did not result from BPA trading activity. BPA states in *Columbia River high-water operations* that at no point during June 2010 did it offer to sell power at negative prices.

Figure 2: BPA balancing authority loads and resources and Mid-Columbia market prices: June 1 - 15, 2010



FORECAST EFFECTS OF A GROWING SURPLUS OF LOW VARIABLE COST RESOURCES

The frequency of excess energy events, and resulting effects on wholesale energy prices and resource values were forecast for three cases of future resource development:

Frozen RPS: This case assumes no further development of qualifying resources to meet the RPS obligations of Northwest utilities, or for the purpose of supplying RECs to meet California RPS, beyond currently committed resources. Some committed resource development continues through 2012.

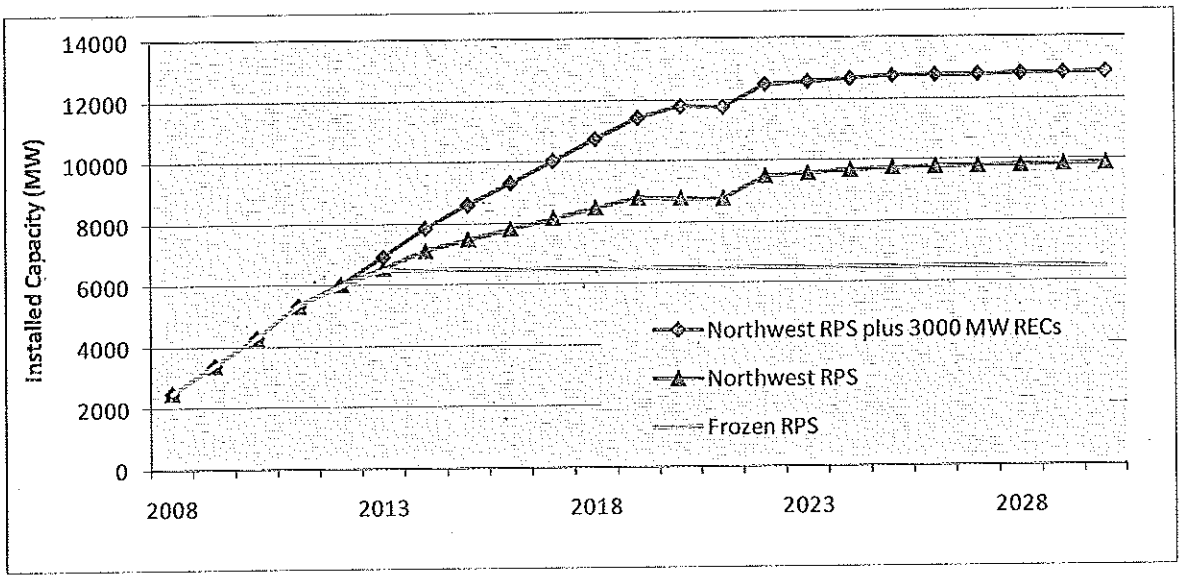
Northwest RPS: This case assumes continued development of a mix of qualifying resources as needed to meet the RPS obligations of Northwest utilities, but no additional development of wind power for the purpose of supplying RECs to meet California RPS. Adding new capacity to meet Northwest RPS begins in 2013 and continues through the end of the forecast period.

Northwest RPS plus 3000 REC: This case assumes continued development of a mix of qualifying resources as needed to fully meet the RPS obligations of Northwest utilities, plus development of an additional 3,000 MW of wind capacity for export to California in the form of unbundled RECs. The capacity to serve California is developed at the rate of 375 MW per year from 2013 through 2020.

Figure 3 illustrates the build-out of Northwest wind capacity for the three cases. The peak penetration of wind capacity as a percentage of Northwest peak hourly load for the three cases is

as follows: *Frozen RPS*: 20 percent; *Northwest RPS*: 29 percent; *Northwest RPS plus 3000 REC*: 38 percent.

Figure 3: Build-out of Northwest wind capacity for the three cases

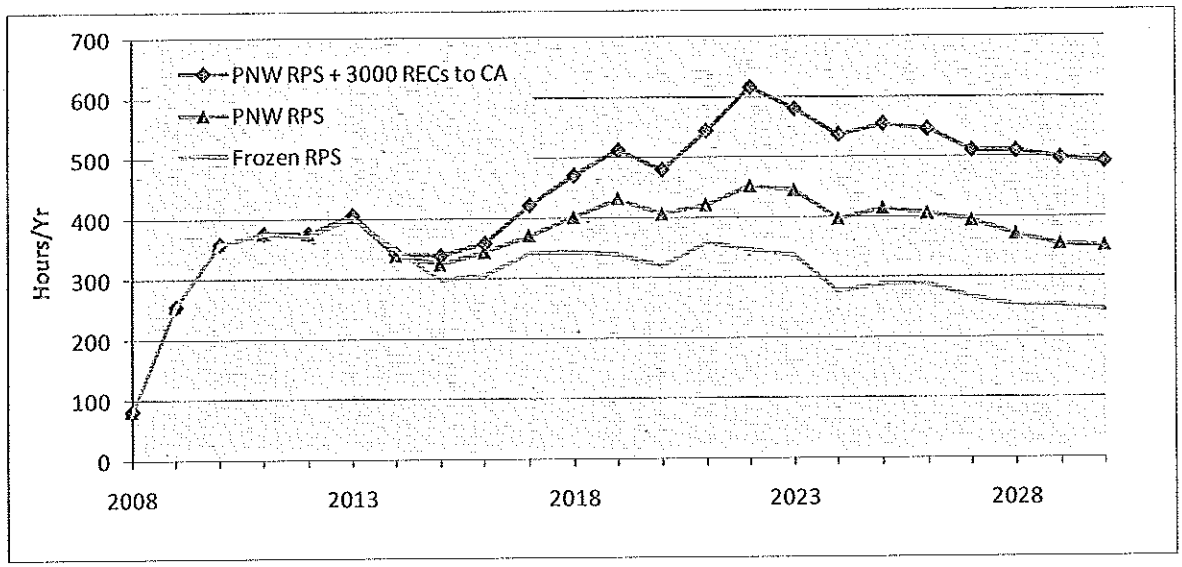


The analysis was performed using the AURORA^{xmp}™ Electric Market Model, using the input data, capacity expansion schedules and principal assumptions of the final wholesale power price forecast of the Sixth Power Plan. Key assumptions included average water conditions, the Council's medium case forecast of natural gas prices, the Council's mean value CO_2 allowance cost trajectory, the energy efficiency targets of the Sixth Power Plan, and the capacity forecast (absent RPS resources in the *Frozen RPS* case) used for the final wholesale power price forecast of the Sixth Power Plan. This capacity forecast includes retiring Boardman and several other coal and older natural gas combined-cycle units between 2016 and 2022.

Frequency of Excess Energy Events

Annual hours during which regulated Pacific Northwest hydropower output is at or below minimum levels was used as an index of the expected frequency of excess energy events. The forecast annual frequency of excess energy events is shown in Figure 4 for the three cases.

Figure 4: Forecast annual hours of excess energy



Regional load growth and resource additions through 2012 are the same for all cases, hence the frequency of excess energy events is identical through 2012. In all cases, the frequency of potential excess energy events grows rapidly from 2008 through 2010, and then continues at a slower rate through 2013. The rapid expansion of wind capacity and stagnant load growth extends from 2008 through 2010. Committed wind development declines in 2011 and 2012 and loads are forecast to recover from the recession. These factors probably lead to the declining rate of increase of excess energy events from 2010 through 2013. Declines continue in 2014, the likely result of load growth exceeding the relatively modest resource additions for this year.

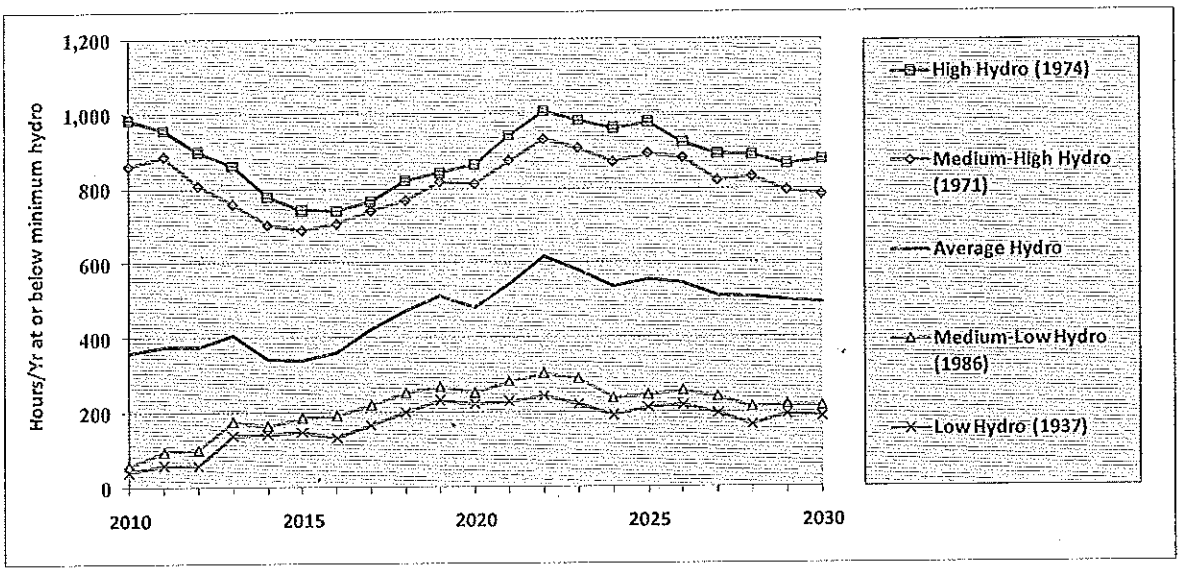
The resource mix of the cases diverges in 2015, as do the frequency of excess energy events. In the *Frozen RPS* case, excess energy events decline through the remainder of the forecast period. This is expected, since new firm resources are added only as needed to accommodate load growth, variable wind and hydropower represent a diminishing share of all capacity, and the production tax credits expire for individual plants following 10 years of operation[9]. Wind penetration continues to increase through 2025 in the *Northwest RPS* case. Excess energy events peak in 2022 at 26 percent greater frequency than 2010. Thereafter, the frequency of excess energy events declines as RPS targets are achieved, wind penetration is held constant, and hydropower penetration declines as a percentage of load. The *Northwest RPS plus 3000 REC* case follows a similar pattern but with a more rapid increase, peaking in 2022 at a 72 percent increase over 2010 levels.

The probability of excess energy events should be lower during poor water years and higher in good water years. Sensitivity to water conditions was tested for the *Northwest RPS plus 3000 RECs* case with a range of historical water years from low to high water conditions. Years with seasonal profiles representing the average were selected. The effect on expected instances of excess energy is shown in Figure 5. As expected, the frequency of excess energy events declines

[9] The availability of production tax credits for new plants are assumed to expire as currently scheduled.

during poor water years and increases during years of abundant water. Modeling results not shown in Figure 5 suggest that the frequency of excess energy events is less sensitive to mid-range water conditions, though more testing is required to confirm this observation.

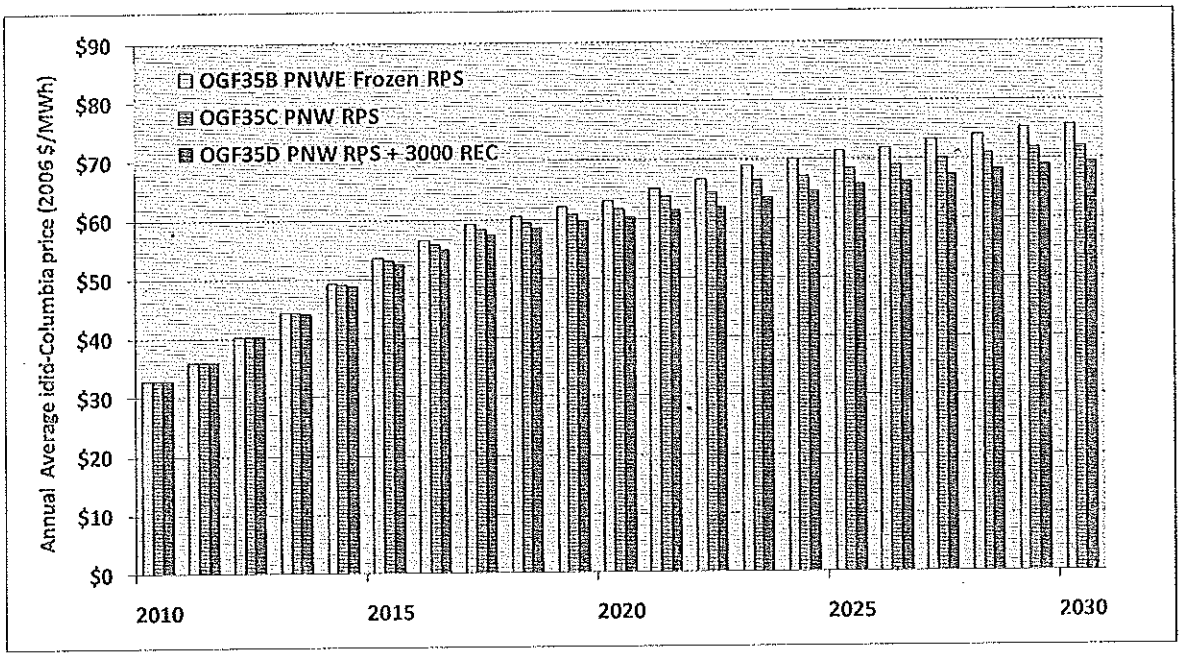
Figure 5: Frequency of excess energy hours under a range of water conditions



Market Price Effects

Forecast average annual Mid-Columbia prices, in constant 2006 dollars, are shown in Figure 6 for the three cases. The overall shape of the forecast is consistent with the electricity price forecast of the Sixth Power Plan. Prices rise fairly rapidly through 2017 as loads recover from the economic recession, natural gas prices rise, and CO_2 allowance costs phase in. Price increases flatten thereafter as the rate of increase of CO_2 allowance costs declines. Prices are further flattened following 2013 for the two cases involving the addition of new resources in excess of load growth. By 2020, the average annual average price in the *Northwest RPS* case is 2 percent below the price of the *Frozen RPS* case and the annual average price for the *Northwest RPS + 3000 REC* case is 4 percent below the *Frozen RPS* case. By 2030, the differences have grown to 5 percent and 8 percent, respectively.

Figure 6: Forecast average annual Mid-Columbia spot prices



The energy value of a resource is the difference between energy revenue and the variable cost of resource operation. As shown in Figure 7, there is little difference in the forecast energy value for the aggregate of Northwest resources among the three cases. Lower market prices in the *Northwest RPS* and *Northwest RPS plus 3000 REC* cases appear to be offset by the added volume of low-cost electricity from the additional capacity present in these cases.

The energy value of hydropower, however, is reduced by the additional resource development of the *PNW RPS* and *PNW RPS plus 3000 REC* case, as shown in Figure 8. Though some additional energy is assumed to come from upgrades to existing hydropower resources and new hydropower additions, the volume of additional hydro energy is insufficient to offset reduced energy market prices. Because the frequency of low prices increases during the spring runoff when large quantities of surplus hydropower are typically marketed, the value of hydropower is more sensitive to surplus energy events.

Figure 7: Energy value of all Northwest resources

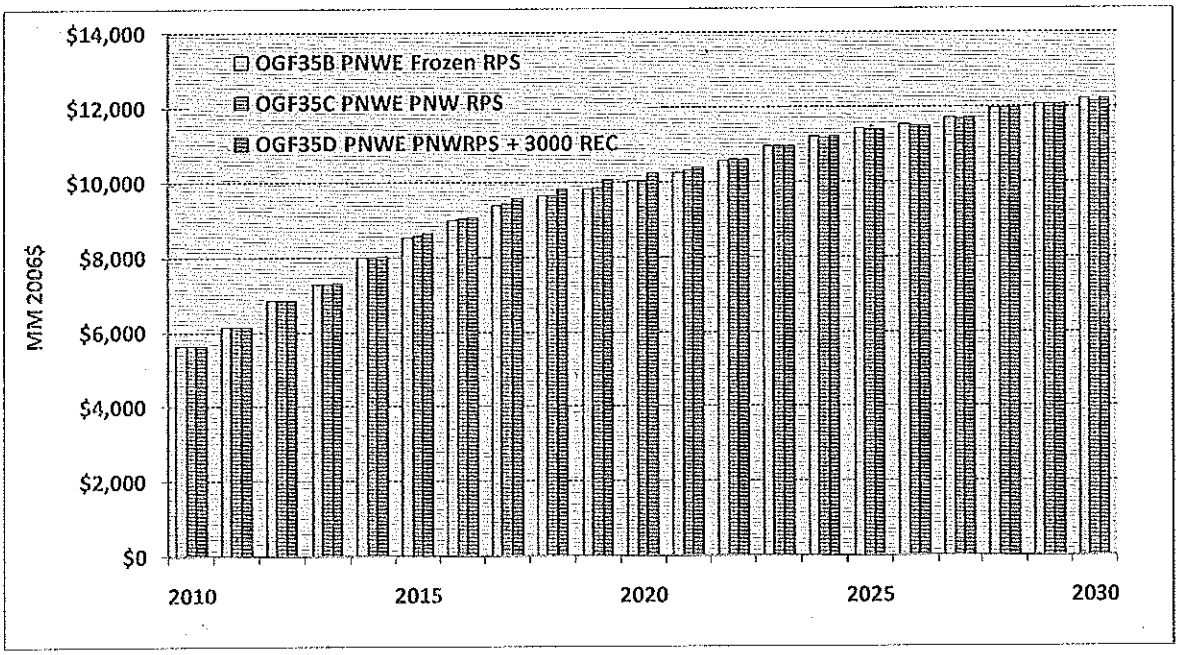
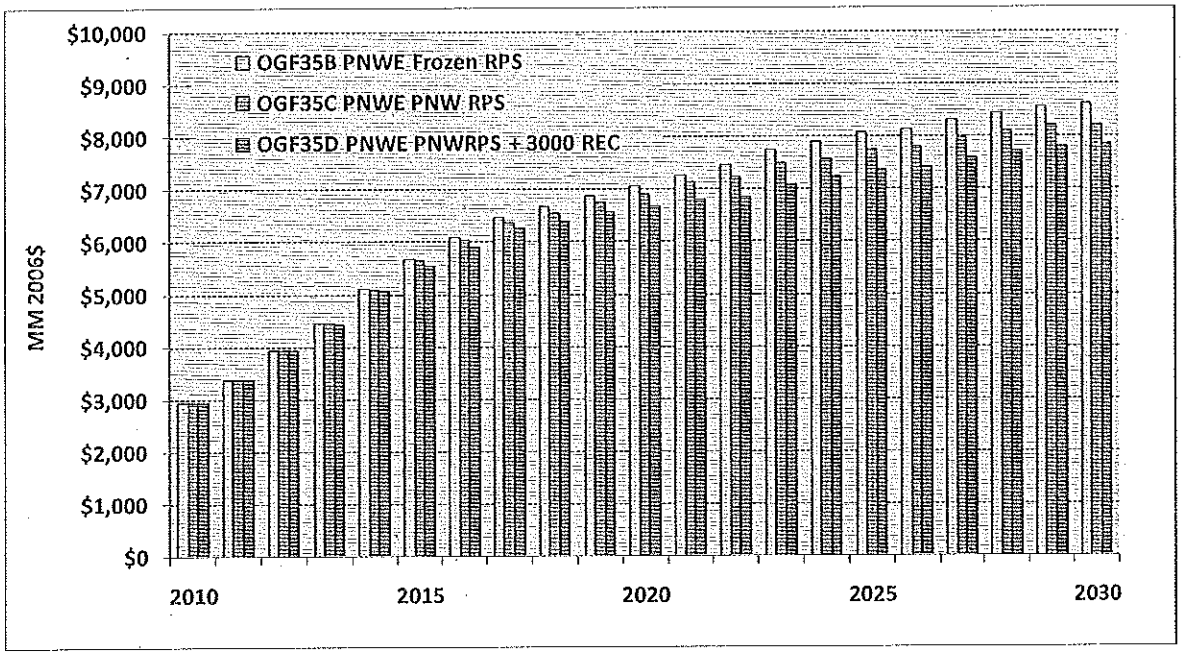


Figure 8: Energy value of Northwest hydropower resources



Not shown in Figures 7 and 8 is the capacity value of hydropower and other firm resources. The bilateral capacity transactions typical for the Northwest limit the ability to capture resource capacity value. It is likely that the capacity value of firm and flexible resources, including hydropower, will become increasingly significant as the penetration of non-firm resources and

resources needing balancing reserves increases. A liquid capacity market would facilitate capture of resource capacity value.

MITIGATING MEASURES

This section introduces measures that could help mitigate the issues presented by a growing energy surplus. These are not analyzed in depth, nor are they exhaustive. Short-term operational actions described in the Bonneville paper *Columbia River high water operations* are not included. The intent is to identify actions deserving further investigation.

Numerous actions are available to alleviate the economic and operational issues associated with excess energy events, to reduce energy market impacts, and to more productively use available low-cost, low-carbon energy. In terms of effects, these actions generally fall into the following categories: curtailing wind output during excess energy events, reducing wind output peaks, reducing hydro output peaks, increasing loads during excess energy events, augmenting energy dump capability, and reducing thermal output during excess energy events. No one action is a panacea and the cost, time to implement, and feasibility varies widely. In terms of feasibility, the actions can be broadly classified as policy-related and structural. Policy-related actions include those such as amending state RPS to allow credit for hydropower substituted for curtailed wind. Policy-related actions can in theory be quickly implemented at relatively low cost, however they may encounter political resistance. Structural measures, on the other hand, such as expanding intertie capacity, are generally slow to implement and costly. Moreover, few of the structural measures, as individual actions, would contribute significantly to resolving the issues associated with surplus energy.

Measures Facilitating Displacement of Wind during Excess Energy Events

Bonneville has stated[10] that it will not pay purchasers to take federal hydropower and that it will curtail the operation of other resources, if necessary, to maintain system reliability and avoid violating environmental standards during excess energy events. Because of the complexity of circumstances associated with excess energy events, the variety of operational measures available to help resolve the conflict between hydropower and wind generation, and the prospect of economic loss to wind operators, it is prudent for Bonneville, or any other balancing authority (BA) asserting this policy, to clearly identify the conditions under which it will curtail, and the actions it will take prior to curtailment. In fact, Bonneville has proposed to do this. This policy, however, does not resolve the economic concerns associated with this matter, since curtailments will not leave wind operators economically whole, unless their power sales agreements are negotiated with an expectation of occasional curtailment. Several options for reducing the financial disincentive for wind plant operators to curtail operation during over-generation events are available. These include crediting substitute hydropower as a RPS and PTC qualifying resource; substituting fixed payment for variable payment incentives and compensating wind operators for curtailment losses.

[10] Bonneville Power Administration. *Statement on Environmental Redispatch and Negative Pricing.* December 3, 2010.

Qualify substitute hydropower as a RPS/PTC resource: Wind operators receive value in the form of RECs for producing qualifying RPS energy. Many also receive revenues from the federal production tax credit. Because these revenues are a function of energy production, the net variable cost of operation is negative. If the wind plant owner received an equivalent production tax credit and RPS credit during defined conditions under which hydropower was substituted for wind power to maintain environmental requirements, wind power would then carry a slight positive variable cost. If the resulting variable cost of wind were higher than the variable cost of hydropower, wind operators would curtail in advance of hydro. Because the "true" variable cost of wind plant operation is low, it may also be necessary to levy a portion of its integration costs as variable to ensure that the dispatch cost of wind is higher than that of hydro. Reducing costs associated with displacing wind would help alleviate excess energy events and reduce downward pressure on market prices while potentially reducing dissolved gas problems. The efficacy of this action may be limited by existing wind power purchase contracts prohibiting substitute energy, and by PURPA contracts.

Implementing this concept would require changes to federal production tax credit statutes and to California, Oregon, and Washington RPS statutes. Though in theory these changes could be enacted quickly, the political challenges of re-opening incentive legislation may make it difficult to quickly implement these changes.

Substitute fixed for variable financial incentives: Many early renewable resource incentives were fixed, including front-end grants and investment tax credits. Because some of the resulting projects performed poorly, and to encourage plant owners to maximize energy production, fixed incentives were largely abandoned for the production tax credit, a variable payment based on energy production. State renewable portfolio standards also create variable incentives, since the premium paid for qualifying energy is based on energy production. Some fixed incentives remain, such as the sales tax credit that Washington provides for certain renewable energy equipment, the federal investment tax credits for solar and certain other renewable energy projects, the Oregon business energy tax credit, Energy Trust of Oregon grants, and federal construction loan guarantees. Moreover, Section 1603 of the American Recovery and Reinvestment Act (ARRA) of 2009 allows wind project developers to forego tax credits for an up-front grant equal to 30 percent of the capital investment. Projects completed during 2009 and 2010, or under construction as of the end of 2010 are currently eligible for this grant.[11] The grant option has been very popular and extension would likely result in the majority of new projects opting for the grant. Extending the grant option, combined with the gradual expiration of the production tax credit for existing projects could, over time, eliminate the production tax credit as a negative price signal.

Compensate wind plant owners for losses due to curtailment: A balancing authority could compensate wind operators for losses from curtailment; however, revenue to cover the cost of compensation would have to be secured. One approach is for the balancing authority to secure an inventory of curtailment options to cover anticipated curtailment needs. Revenues to finance acquiring the options could be rolled into wind integration costs. This approach would leave

[11] The Tax Relief, Unemployment Insurance Reauthorization and Job Creation Act of 2010 extended the eligibility to December 31, 2011.

individual wind plant owners economically whole by spreading the cost of lost incentives among all wind plants. The cost to wind plant owners could then be passed to wind energy customers.

Measures Reducing Wind Output Peaks

The average annual capacity factor of Columbia Basin wind projects is approximately 28 to 32 percent. The relatively low capacity factor of wind power leads to peak output events up to three times the average energy output. Developing higher capacity factor resources and resources with output better coinciding with load would reduce the probability of excess energy events for a given amount of RPS-qualifying energy. Several approaches to accomplishing this are described below. These are long-term measures, requiring years to become effective. They might also reduce the impact of RPS development on the value of hydropower to the extent that the peak resource output would shift to seasons other than spring.

Encourage commercialization and development of higher capacity factor resources and resources with better load-resource coincidence: Biomass, geothermal, hydropower, and offshore wind power typically operate at a higher capacity factor than terrestrial wind power, and could help reduce peak output relative to average energy production. Solar photovoltaic facilities, on the other hand, have an even lower average capacity factor and a higher peak to average output ratio than terrestrial wind power. Solar resources, however, do not produce during low-load nighttime hours. Wave power, though having a low average capacity factor, has a strong winter peak that coincides with Northwest loads.

Expand the scope of RPS-qualifying resources to include additional high-capacity factor low-carbon resources: Washington's Renewable Energy Standard (RES) and Oregon's Renewable Portfolio Standard are relatively inclusive, and opportunities for expanding the set of qualifying resources with favorable operating characteristics are limited. Crediting energy efficiency on par with renewable energy would encourage developing an abundant, fixed-cost, zero-carbon resource with "output" nearly coincident with load. The Washington RES prohibits new hydropower, except from irrigation pipes and canals that do not result in new diversions or impoundments. Expanding the definition of qualifying hydropower to include projects involving new water control structures outside of protected stream reaches might increase hydropower development potential. Though such potential within the U.S. Northwest appears to be limited, British Columbia offers substantial undeveloped hydropower potential. Another avenue would be expanding qualifying cogeneration capacity. For example, Washington's RES currently prohibits energy from cogeneration facilities fueled by black liquor.[12] Expanding eligibility to new or upgraded black liquor cogeneration facilities could expand the availability of high-capacity factor qualifying resources at no increase in air emissions since the black liquor must be burned to recover the pulping chemicals whether or not power is produced from the resulting energy.

[12] Black liquor is the spent cooling liquor of the Kraft wood pulping process. It contains lignin residues, hemicellulose, and the inorganic chemicals used in pulping process. The lignin and hemicellulose residues impart high energy content to black liquor, allowing it to be concentrated and burned in a chemical recovery boiler to recover the pulping chemicals for recycling.

Increase the geographical diversity of wind projects: Over 70 percent of committed Northwest wind capacity is located in areas strongly influenced by Columbia Gorge winds. This concentration leads to peaks in wind output approaching full installed wind capacity, which contributes to the frequency and magnitude of excess energy events. Good quality wind resources are found elsewhere in the Northwest and in adjacent regions; however it would be necessary to strengthen or extend the transmission grid to tap large amounts of new resources in outlying areas. New long-distance high voltage transmission is expensive, requires many years to develop, and encounters public resistance. Moreover, because of the relatively low capacity factor of wind and the need to secure transmission capacity to accommodate a large proportion of the interconnected wind capacity, transmission interconnection is more expensive for wind than for higher capacity factor resources. A recent study by the Columbia Grid and Northern Tier Transmission Group Wind Integration Study Team (WIST) found that continued development near existing transmission, though incurring higher integration costs because of geographic concentration, is likely to be more cost-effective than constructing new long-distance transmission to tap remote wind resources. Exceptions to this may be remote development that could access existing transmission with the potential for relatively low-cost upgrades of transfer capacity.

Measures Reducing Hydro Output Peaks

Several measures have been proposed that would reduce the volume of stream flow during over-generation events. These measures could reduce spill. Because some of these measures would require pumping, they would also increase electrical loads during surplus energy periods. These measures include on-stream pumped storage, increased irrigation withdrawals, and managed aquifer recharge. With the exception of increased irrigation withdrawals, these measures would require several years to implement and could require significant capital investment. These measures would reduce the severity of excess energy events, expand the productive use of low-cost, low-carbon hydro and wind energy and help curtail negative electricity market prices.

Add On-stream pumped storage: The John W. Keys (Banks Lake) pumped-storage project is an on-stream project where water is pumped directly from Roosevelt Lake behind Grand Coulee Dam. At full load, this project draws about 600 MW and can pump about 18,000 cfs of water up to Banks Lake. Six of the 12 units are reversible, and can generate about 300 MW when discharging to Roosevelt Lake. The original and primary purpose of this plant is to supply water to the Columbia Basin Irrigation Project via Banks Lake. Peak flows at Grand Coulee during the June 2010 surplus energy episode were about 195,000 cfs, so the Keys plant in pumping mode could divert about 9 percent of the peak in-stream flow during the June 2010 event while consuming about 9 percent of the full output of Grand Coulee. Moreover, diversion above Grand Coulee would reduce flow at all downstream projects. The combined effect is estimated to be equivalent to about 2,100 megawatts of load. Banks Lake storage capacity and ability to discharge to the Columbia Basin Irrigation Project could ultimately limit the period of withdrawal; however, the active storage capacity of Banks Lake represents about 480 hours of pumping at full capacity.

According to operational data received from BPA, the pumps at Grand Coulee typically came on for about nine hours during the night through this period, but never at full capability. Operational constraints may limit the ability to operate the pumps over more hours, and

maintenance may have limited the maximum capability level. The data also indicate that the pump/generators actually generated a total of almost 5,000 MWh during the first two weeks of June. It is possible that more could be done to optimize the operation of the pumps and pump/generator units during these events.

As of October 2010, 10 preliminary permits had been issued by FERC for proposed pumped storage sites in the Northwest and four more preliminary permit requests were pending. None of the 14 proposed projects would pump directly from in-stream sources, so they would not directly reduce in-stream flows. One, the proposed Banks Lake project, however, would use Banks Lake as a lower reservoir and could indirectly augment withdrawal by increasing the effective upper reservoir capacity of the existing Keys pumped storage facility.

Increase irrigation withdrawals: The irrigation season in the Northwest runs from early April to mid-October. The season overlaps the April through June period during which excess energy events most frequently occur. Increasing irrigation withdrawal rates during this period will reduce in-stream flow. Electrical loads would increase to the extent pumping is used to lift irrigation water. The feasibility of this option would depend on crops, crop growing status, soil characteristics and moisture content, and other factors. Water withdrawal rights might complicate the feasibility of this measure. This measure could be implemented quickly and without significant capital investment.

Develop recharge capability for depleted aquifers: Managed recharge of depleted aquifers could increase upstream water withdrawals and productively employ surplus electrical energy. Groundwater pumping for irrigation has resulted in declining groundwater levels in several areas of the Northwest, including the Odessa area of eastern Washington and the eastern Snake River Plain. A 1999 feasibility study of managed recharge of the Eastern Snake River Plain aquifer suggests that relatively little capital investment would be required for the recharge facilities themselves - they would essentially consist of ponds located in natural depressions fed by controlled discharges from existing irrigation diversions. Issues include withdrawal rights, conflict with in-stream hydropower, fisheries and other in-stream environmental issues, and control of injection water quality. The eastern Snake study assumed use of existing irrigation diversions and canals during the off season and considered the cost of constructing new facilities to be "prohibitive." Because recharge during the spring freshet season to mitigate surplus energy events would compete with irrigation use of the existing diversion and conveyance structures, a scheme intended partly to alleviate surplus energy events would require expanding the capacity of the existing irrigation conveyance system or constructing new conveyance facilities.

Expand in-river storage: Additional in-river storage could be gained by raising high water reservoir elevations. This has been proposed for at least one Mid-Columbia project. An assessment of this potential was not located for this paper.

Refine flood control management: Flood control operations require reserving storage capacity to accommodate flood flows. This can restrict storage capacity during high flows not approaching flood-level. Improved forecasting, control, and communication techniques may provide opportunities for refining flood control management and creating additional upstream storage during surplus energy events. Flood control operations are under review as part of the Columbia River Treaty negotiations.

Measures Increasing Loads during High Runoff Periods

Measures that would increase loads during high runoff periods could reduce the incidence of excess energy events and expand productive use of available low-carbon hydro and wind energy. Strategies to increase loads during high runoff periods include fuel shifting, load shifting, producing alternative fuels using electricity, and increasing export capability. These measures could reduce the incidence and severity of excess energy events, expand the productive use of low-cost, low-carbon hydro and wind energy and help curtail negative electricity market prices.

Fuel shifting: Fuel shifting measures include electric vehicles, auxiliary electric boilers, hot water heaters, and dual-fuel boilers and hot water heaters. These examples of fuel shifting would increase loads and could also provide energy storage. This could help dampen price volatility, increase the export potential by facilitating transfers during off-peak periods, and possibly reduce the severity of excess energy events. Though additional load would increase the need for RPS-qualifying energy, the proportion of hydro capacity to load would diminish, reducing the frequency of excess energy events. With some exceptions, fuel-shifting options would require many years to achieve significant penetration and would require considerable capital investment.

Synthetic fuel or chemical production: Surplus electricity could be used to produce hydrogen or ammonia. Synthetic fuel production options would require many years to achieve significant penetration and would require considerable capital investment. Because of the magnitude of the capital investment, year-round operation would be required to achieve economic viability, and a facility could not depend solely on low-cost surplus energy

Expand export capacity: Expanding out-of-region export capacity could increase loads without increasing Northwest state RPS obligations. Intertie capacity to California was not fully utilized during the June 2010 surplus energy episode. Reasons cited for this include line deratings, illiquid intertie capacity release markets, and pricing differentials resulting from California ISO congestion pricing (raising the cost of imports from the perspective of California utilities). Some increase in export capability could be secured relatively quickly and at low cost by resolving these issues. Over the longer term, and at much greater cost, expanding intertie transfer capacity could be undertaken. Current California RPS policy that only requires the equivalent of REC-associated energy to be imported within the calendar year provides little incentive for California utilities to support expanding intertie capacity. Policies encouraging transfer of associated energy nearer the time of production would provide incentive for expanding intertie capacity. Efficient operation of the interties could be compromised unless this policy was carefully designed. In-state development of RPS-qualifying resources within California could increase the incidence of excess energy events within California itself, possibly compromising the value of increasing intertie transfer limits, depending upon the daily and seasonal output of in-state RPS resources.

Energy storage: Energy storage facilities could shift surplus energy to periods when useful load may be available. Available technologies include pumped-storage hydropower, batteries, flow batteries, compressed air storage and, to a limited extent, demand response measures such as hot water management. These storage technologies are typically employed to shift energy between light and heavy load hours, and can become economically infeasible if cycled less frequently. Storage could expand productive use of hydro and wind energy and could ease the severity of

excess energy events through load-shifting and more efficient use of intertie transfer capacity to access California loads. Because springtime high wind periods are typically of several days duration, storage technologies may not be an economic means of leveling wind output. Storage economics have not been favorable in the Northwest because of modest heavy load and light load price differentials; however this analysis suggests that heavy and light load differentials may become more pronounced in the future. This, plus a growing need for capacity services, may improve the economic prospects of storage. Storage developed for other purposes may be able to provide some useful shifting of energy during excess energy events.

Measures Augmenting Energy Dump Capability

These measures would increase the ability to release surplus energy in an environmentally acceptable manner, thereby reducing the need to displace wind or hydro. Although these measures effectively waste potentially useful low-cost, low-carbon energy, the effect is similar to the historical spilling of water at the dams prior to establishment of total dissolved gas (TDG) limits.

Improved dissolved gas abatement: Gas entrainment occurs as spill plunges into the stilling basins below the spillway. A variety of structural and operational measures for reducing dissolved gas levels have been proposed, including spillway flow deflectors, raised stilling basins, raised tailrace channels, additional spillway bays, tailrace/stilling basin separation walls, submerged conduits, baffled spillways, side channel spillways, pool and weir channels, and submerged spillway gates. The most feasible structural alternatives, primarily spillway flow deflectors, have been installed at all Lower Snake and Lower Columbia Corps projects with the exception of The Dalles,[13] thereby increasing gas-limited spill capacity.

Relaxed dissolved gas standards: Currently, exceeding TDG water quality standards is only permitted for voluntary spill for fish passage purposes through the waiver process in Oregon and the exemption built into Washington's water quality standards. An effort to obtain a similar waiver or statutory provision that pushes allowable spill even higher during periods of excess energy would not likely prove feasible since water quality standards must be stringent enough to protect all the designated uses of the Columbia and Snake rivers and aquatic life is generally the most sensitive of those designated uses.

While scientists and policymakers may not necessarily agree on the specific point where the risks of gas bubble trauma to aquatic life outweigh the benefits of spill for juvenile fish, it is generally agreed that there exists some level at which the risks of gas bubble trauma outweigh the benefits of assisting migrating smolts. Given that excess energy events are likely to occur in June when the TDG 115/120 percent waiver cap is in effect, getting Oregon's Environmental Quality Commission or Washington's Department of Ecology to go even further, at significant risk to salmon and other aquatic life, in order to deal with a surplus energy event seems highly improbable. Past review processes to obtain the waivers have proven both lengthy and contentious. Moreover, the EPA's review of any changes to state water quality standards that would allow TDG standards to be exceeded during times of excess energy would likely take a long time, and the outcome uncertain.

[13] Stilling basin bathymetry at The Dalles would compromise the effectiveness of spillway flow deflectors.

One other possibility may be to create an exemption in the state water quality laws for excess energy events similar to what is provided for 7Q10 flood flows.[14] While surplus energy events may not necessarily be considered "involuntary" in the traditional sense, it may be difficult if not impossible to get the states to adopt, and EPA to approve, an exception to state water quality standards given the existing restrictions on spill required to protect aquatic life.

Resistive Load Banks: Resistive load banks are devices designed to absorb electric energy, providing a load with desirable characteristics (unity power factor). Load banks are in common use for generator testing. The Northwest's 1,400 MW Chief Joseph substation "dynamic brake" is an example of a load bank used to maintain power system stability. This facility may have no practical application for the envisioned need as it is designed to operate for less than a second at a time.

While BPA's dynamic brake demonstrates the scale feasibility of load banks, commercially available load banks are designed for continuous service. A quick internet search found a handful of providers of megawatt-scale units.[15] The cost for the units, absent installation and interconnection, appears to range from about $20-40/kW. Spill rates during the June event were approximately 875 MW at Grand Coulee and 325 MW at Chief Joseph. If the total 1,200 MW were matched by load banks, the equipment cost of accommodating the generation and avoiding spill would be on the order of $25-50 million. Additional costs for land, installation, and interconnection could increase this two to three times.

Although finding more constructive uses for the energy would be desirable, load banks could insulate BPA from negative pricing events by expanding zero price options for generation, provide an alternative to spill that would otherwise raise nitrogen levels, and provide additional system reliability to the balancing area to reduce the risk of over-frequency events. Perhaps the highest value of load bank technology is in providing a cost yardstick against which other solutions can be compared.

Measures Facilitating Curtailment of Thermal Output during Excess Energy Events

During the height of the June 2010 excess energy episode, several hundred megawatts of thermal generation remained in operation in the BPA balancing authority area. Because this generation may have been required to maintain system stability or to provide balancing reserves it is not apparent that further reduction in thermal output was possible. Slow response capacity such as the Columbia Generating Station was held at minimum operating levels to serve unanticipated loads as the warm season approached. Westwide, however, there may be opportunities to further reduce thermal operation during excess energy events. Plants can be retrofitted to reduce minimum operating levels. This can also increase the ability of these plants to provide balancing reserves. Replacing slow response thermal capacity, such as steam boiler units with faster-responding units like gas turbines, can reduce the need to keep capacity in operation to respond to unanticipated loads. Fast response units are also better-suited to provide balancing reserves.

[14] 7Q10 is the average peak annual flow for seven consecutive days that has a recurrence interval of 10 years.
[15] Avtron, Mosebach Manufacturing, Power House Manufacturing, Sephco, and Simplx.

Further curtailing thermal output would help use more low-cost, low-carbon hydro and wind energy, ease the severity of excess energy events, mitigate negative market price pressure, and facilitate more optimal dispatch. The process of replacing aging coal and gas-fired boiler-steam units is likely to lead to a more agile fleet of thermal units, but it will require many years and substantial capital investment to achieve this.

http://www.masterresource.org/2010/10/bingamans-national-res/

Bingaman's Insidious National "Renewable Electricity Standard" (S. 3813)

by Glenn Schleede
October 6, 2010

On September 21, 2010, U.S. Sen. Jeff Bingaman (D-NM) introduced a bill[1] that would create an insidious national "Renewable Electricity Standard" (RES). Bingaman now has 32 cosponsors but expects 60.

The bill would result in higher monthly bills for millions of home owners and renters, farms, businesses, industries, hospitals, educational institutions, and any other organization that uses electricity.

Despite the intense citizen displeasure with Congress, Bingaman's RES bill shows that both Democrats and Republicans, while in Washington, are eager to favor special interests and their lobbyists while ignoring the adverse impact of their actions on the nation's ordinary citizens, consumers and taxpayers. The bill belies Republican claims that they favor less federal government intrusion, control, and damage.

Key Provisions

The bill would require that, by 2021, 15% of the electricity sold by an electric utility must be generated from wind or certain other "renewable" energy sources, or from energy efficiency. The bill would create a new US Department of Energy (DOE) bureaucracy to oversee and enforce the new federal demands. Under the bill, up to 4 of the mandated 15% could, theoretically, be achieved by actions that improve energy efficiency but the measures that qualify are tightly defined so utilities may have to use electricity from renewables instead of energy efficiency to meet the bill's requirements.

As demonstrated by states and European countries that have imposed similar "renewable" energy requirements, higher electric bills are a direct result. Electric bills will increase because it is much more costly to produce electricity from wind and other "renewables" favored by Bingaman's bill than from existing, reliable generating units. Electricity from wind is especially high in true cost and low in value.[2]

Special Interests Pushing Hard

During the past decade, the wind and other renewable energy industries have been incredibly successful in getting federal and state government officials to grant them generous tax breaks and subsidies, including state Renewable Portfolio Standards. The lobbying effort mounted during the past few weeks suggests that they are intent on gaining another subsidy in the form of Bingaman's proposed RES.

The wind industry, which has received nearly $4.5 billion in "stimulus" program[3] cash grants during the past year from the Obama Administration, apparently has plenty of cash to finance its intense lobbying.

Many senators and representatives are vulnerable since they (a) wish to have campaign contributions, (b) don't yet understand the adverse impacts of wind energy, and (c) may not yet realize the extent of their generosity to owners of "wind farms" and other renewable facilities or the extent to which they are enriching these owners and their financial partners at the expense of taxpayers.[4]

Insidious Impacts of Tax Breaks, Other Subsidies

Tax breaks and subsidies, including "Renewable Electricity Standards" such as those proposed by Senator Bingaman are insidious because they hide from public view the high true cost of electricity from "wind farms" and other favored "renewable" facilities.

Much of the true cost of these facilities is covered by federal and state tax breaks and subsidies. These generous benefits flow directly to facility owners and are separate from and in addition to the revenue facility owners receive from the sale of electricity. Of course the cost of the government subsidies and tax breaks do show up in tax bills. So, tax burden escaped by owners of "wind farms" and other facilities is shifted from the owners to ordinary taxpayers who don't have the benefit of generous tax shelters.

Wind and other "renewable" energy industries have secured another subsidy in some states in the form of state "Renewable Portfolio Standards" (RPS) that are similar in effect to Bingaman's proposed national RES. Like the proposed RES, state RPS require that significant shares of the electricity sold by utilities come from wind and certain other "renewable" energy sources.

State RPS and the proposed national RES, in effect, create artificially high priced markets available only to owners of "wind farms" and other renewable energy facilities. These markets are not available to owners of electric generating units using traditional energy sources that produce electricity at lower cost.

Under Bingaman's proposed national RES, utilities selling electricity to customers would be forced to either (a) produce electricity from renewable electric generating facilities they own, (b) buy electricity at high, above market cost from others who own such facilities, or (c) buy "renewable energy credits" (RECs) or "energy efficiency credits" (EEC) under the complex new national certificate trading system "managed" by DOE.

Utilities that are forced to produce or buy electricity from renewable energy facilities pass along the higher costs to their customers via their monthly bills. When electric bills go up, customers typically blame their local electric utility – not the legislators who have created the additional costs. Thus, RPS and RES are ways legislators are able to satisfy the wind and other renewable industry lobbyists and campaign contributors while not "having their fingerprints" on the higher electric bills.

Harsh Negative Impacts

Tax breaks and subsidies have already become so generous that they – not the alleged environmental and energy benefits — have become the primary reason "wind farms" have been built in the US. In fact, it is now clear that wind energy advocates have overestimated environmental benefits while understating adverse environmental, ecological, economic, scenic, and property value impacts of "wind farms."

In fact, there are three major adverse economic impacts of government tax breaks, subsidies and renewable standards that should not be overlooked:

- First, wealth is transferred – hundreds of millions of dollars annually – from the pockets of ordinary taxpayers and electric customers to the pockets of the owners of "wind farms" and other renewable facilities and to the financial partners.
- Second, billions of capital investment dollars are being misdirected to the construction of energy facilities – particularly high cost "wind farms" that produce only small amounts of electricity – which electricity is intermittent, volatile, unreliable, and low in real value. It is low in real value because it is unreliable and tends to be produced at night and in colder months and not during periods of high electricity demand when electricity has high real value.
- Third, other resources – including human talent – are diverted. Those in the private sector with resources to invest have learned that they can obtain larger returns with less risk by "mining" generous government tax breaks and subsidies than they can by investing in potentially productive and innovative endeavors in the private sector where risks are higher and returns not guaranteed.

Fallacious Assumptions of Renewable Quota Proposals

As indicated, Bingaman's proposed RES would be costly to millions of Americans, but it should be recognized as merely the latest in federal and state government "energy technology forcing" proposals that contribute little toward the objective of providing the energy required for the U.S. economy at reasonable economic and environmental cost.

When addressing energy issues, legislators tend to start with the correct assumption that technological advances will eventually be the key to US energy challenges, but they go "off-track" when they turn to demonstrably false assumptions when coming up with specific energy policy proposals.

The three most common false assumptions that underlie proposals that mandate the use of particular energy sources and technologies are the following:

- **False Assumption #1**: Planners and political leaders assume they are capable of picking energy sources and technologies that will be successful in the private competitive economy. However, experience in the US and other countries during the past 40 years has demonstrated clearly that neither Republicans nor Democrats, whether in Congress, state legislatures, governorships, or the presidency, are successful in picking energy technology "winners."

During the past four decades, dozens and dozens of "new" or "alternative" energy technologies have been advocated by presidents, governors, legislators, and regulators as having the potential to make a major contribution towards supplying US energy requirements at a reasonable cost if only they are supported by more tax dollars for R&D, or "helped" by state RPS, a national RES, or other mandate.

But something happens along the way to these government attempts to force selected technology "winners" into the economy. Instead of achieving the great benefits claimed by the promoters of the various technologies and their government supporters, the highly touted "winner" technologies turn out to (a) face insurmountable technical hurdles, (b) cost far more than claimed, (c) take far longer than claimed to develop, and/or (d) have unacceptable environmental effects.

Note that the US Department of Energy (DOE) and its predecessor agencies have spent about $175 billion (2009$) on "energy R&D" focused on a long list of government-selected energy technology "winners" and have very little in benefits to show for those tax dollars.

- **False Assumption #2:** Embedded in the above is another false assumption; i.e., that spending more money on R&D will inevitably overcome all obstacles to the development and acceptance of a potentially useful energy technology.[5] While R&D is critically important to the country's future, not all energy technologies promoted to government officials will be proven successful by more R&D.

The unfortunate truth is that government officials are ill-equipped to select energy technologies that deserve taxpayer supported R&D. They simply don't have the ability to discern the difference between facts and exaggerated claims made by promoters of new energy technologies and their lobbyists. The unfortunate result is that a promoter's lobbying prowess can be more important than technological merit when government officials try to pick "winning" energy technologies.

- **False Assumption #3.** The third false assumption underlying most government proposals to encourage or force acceptance of government-selected energy technologies is that "economies of scale" (i.e., producing more copies) will inevitably bring down the cost of the technology.

This false assumption underlies state Renewable Portfolio Standards, the Bingaman RES proposal, tax breaks, subsidies, and mandates that federal and state agencies spend tax dollars to buy products using government selected technologies. The thought behind this assumption is that an artificially created market will lead to enough demand to give the selected technology a "foothold."

While "economies of scale" worked for Henry Ford and dozens of other consumer products developed in the private sector, it does not necessarily work for technologies selected by officials in Washington DC or state capitals.

Wind industry officials and lobbyists and their supporters in government have long claimed that the industry needed tax breaks and subsidies only initially so that wind turbine technology could gain a market foothold and be competitive with other energy sources used to produce electricity. In fact, however, there are now a number of large wind turbine manufacturers competing in the global government created market for wind turbines but the true cost of electricity from wind remains much higher than the cost from traditional sources.

Outlook for S. 3813.

Wind industry officials, through their massive lobbying for continuation and expansion of tax breaks and subsidies for "wind farms" – including Bingaman's RES proposal – have made it clear that they have no realistic expectation that electricity from wind will become commercially viable.

As indicated earlier, Senator Bingaman has more than 30 Democrat and Republican cosponsors for his bill and has indicated that he expects to have at least 60 favorable votes when the bill is taken up in a November 2010 lame duck session or early in 2011. Since bills with similar provisions have passed the House in 2009-2010 with support from both Republicans and Democrats, Bingaman and the interests he favors are confident that Bingaman's bill would also pass the House in 2011.

Whether the bill will pass will depend heavily on the actions taken by citizens who express their views on the bill to their senators and representatives. Decisions by members of Congress from states that have few potential wind or other "renewable" energy resources will be especially important. Bingaman's proposed RES and other subsidies and tax breaks for wind and renewables will continue or increase the outflow of wealth from their states to those states with greater "renewable" energy sources.

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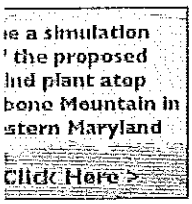
[1] Search on bill number S.3813 at http://thomas.loc.gov/

[2] http://www.windaction.org/documents/25496 & http://www.wind-watch.org/documents/?p=1671

[3] Section 1603 of the American Recovery and Reinvestment Act, commonly referred to as the "Stimulus bill."

[4] See, for example, http://www.masterresource.org/2010/07/dear-virginia-windpower/

[5] A partial defense for politicians who rely on this assumption is that in times of a perceived energy "crisis" or rapid increase in energy prices, they are pressured to do "something" to relieve citizens' economic pain. In such situations, officials often decide to "do something even if it is wrong" to appear responsive to constituents. Spending more money on "energy R&D" is a convenient "answer" since the general public may recognize that it is unreasonable to expect immediate results from R&D. This provides time for the "crisis" to resolve itself, for the constituent to turn to different concerns, or for the government official to move on.



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The Top Ten False and Misleading Claims the Windpower Industry makes for Projects in the Eastern United States

1. Industrial wind developers are interested only in providing a public service.

Their primary purpose is to take advantage of extraordinary income sheltering opportunities... More...

#1. Industrial wind developers are interested only in providing a public service.

All the false and misleading claims which this industry makes for itself work to disguise the fa that it is only a nominal producer of electricity in the eastern US. Its primary purpose is to increase profits by providing extraordinary tax and income sheltering opportunities for a few wealthy investors—such as Florida Power and Light, which owns the nation's largest stock of wind projects, AES, General Electric (which purchased Enron's windplants when the latter company went bankrupt), and BP—at the expense of average taxpayers and ratepayers. Taxpayers presently cover between 65-80% of the capital costs of all wind installations, allowing wind ownership to avoid paying their fair share of taxes to the federal treasury. On a per kilowatt hour basis, wind is the most heavily subsidized source of industrialized power in the nation, receiving 25 times more support than coal, natural gas and hydro, and 16 times mo than nuclear generation.

In response to persistent lobbying from the wind industry and its allies, 29 states have passed renewable portfolio standards requiring each state to purchase a percentage of its electricity from renewable power sources. This obligates utility companies doing business in the state to purchase electricity from the wind industry without any meaningful competition.

Congress has provided wind developers with an accelerated double declining capital depreciation schedule and extraordinary investment and production tax credits. With laws ensuring a captive market and with tantalizing incentives for profit, investment in wind seems nearly risk free. The only remaining factor assuring success is access to land—and lots of it.

This is a major obstacle to the industry. A typical windplant is gigantic, consisting of dozens c 400 foot turbines arranged along many miles of access roads and communication/transmissio line infrastructure. But the potential for profit is so great that wind investors work hard to bulldoze opposition in order to secure the land they so desperately need. Meanwhile, Congres has made wind initiatives so lucrative that it seems to have discouraged responsible citizenshi Consider what's at stake financially:

- Federal production tax credits remain front and center for wind developers and their investors, giving the industry tax credits worth 2.1 cents for each kilowatt-hour it produces. As cited in Claim #4, a modest 40 MW windplant should produce about on hundred million kW hours annually (each 1.65 MW turbine would yield about four

million kW hours a year), generating over $20 million in tax credits over the ten year period allowed by the production tax legislation. Since this windplant, if it produced steady energy, would power about 9000 homes a year, the total subsidy, underwritte by taxpayers, would be about $2,500 for each household powered! But this is just the beginning of the story. At a Maryland Public Service Commission heading, a spokesma for Clipper Windpower, a company proposing to erect a 100MW wind facility in Western Maryland, told the hearing examiner that his company expected $150,000,0 from production tax credits leveraged over a ten year period.

- Moreover, federal tax benefits pay as much as two-thirds of the capital cost of each $4.5 million wind turbine, with many states creating incentives to cover on average a additional ten percent of these costs. Windplant owners can use these tax credits to reduce their corporate tax obligations by tens of millions each year, as the Marriott Corporation did a few years ago with a similar clean energy scheme, within a year reducing its corporate tax obligations from 36 to 6 percent—at a savings of nearly $1(million, with average ratepayers and taxpayers picking up the slack to the federal treasury (See "The Great Energy Scam: How a Plan to Cut Oil Imports Turned Into a Corporate Giveaway," Time Magazine, October 13, 2003. Read an excerpt here). And Florida Power and Light, using primarily its wind tax shelters, has not paid any income tax for years, despite having annual revenues in the billions.
- State renewable portfolio standards laws make it probable that wind companies will likely charge utilities double the price paid for coal. For example, a 140MW wind facili as a consequence will likely reap 25 million dollars annually for the product it generates, and almost all of that energy product will be wasted in the electricity grid's spinning reserves. In addition to its lucrative production tax credits, the wind industry a lusty cash cow.

One should be mindful that most of limited liability wind companies are merely "mom-and-po operations (US Windforce, Synergics, Critierian) formed to assemble the initial capital and grease the local officials. Once the wind project is approved, they either sell it to companies li Constellation Energy, Florida Power and Light, or AES, which have a lot of discretionary income to shelter, or enter into an "equity" partnership with them, which accomplishes the san purpose (but hides the situation from the public).

It is for these kinds of rewards that wind developers have placed private gain over the public interest. In the process, they have transformed the wind business into yet another extraction industry, relying upon false claims and the gullibility of those seeking easy solutions to compl problems.

There are now about 35,000 industrial wind turbines in operation across the United States, producing less than one percent of the nation's actual generation. No coal plants have closed anywhere. And no empirical evidence exits that there is less coal burned per unit of electricity produced as a specific consequence of wind. And no evidence whatsoever that the nation has

reduced CO2 emissions in the production of electricity. Indeed, none of the industry's substantial subsidies are indexed to actual measured reductions of CO2 or the closing of any fossil-fired plants.

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2. Windplants do not harm wildlife.

Despite industry insistence this won't happen, it already has... More...

#2. Windplants are harmless to wildlife.

Untrue. The second leading cause of bird mortality in the nation is collisions with tall structur particularly at night under conditions of poor visibility, when neotropical songbirds migrate twice annually (house cats, the leading cause, kill hundreds of millions annually). Some of the migrants are species with extremely vulnerable populations. During the day, thermal-riding raptors—hawks, falcons, and eagles—frequently fall victim to a wind turbine's rotors. Experts such as Chandler S. Robbins, the dean of American ornithology, Michael Fry, of the Americai Bird Conservancy, Bridget Stutchbury, author of Silence of the Songbirds, and raptor specialis and author, Donald Heintzelman have expressed grave concern. But this concern is worldwide At a recent conference in Italy, The Landscape Under Attack, scores of prominent European environments, such as Anna Giordano, who risked her life to preserve eagles, and Stefano Allaveno, a raptor specialist, spoke out against massive wind installations, citing their concern about increasing the risk of avian mortality with wind projects. And recently, Canadian environmentalist, Wayne Wegner, wrote a compelling article about his apprehensions.

Bats are greatly attracted to wind turbines, and are slaughtered wholesale. Nearly all bat scientists are alarmed, particularly Boston University's Tom Kunz and Penn State's Michael Gannon. Canadian researcher Erin Baerwald has uncovered provisional evidence that pressure changes near a turbine's interior rotors caused the lungs of bats to explode, killing them instantly; many dead bats recovered at the base of wind turbines had no sign have external trauma, which would be the case with a collision. Instead, autopsies revealed internal damage the lungs. Baerwald and others are now seeking evidence conclusive evidence.

Nonetheless, the wind industry has touted the safety of its newer technology, maintaining that "monopole towers" and slower moving blades, which rotate no faster than 15 rpm, will not ha wildlife. However, huge 350-465 feet tall continuously lit wind turbines—with propeller blade so long that, at 15 rpm, they are moving at 170 miles per hour at their tips—and placed atop prominent ridges where large numbers of wildlife migrate—kill raptors, songbirds, and bats. Despite industry insistence this won't happen, it already has. The annual body count at Altamc Pass, California has averaged nearly 5,000 bird deaths annually for 20 years, prompting severa current lawsuits.

The wind industry response has been: "We need more time to study the problem"—while the turbines continue to run full bore. Indeed, when confronted with actual bodies on the ground, the industry argument morphs into a ten wrongs make a right scenario: "Cats and communication towers kill millions of bird and bats annually, and we don't expect to kill that many." When challenged about the appropriateness of this defense, the industry shifts gears once more: "The strategic need for clean energy justifies the tactical loss of some wildlife."

When pressed hard, wind developers do admit their technology does kill. But the low bird and bat mortality ultimately acknowledged is extremely misleading if not outright disingenuous. Their "experts" often use an apples to orangutans comparison, giving statistics (only two or three birds killed per turbine) derived from turbines located in the western United States averaging about 150 feet tall and located in fields not known for significant avian migration—then stating these should be comparable to 400 foot turbines located on high forested ridges in areas well known as a major avian flyway. This kind of comparison is no basis for credible prediction, which is the purpose of scientific analysis.

Recent radar studies at proposed industrial windplant locations atop the mountains of Vermon and West Virginia demonstrate that hundreds of thousands of birds and bats fly low enough to collide with huge turbines, placing them at risk—especially birds in times of fog and low clouds. The taller the turbines, the larger the threat. In 2003, a developer-sponsored mortality study conducted over a several week period at a West Virginia windplant revealed that over 2,000 birds and bats had been killed during fall migration in that span. Independent experts ha doubled that mortality figure to more than 4,000, concluding that the developer's accounting methodology was insufficient.

While bird mortality has long been a concern, recent studies show that bat mortality may be a even greater problem, for reasons that are not entirely clear. But wind industry proponents pre forward. To insure they receive all their tax credits, they continue to insist on post constructio studies, a la Altamont Pass, vowing to work on resolving the "problem" in the future. Nonetheless, because of the documented experiences at Altamont and the recent discoveries made by radar analysis on ridgetop migratory routes, the industry has now begun to admit that windplant mortality could be very high. But not high enough to deter the building of windplan in risky areas, since, while the wildlife mortality at these sites may be significant, it is, according to the industry "not likely to threaten any species with extinction...."

Faced with the news that its wind turbines were killing thousands of bats at two windplants on Appalachian mountain ridgelines, Florida Power and Light, the owners of these windplants, reacted quickly. It barred scientists from pursuing follow-up work, pulled its $75,000 contribution from the research cooperative studying bat mortality and ended the doctoral work of a graduate student who had produced two years of data showing unusually high rates of bat death at the Pennsylvania and West Virginia sites. Although Florida Power and Light has pull the plug on further research into avian and bat mortality on any of its properties, the company plans to construct hundreds more huge turbines in the mountainous areas.

But direct bird and bats kills from turbine collisions are not the only environmental threat. The montane forest fragmentation that would result from thousands of wind turbines will create hardship for a variety of wildlife and plants.

The scientific literature extensively documents concern for wildlife due to the harm such fragmentation will cause. Forest fragmentation has basically two components—the loss or reduction of habitat and the breaking of remaining habitat into smaller more isolated patches. Among the negative effects of fragmentation are: the elimination of some species due to chanc events; an increase in the isolation among species populations due to their lessened ability to move about the landscape; reductions in local population sizes sometimes leading to local extinctions; and often wholesale disruptions of ecological processes that jeopardize survival fc many species.

The clearing of wide corridors for hundreds of miles along the crests of forested mountain ridges in order to construct and operate utility-scale wind turbines will be a major contributor forest fragmentation and loss of important forest interior habitat (which is defined as woods th are more than 100 meters from a clearing) within our region.

For the forest as a whole, roads—and maintenance of roads and infrastructure—are known to have a number of negative effects, ranging from barriers to immigration and emigration, opening new corridors that provide an avenue for native predators and competitors to enter the area, as well as creating new pathways fostering the spread of non-native, invasive species.

High elevation forest interiors offer the only habitat conditions for some species—and it is the type of habitat most easily destroyed by development. When the habitat disappears, so does th species.

Recently, the wind trade association, the American Wind Energy Association and Bat Conservation International have joined in research effort to find "solutions" to the wind/bat mortality problem. Contrary to public perception, this is a very problematic development. For fee, Bat Conservation International—and, in the bird arena, Massachusetts Audubon, which ha been angling to have its experts "study" the proposed Cape Wind project off Cape Cod—seem to have been co-opted as a public relations tool—giving the public the idea the industry is real concerned about protecting the environment. Nowhere, however, has any wind project has bee halted or even modified because of the work of bird or bat experts. Quite the contrary.

There is little that captures the notion wind projects should not be built because there are too many unknown variables, using the precautionary principle as justification. Increasingly, bird and bat experts used as engineers or plumbers, tinkering away, hoping to discover something that might mitigate bat or avian mortality, project by project, but with no sense of consequenc if they do not. Meanwhile, the wind trade association trots out for public consumption its "relationship" with the wildlife experts, confidant that those experts are one with the organization. And, if the experts do come up with a solution—wonderful. If they don't, well, they—uh—tried... And all the while, new wind projects are proposed in areas with a high

likelihood of causing problems to bats and birds. The whole enterprise seems, well, unseemly.

Good public policy requires those who make claims about the safety of their product to substantiate those claims before introducing it into the environment, deferring to what Rachel Carson called the precautionary principle. Industry funded research should be highly suspect. Experts who work for the industry should submit their research and resulting conclusions for independent, peer-reviewed analysis. Good science insists upon conclusions that account for a the evidence, not selective pieces which fit the convenience of a developer's point of view. Po: construction studies are extremely risky and problematic—and more than a little self-serving. As is the case at Altamont Pass, who is going to shut down a $400 million capital facility once is running, even if studies verify it kills significant wildlife?

Actually, a federal judge just did for a West Virginia project, Beech Ridge. However, Roger Titus' injunction will likely be temporary, since he instructed the wind developer to seek an "incidental takings" permit from the United States Fish and Wildlife service, which, under tha agency's proposed new wind regulations, would allow wind project's, with a permit, to kill (take) even endangered species like the Indiana Bat, assuming the killing was not "intentional.

It's hard to see, though, how it could be otherwise, since wind projects will continue to be buil along areas well known for sheltering both indigenous and migratory endangered species. Therefore, permitting the operation of industrial machinery even better known for its ability tc attract and kill species that are threatened and endangered—and then saying that any subseque deaths of those species caused by such machinery is "incidental"—should be an unacceptable level of Orwellian logic, even for the federal government.

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3. Windplants will reduce the mining/burning of fossil fuels and lessen dependence on foreign oil.
The wind industry in the East will not put much of a dent in our reliance on fossil fuels. More.

#3. Windplants will reduce the mining/burning of fossil fuels and lessen dependence on foreign oil.

Nonsense. Here are the facts:

Foreign Oil

Wind only generates electricity. Electricity generation is only part of our energy production. Sixty percent of the nation's energy use does not involve the making of electricity. Coal and g

fired power plants do pollute the air with toxic hydrocarbons. But the sheer volume of automobile exhaust combined with home heating demand are major contributors to the proble It is folly to suggest that thousands of wind turbines blanketing the mountains of the eastern U would do anything of significance to mitigate these other energy forces evidently contributing the warming of the planet. Allegheny Power, the major electricity provider in the region including Western Maryland, reports that oil accounted for three-tenths of 1% of the resources used to generate its power in 2008. Nationwide, this figure is about 1%. Even if industrial win generated ten percent of the nation's electricity, it would not staunch the fossil fuel emissions thought to be involved in accelerating global warming, given our nation's increasing energy consumption and given that wind can only intermittently, and in a continuously variable way, address the electricity portion of the energy production problem—the minor portion.

Given that wind only produces electricity, given that we use so little oil for electricity production, and even if large numbers of wind turbines displaced the three tenths of one perce of our electricity now produced by oil, the region would still be heavily dependent on coal and gas, power sources often described as "dirty"—and we would still be mightily dependent on foreign oil, contrary to what the wind industry claims.

Fossil Fuels

Wind technology in the uplands of the eastern United States stands little chance of displacing fossil fuel extraction efforts or reducing its consumption, given our increasing rate of electricit demand. Wind machinery has problems accessing and controlling its source of power. Becaus of the variable nature of wind velocity, sometimes it is not strong enough to generate power a other times it is too strong to be commercially tapped. The industry has attempted to increase i effectiveness by making taller machines and targeting them on high ridges with excellent wind potential. Nonetheless, because of its intermittency, wind technology will require compensatio from other, often "dirty" power sources for the time it does not operate or works at sub-optima levels—which is more than 70% of its rated capacity.

A wind turbine is designed to generate optimal electrical power relative to its size, shape, abili to withstand stresses, rotor sweep and efficiency, and location, among other conditions. The wind needs to blow eight to fourteen miles an hour before a turbine will produce electricity, a a turbine is programmed to shut down when the wind velocity exceeds 50 or 55 miles per hou to prevent harm to its gears. If the wind were to blow at a sufficiently consistent velocity all th time and the turbine never broke down, the turbine would be operating at 100 percent of its capacity potential over a year's time—its Rated Capacity. However, because the wind is intermittent and volatile, and the turbines at various times require maintenance, they actually will produce electricity only some of the time. Using a combination of considerations, such as meteorological testing, weather history, the history of turbine effectiveness, among others, energy experts assign a Capacity Factor for each turbine model, which predicts the amount of

electricity a turbine will actually produce in a year. No existing windplants located in the Pennsylvania, New Jersey, Maryland (PJM) region have achieved a capacity factor of more th 30 percent. This means that 70 percent of the time they are not producing electricity. Consequently, a windplant rated at 47 MW, for example, will annually generate in the neighborhood of 12-15 MW (25-30% of its rated capacity). Sixty percent of the time it will produce less than 12-15MW. And at peak demand times frequently generate nothing. Whatev it does produce would be continuously skittering, never steady, since any wind "power" is a function of the cube of the wind's speed. Consequently, a change in the wind speed of from 11 to 22mph would mean that the wind energy would increase sevenfold—from 6 to 73% of its rated capacity. And vice versa. Other power sources, such as coal or nuclear, also don't work a of the time and must be supplemented by power sources that are working. The electricity grid has a complex monitoring system for predicting and maintaining its supply. Electricity must balance the rate of production with the rate of consumption at all times. A fundamental proble with supplying electricity is that electricity cannot be stored at industrial levels. Once generate electricity must be delivered and consumed immediately. However, power sources like coal ar nuclear are rarely volatile when producing their yield. Nuclear has a national capacity factor o 92%, meaning that it produces its capacity factor, or a requested portion thereof, virtually all t time throughout the year. Large coal plants do the same, and have a capacity factor over 80%. The volatile, extremely unpredictable nature of wind resource makes its technology different from other power sources not only in degree but in kind.

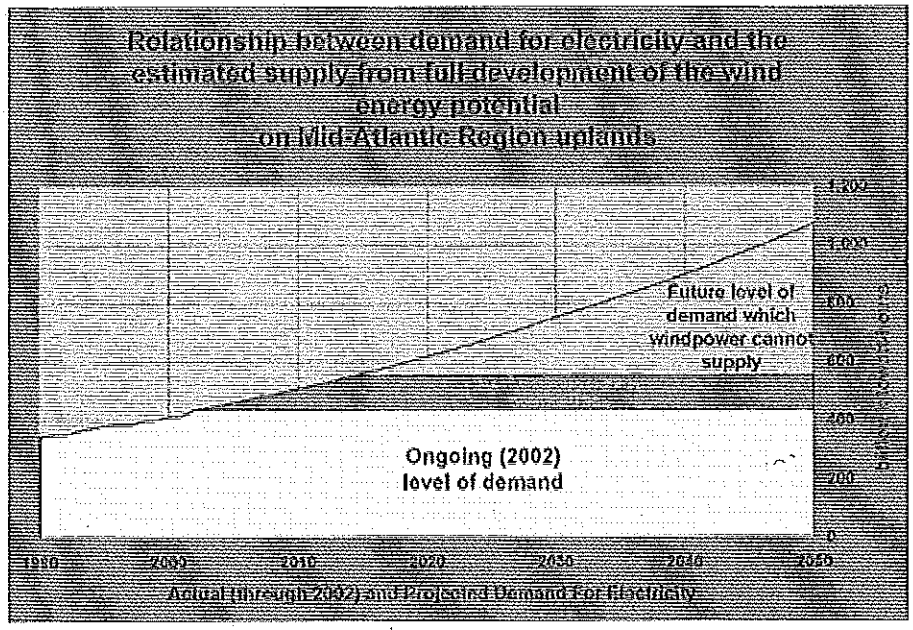
The variable nature of wind energy might not pose a problem to the region's electricity grid at present levels. However, increasing the percentage of wind energy to higher levels would require significant and expensive technological modifications to the grid and to the various transmission systems out to the end user. It would also present major challenges for the grid's management.

This may not be a substantial concern until wind energy becomes a major contributor to the electricity grid, adding, say, two or three percent to the total electricity supply. A "Wind Repo 2004" by E-On/Netz, one of Germany's largest electric grid operators, confirms this analysis, adding many other "price" caveats: given the intermittent and volatile nature of the wind, both the mechanics of grid operation and transmission technology would have to be retooled—at substantial cost—to back up wind generation. In fact, if wind energy increased to provide, say just a small percentage of the power for the PJM grid, primarily fossil-fueled generating plants would have to fire up to levels of 90 percent to function as a "shadow" back up service. This report also confirms that wind utilization rates rarely achieve 30 percent, that is, they don't wo more than 70 percent of the time.

Even with a generous 30 percent capacity factor, more than 2000 giant 2.5 MW turbines are needed to mathematically equal the annual production of one 1600 MW coal plant. But they can't do so functionally, for what must happen when 5000 MW of wind is producing only 100MW at peak demand times, which happens frequently. Even if we placed huge wind machines at all the good wind sites possible in the uplands east of the Mississippi River (a region with only 5% of the wind energy potential of the continental US), this would still not

reduce the mining or burning of coal, given that our demand for electricity will continue to increase. In fact, wind technology works least when the need is greatest—summer peak dema when the wind is typically not very active. For example, at the newly constructed Mountainee wind facility in West Virginia, the capacity factor during summer months averages less than 1 percent—half of the average annual capacity factor. This is also true for the mountains of western New York state, based upon anemometer projections for that region.

Consider the following graph showing the relationship between demand for electricity and the potential of windpower to meet it in the uplands of the Mid-Atlantic region.



This region comprises all or most of six states and Washington, DC. Its ridges have less than one percent of the nation's wind energy potential. Moving from left to right, the upward curve on the graph represents the demand for electricity that is expected to increase in the region at a conservative projection rate of two percent each year into the foreseeable future, particularly a the current recession ebbs. Present supply comes from the PJM Interconnection, the world's largest grid operator, which taps a variety of power sources—primarily fossil fuels, with negligible contributions from wind.

However, *if* (and this is a most improbable if) the wind industry could immediately exploit all the wind potential available in the region's uplands, saturating it with 30,000 huge turbines functioning at a capacity factor of 30 percent (see the table below), then it could produce, mathematically, enough electricity to supply about one-fourth of the present level of demand. the graph, this hypothetical supply from wind is represented in blue atop the ongoing level of demand. But note, in about 15 years, our increased rate of demand will absorb any yield produced by wind, necessitating additional energy sources to supply it. Unless wind turbines f up the Chesapeake Bay and are constructed off the ocean's shore, the projected additional futu

power sources will not come from wind, for the industry will be tapped out on land. As the graph rather dramatically shows, wind energy development of the region's uplands—at its realistic maximum—will not result in a net reduction of greenhouse gases or cut the present ra of the burning of coal and other fossil fuels. The very best case scenario for wind in the Mid-Atlantic region is that future wind energy development will only slightly lessen the rapidly increasing rate in the growth of demand for electricity from "dirty" power sources. But the dynamics of wind volatility will ensure that the industry will not produce any meaningful carbon emissions offsets.

The claim wind companies make about potential wind energy production may seem impressiv However, a million hamsters churning treadmills will also produce electricity. But what's the point? In this larger scheme, industrial wind's comparatively minuscule energy production would immediately be engulfed by increasing demand. The PJM grid coordinates the delivery more than 163,000 MW of electricity annually to the region. A 45 MW wind facility might annually contribute 14 MW of unreliably intermittent energy to the grid—.0000858 percent of the grid's current supply. The boast that this kind of energy plant would be an important first step in the direction of a comprehensively effective wind system is therefore unsupportable.

See the chart below.

Potential Amount of Electricity That Could Be Generated Annually From Renewable Sources Within States Of The Mid-Atlantic Region

STATE	RENEWABLE ENERGY SOURCES[1]				TOTAL OF RENEWABLE ENERGY SOURCES (million kwh)	% TOTAL FROM WIND	NUMBER OF INDUSTRIAL WIND TURBINES TO GENERATE WIND POTENTIAL[3]
	Geothermal Potential (million kwh)	Landfill Gas Potential (million kwh)	Clean Biomass Potential (million kwh)	Wind Potential[2] (on-shore) (million kwh)			
DC	0	0	0	0	0	0	0
Delaware	0	123	561	4,806	5,490	88%	1,219
Maryland	0	515	2,333	5,640	8,489	66%	1,431
New Jersey	0	1,374	492	15,327	17,192	89%	3,888
Pennsylvania	0	1,748	9,969	67,894	79,611	85%	17,223
Virginia	0	1,098	11,669	13,366	26,132	51%	3,391
West Virginia	0	0	5,323	9,764	15,087	65%	2,477
TOTAL	0	4,858	30,337	116,797	151,991	77%	29,629

1. Source information is from a national report entitled - **Generating Solutions: How States Are Putting Renewable Energy Into Action** - A Report of the US PIRG Education Fund and the State Public Interest Research Groups. February 2002. ["This report examines 21 states and their potential for electricity generation from renewable resources using state-of-the-art

technology." Estimates of amount of electricity possible for energy sources were based on studies by government (mainly National Renewable Energy Laboratory), industry and the Union of Concerned Scientists (UCS).] Amount of electricity is shown as Million kilowatt-hours.

2. Union of Concerned Scientists estimate based on a state breakout of data developed for Doherty, Julie P., "U.S. Wind Energy Potential: the Effect of the Proximity of Wind Resources to Transmission Lines," Monthly Energy Review, Energy Information Administration, February 1995. Includes class 3 and higher windy land area within 20 miles of existing transmission lines, excluding all urban and environmentally sensitive areas, 50% of forest land, 30% or agricultural land, and 10% of range land.

3. Number of modern industrial wind turbines is calculated by dividing each state's Wind Potential by the average amount of electricity annually generated by a 1.5-MW turbine. An "average" 1.5-MW turbine produces only about 30% of its rated capacity each year (i.e., Capacity Factor = .30), so its annual output would be about 4 million kilowatt-hours (1,500 kw *.30 * 8760 hrs/yr).

Unfortunately, the demand for electricity will be so great over the next thirty years that additional coal plants are likely to be built. Florida Power and Light, the nation's third largest electric utility company, now owns over one-half of the wind energy facilities in the US. Moreover, AES Corporation, which operates a coal-burning power plant at Cumberland, Maryland, has recently joined with US WindForce (which has several approved and planned projects in West Virginia and Maryland), lending its financial backing to wind energy development in the region. US WindForce is the most ambitious developer of wind energy in the Alleghenies.

Such "equity investments" between wind and coal will likely grow in number, as the former industry reaps the cachet of association with a major electricity producer while the latter gathe in the use of wind's generous tax avoidance shelters and its reputation as a green energy sourc The irony of these partnerships should not be lost on the public.

Unless we have a major change of political direction, fossil fuel combustion, and the toxins it emits into the air, will increase in the future, contributing to such dire statistics as the rate of asthma's doubling every five years. The wind industry will not itself alter this circumstance. Only when the public insists upon implementing appropriate standards and newer equipment t increase efficiency, as well as conservation measures that reduce per capita consumption demand, will air quality improve. Indeed, because of some of these measures residual to the la Administration, which mandated newer, more efficient coal-burning technology, air quality in the region has actually improved in recent years.

Altogether, the wind industry in the uplands of the eastern US is not an answer to the concern about global warming, energy independence, air pollution, or public health.

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4. Windplants are highly efficient and provide power for significant numbers of homes.

Wind technology is relatively feckless. More...

#4. Windplants are highly efficient and provide power for significant numbers of homes.

The press often prints this inflated fiction as truth. It's actually a throwback to the 1940s and early 1950s, and was used by the nuclear industry as a public relations tool to make that source of power seem warm and fuzzy. As most people should know, residential use is only one of th demand segments for electricity. Commercial, industrial, and public sector users constitute majority demand.

All conventional sources of power produce their rated capacity—their optimal performance—when dispatched to do, changing their rate of performance only when asked.

The energy produced by wind machines is not dispatchable or controllable (except when they are shut down). A wind turbine is designed to generate optimal electrical power relative to its size, shape, ability to withstand stresses, rotor sweep and efficiency, and location, among othe conditions. The wind needs to blow 8-14mph before a turbine will produce electricity, and a turbine is programmed to stop when the wind velocity exceeds 50 or 55 mph to prevent harm t its gears. If the wind were to blow at a sufficiently consistent velocity all the time and the turbine never broke down, the turbine would be operating at 100 percent of its capacity potential—its rated capacity. However, because the wind is intermittent and volatile, and the turbines at various times require maintenance, they actually will produce electricity only some of the time.

Whatever energy the wind turbine produces is always a function of the cube of the wind speed Consequently, small changes in wind velocity produce major changes in the wind energy. Usi a combination of considerations, such as meteorological testing, weather history, the history o turbine effectiveness, among others, energy experts assign a capacity factor for each turbine model, which predicts the amount of electricity a turbine will actually produce in a year.

No existing windplants located in the PJM (Pennsylvania, New Jersey, Maryland) region have achieved a capacity factor of more than 30 percent. Therefore, conventional generators provid over 70% of any wind turbine's rated capacity. About 60% percent of the time, a wind project will produce less than its capacity factor. It would rarely produce its rated capacity. And about 15-20 % of the time, particularly at peak demand times, it would generate nothing. Whatever i does produce would be continuously skittering; no one can know how much energy any wind

project will produce at any future interval. Consequently, a windplant rated at 40 MW, for example, will generate electricity in the neighborhood of 11-12 MW (25-30 % of its rated capacity).

Consider the following example.

Recently, a wind developer claimed his proposed 40-megawatt windplant would generate enough electricity to power 33,000 homes. A megawatt (MW) is one million watts or one thousand kilowatts (kW). According to the Department of Energy, the average home consume 12,000 kW hours of electricity annually. In Maryland, the average home use is 13,000 kWh. Using the national average estimate of 12,000kWh, one can rather easily obtain a reasonable annual projection for the number of homes this windplant might power, if it produced at a steady rate. The following example assumes a 24-turbine windplant with 400-foot tall turbines each rated with a potential of 1.65MW and with a generous capacity factor of 30 percent:

1.65 MW x 30% capacity factor = .50 MW (or 500 KW)

500 KW x 24 hours x 365 days = 4, 380,000 KW hours per year per turbine

4,380,000 KW x 24 turbines = 105,120,000 KW hours annual plant output

105,120,000 KW / 12,000 KW hours average household use per year* = 8760 homes powered annually.

Consequently, a 40 MW windplant, *if* it produced at a steady rate, would power less than 9,00 homes annually. **But wind rarely produces at a steady rate.** Because electricity from wind is inherently intermittent and volatile, it would only "serve" those homes where the occupants were willing to have electricity only when the wind was blowing in the right speed range—or for them to invest in an expensive battery storage system, which would require about 20 years use to offset the cost, far longer than the equipment itself would last. Wind energy would service no homes in any conventional sense of that term's use.

The Mid-Atlantic region requires the PJM grid to supply many millions of households; it generates over 140,000 MW at peak demand times. A windplant with a rated capacity of 40 MW might on average deliver about 14 MW. As shown in the earlier example, this would provide electricity to about 9,000 households--if it weren't so unreliable and variable. Even so, notice how statistically negligible this amount is, virtually meaningless in terms of cleaner air and improved health—.0000858 of one percent of the PJMs production.

The reality is that wind technology at industrial scale can provide energy for no home, no industry, no commercial establishment, no hospital or police station or traffic system—consistent with today's standards of reliability and performance.

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5. Locals who oppose the wind industry are NIMBYS.
One of the most persistent hypocrisies from corporate wind... More...

#5. Locals who oppose the wind industry are NIMBYS.

One of the most persistent hypocrisies from corporate wind and its supporters is the accusatio that locals who resist the industry are selfishly holding back progress. However, many politicians who vote to enable industrial wind do so fully aware that windplants will be built i someone else's back yard, realizing they would not survive the political backlash if one were constructed in their district. Wind investors—and the politicians who enable them—live hundreds of miles away from the results of their handiwork. Although there are many areas of good wind potential available, the industry focuses on rural, often economically depressed are which don't have much money or political influence. In Maryland, for example, the Chesapeak Bay has the best overall wind potential in the state. Yet the wind industry, aware of the probat political repercussions, avoids this region, preferring instead to target Appalachia and the mountains in the far western region of the state. It is the old story of colonialism, with distant capital exploiting the people and resources of the hinterlands to give the illusion of progress.

Nedpower, one of the most aggressive wind companies in the country, is in the midst of constructing a huge 200-wind turbine facility along a 14-mile strip of the Alleghany Front eas of Mount Storm Lake in West Virginia. Frank Maisano, a Washington, DC lobbyist and media spokesman for Nedpower and who lives near the Bay, said that any allegation that a wind-powered project will be an "eyesore" is generally a claim without merit." However, when aske by a reporter, he declined to say if he would want such a project built within two miles of his home. "I'm not living next to one, so I'm not going to answer hypothetical questions for you ju for the sake of answering them," he said. (Charlotte, WV Gazette, November 30, 2005.)

As has been shown, there are legitimate, unselfish reasons for locals to be concerned about ho massive windplants will affect their lives.

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6. Windplants will generate significant local revenue and increase property values.

...two recently constructed windplants... have contributed virtually nothing to the local tax bas More...

6. Windplants will generate significant local revenue and increase property values.

Promised "windfall" revenue is tantalizing. Rural areas often rely heavily upon tourism attract to the region's scenic natural beauty. The lure of additional revenue without any apparent cost

often blinds authorities to the problems created by development that will diminish the natural beauty at the heart of the economy.

Promises of tax revenues are merely hopeful thinking; they are not secured. What peopl should keep in mind is that claims made by limited liability wind companies are strictly put forth in a blatant attempt to gain a larger profit. Assertions by state tax offices are based on general mathematical formulas (vs. real world guarantees) that only indicate what may be obligated BEFORE ANY DEDUCTIONS THAT A WIND LLC MAY USE TO REDUCE THAT FORMULA OBLIGATION.

This is really what industrial wind is about, after all—finding ways to shelter income through tax avoidance, although a new Treasury Department program now provides the option of cash grants for production tax credits.

Taxes

Most rural communities have no ordinances for taxing a windplant in ways commensurate wit the capital value of a proposed windplant. Wind developers' promises about what their plants will pay in taxes are basically promotional propaganda to curry favor with local politicians, an should be closely scrutinize for legal accountability, since these claims are usually not secured by any legal document. Characteristically, nowhere is it made clear what the assessed value of each turbine will be for tax purposes. Developers often claim a 30-year turbine life, which seems meaningless in light of the federal double declining capital depreciation schedule allow for the industry.

For the first two windplants operating in Somerset County, PA, the average per turbine tax payment in 2003 was only $528, a combined property tax payment of $7,388 (fide Somerset County Commissioner Pamela Tokar-Ickes) on machines that cost nearly $50 million to instal Moreover, another Florida Power and Light windplant in Thomas, West Virginia (Mountainee Wind) has purportedly paid $93,000 over several years after a capital outlay of over $70 million—and this after much delay and a lot of negative press (Judy Rodd, Citizens for Responsible Windpower). These companies had originally promised to contribute many hundreds of thousands of dollars in local taxes. Usually wind facilities will not be taxed as public utilities. Indeed, it is not clear what taxes they would be obliged to pay. With knowledgeable tax accountants, a developer will undoubtedly look to protect his investors, no local economy hundreds of miles away from its corporate offices.

No penalties seem to apply if local jurisdictions do not receive promised tax revenues. Consequently, there are no real incentives to tell the truth. Wind developers know that spin wins.

Since this project will lease private land, the county will receive little additional property tax.

Wind leases are typically written to favor the developer, restricting the owner's use of the land for up to 35 years and devaluing it significantly (a major problem for those in need of emergency funds). Turbine leases also may allow abandoning all equipment to the property owner, providing little or no indemnification for any decommissioning, removal, or restoratio costs. And they often include noise and other "nuisance" easements, holding the developer harmless from legal responsibility if his machines create such nuisances.

Wind Leases

Income generated from turbine lease agreements varies widely. Wind developers insist that th leases with private property owners remain secret, but they will often claim that lease income will range from $4,000-$6,000 annually per turbine, although it is not clear how this estimate derived. An examination of several wind leases obtained from disgruntled lessors, however, reveals provision for an initial, one-time payment (from $500 to $1,000) to reserve a turbine lease, with pledges of minimum annual rental income of about $1500 per turbine against a sm percentage of the power the turbines actually produce, generating at maximum about $2500 p turbine. Wind lessors should interrogate any lease proposal from a wind developer before signing anything. The supposedly "solid" promises of lease revenue are typically unsecured— and the developer can unilaterally withdraw from the lease with only a 60-day notice. The less will not have this luxury.

Wind leases are typically written to favor the developer, often restricting the owner's use of th land for up to 35 years. Aside from saddling lessors with an onerous obligation, the contract al may place property owners who live near the proposed wind turbines at risk. A contract typically specifies that the wind developer can make noise without hindrance on the leased property, which noise will likely spill over to adjacent properties. The contract also may stipulate that the wind developer has the right to the free flow of the wind, effectively controlling not only what can and what cannot be built on the property but also where any building can take place. It usually gives the developer veto power over hunting on the land. Th grant of easement may permit the wind developer rights to use any and all the property at the developer's discretion, including provisions for unlimited ingress and egress at any time, for transmission lines, for building any structures, wires, fences, buildings at any place the developer deems necessary, for allowing access at any time to any of its employees—and "an easement for any sound waivers or noise emitted from the wind turbine generators or other equipment."

Further, these agreements may stipulate that the owner "shall join with [italics added] the developer in requesting all infrastructure modifications and ...any and all zoning changes or other land use permits and/or approvals necessary to the developer...". In the words of one contract lawyer who has reviewed these documents, they may well constitute an "unconscionable contract," so lop-sided in favor of the developer that it is unconstitutional.

Windplant leases diminish property values throughout the viewshed, while creating major disturbances that reduce the quality of life for nearby residents. One of the most validated real estate precepts is the idea that significant natural views have premium value, and intrusions th restrict that view erode value. Realtors doing business near windplants in the western United States and in Europe understand that property will sell for between ten and thirty percent less than previous market value, depending upon how close it is to the windplant. The few "studies which appear to support the claim that windplants don't devalue property are extremely flawe in fact and methodology, often surveying people and evaluating property miles away from a wind site. According to Paul Gipe, author and proponent of responsible wind development, an axiom for the wind industry is that its technology is far more popular with people who live a remote distance from wind facilities—and much more unpopular with those who live nearby. This attitude manifests itself when calculating values to properties near windplants.

Local Revenues

Wind developers nearly always overstate the general local economic benefits from a wind facility by counting the full price of goods and services, rather than value added. Generally, a large part of the price paid to a local supplier has to be paid by that supplier to another agent, i this case likely to be a party outside the local area. This price is part of the local supplier's cost of acquiring the goods (for example, the purchase of fuel, wiring, cement) the local supplier is reselling to the windplant. The only portion of the price paid by the windplant that should be tallied is the difference between the local supplier's cost and the price he charges—that is, the value added portion—which in any case would be extremely small in a rural county as most goods will be purchased elsewhere for a wind facility.

Property Values

Although looming windplants are a relatively recent phenomenon in the eastern United States, there is increasing evidence that the closer one resides to them, the lower one's property value falls. For quiet rural properties, the premiums paid for the serenity of natural views can no longer be justified if huge wind turbines surround the area. The rural areas targeted by wind developers are often filled with family farms framed by misty mountains. Those who feel that single wind structure is beautiful should visit a wind facility like the one above Meyersdale, P. to see how the 2,750 foot mountain there seems to disappear with 375 ft. wind machines on to (one can see these 15 miles away on a clear day). Note, too, the four acres of clear-cut around each turbine.

One of the most validated real estate precepts is the idea that significant natural views have premium value, and intrusions that restrict that view erode value. Realtors doing business near

windplants in the western United States and in Europe understand that property will sell for between ten and thirty percent less than previous market value, depending upon how close it is to the windplant. The few "studies" which appear to support the claim that windplants don't devalue property are extremely flawed in fact and methodology, often surveying people and evaluating property miles away from a wind site, then "averaging" these results with properties adjacent to windplants.

The wind industry has recently put forward The Renewable Energy Policy Project(REPP) (Ma 2003), written by personnel associated with the national Renewable Energy Lab, to bolster its claim that not only will wind facilities not diminish nearby property value--they will actually enhance them. However, this study contains serious methodological flaws:

- The study covers just ten projects, only one of which comes close to the size and scope of ma newly proposed projects—and this site (Madison County, NY--the Fenner Site), with 20 1.5 MW turbines situated on farm fields—not atop prominent ridgelines—interestingly showed significant decreases in property values.
- The time frame of the study was so short that even the study's authors were compelled to sta the data was insufficient to offer compelling conclusions.
- The study did not verify whether individual properties had a direct view of the windplants, making the use of the term "viewshed" something of a misnomer in this context, since the viewshed properties were actually all properties within a five mile radius of the turbines regardless of whether they had a direct line of sight. To mitigate this problem, the researcher conducted phone interviews with tax assessors and other local authorities to get estimates of the number of properties in the defined viewshed that might have had views of the turbines. However, under scrutiny, many of these estimates proved inaccurate.
- The analysis used in this study did not incorporate distance from a wind facility as a variable o weighting factor, so that a viewshed property sale five miles away from a windplant counted the same as one a quarter mile away. It is at least plausible that if windplants do have an effe on property values, it would be strongest close to the turbines and decline with distance. Simple geometry suggests that the majority of properties in the area of a five mile circle are likely to be fairly distant from the wind development: 64% of the area of this circle is three miles or more from the center—and only 4% lies within the first mile. Though properties are not necessarily distributed evenly about the landscape, and property values conceivably can b affected by other things in the vicinity, the REPP study confuses substantially the proportion o properties that either have only a distant view of wind turbines or no view at all.
- The study relied on average rates of sale prices before and after the windplant construction a between viewshed properties and properties in a comparison group. Therefore, if one calculates that sale prices among viewshed properties increased $50/month faster than sale prices in the comparison group, then it makes a difference whether the statistical uncertainty the point estimate is plus or minus $25/month or $500/month. The former leads to a conclusion that the wind development unlikely had a negative effect on property values while the latter intimates that the data are inconclusive--there could be a large negative impact, a large positive impact or no impact at all. These "smoothed" average sale prices against a very small time variable creates a regression analysis that is, for prediction purposes, almost besid the point, suggestive of nothing.

The REPP "study," although its basic methodological approach holds considerable promise, is severely flawed. To say, as wind developers do, that the study demonstrates a proposed windplant will have no effect on property values, that it may in fact enhance them, is disingenuous. George Sterzinger, the executive director of the REPP, admitted as much in response to critics who stressed the study contained no proof that windplants were the reason f changes in property values. "We have no idea," he said, noting that the REPP did not have tim or money to answer that question. (Cape Cod Times, June 20, 2003). Sterzinger further agreed that the study's findings have to be applied carefully to different situations.

There are very few windplants in the world, let alone in the eastern United States, with turbine over 400 feet tall placed on such a prominent ridgeline. Consequently, there is no comparable facility "yardstick" by which appraisers can measure the impact for predictive appraisal purposes. And without knowing about the various nuisances this kind of windplant will produce, the problems for credible prediction increase even more.

Let's examine a few other areas where wind facilities and property values have actually been correlated. In 2001-2002, the Moratorium Committee of Kewaunee County, Lincoln Township Wisconsin compared property sales prices to assessed values before and after the construction two wind energy facilities, each having relatively small .65 MW turbines. An assessor reporte that property sales (vs. 2001 assessed values) declined by 26% within one mile and by 18% more than one mile of the wind project. The Moratorium Committee also sent anonymous survey forms to 310 property owners, of whom 223 responded. These responses were then grouped based upon proximity to the windplants.

The survey results found that 74% of respondents would not build or buy within 1/4 mile, 61% within 1/2 mile and 59% within 2 miles of the windplants. In fact, a large percentage stated th they would not buy a home within 5 miles of the turbines. The windplant's offer to purchase neighboring homes for demolition—to create an "additional buffer for the windmills"—came immediately following the release of a noise study showing the Lincoln wind turbines increase the ambient noise level significantly, depending on wind conditions, etc.

A 1996 Danish report, Social Assessment of Wind Power—Visual Effect and Noise from Windmills—Quantifying and Valuation, contained a survey of 342 people living close to windplants. The accompanying survey found 13% of people in the area considered wind facilities a nuisance and would be willing to pay 982 DKK per year to have them leave. A survey of house sale prices showed a 16,200 DKK lower price near a single wind turbine and 94,000 DKK lower price near windplants versus similar houses located in other areas.

In October, 2003, the Beacon Hill Institute, as part of a study of the proposed Cape Wind project in which hundreds of 430 foot turbines were to be located five miles off shore from Ca Cod in Nantucket Sound, contacted 45 real estate professionals operating in towns around the Sound, asking them about the anticipated effects of the wind power project on property values Forty-nine percent of these realtors expected property values within the region to fall if the Ca Wind power plant was erected, while most of the rest said they didn't know. [Jonathan

Haughton, Douglas Giuffre, and John Barrett, Blowing in the Wind: Offshore Wind and the Cape Cod Economy, Beacon Hill Institute at Suffolk University, October 2003, pp. 16-17] Th BHI study also surveyed 501 home owners in the six towns that would be most affected by th Cape Wind project . Sixty-eight percent of these said that the turbines would worsen the view over Nantucket Sound 'slightly' or 'a lot'.[BHI study, page 14] On average, they believed that Cape Wind would reduce property values by 4.0%. Those with waterfront property believed t it would lose 10.9% of its value. The study concluded that, based on the loss of property value expected by home owners, the total loss in property values resulting from the construction of Cape Wind would be $1.35 billion, a sum substantially larger than the approximately $800 million cost of the project itself.[BHI study, page 4]

As the study noted, any reduction in property values would, in turn, lead to a fall in property t collections in the affected towns; the drop in these tax collections would be $8 million annuall If the tax rates were raised to maintain revenue, this would shift some of the property tax burd off waterfront residents (whose property values would fall the most) and on to the (less afflue island residents.[BHI study, pages 4, 5]

In the home owner survey, in response to the statement: "It is important to protect an uninterrupted view of Nantucket Sound," 76% strongly agreed, 18% somewhat agreed, 3% we neutral, 2% somewhat disagreed, and 1% strongly disagreed.[BHI study, page 28] It's worth noting that of the home owners surveyed, 94% did not have homes with a view of the Sound; [BHI study, page 32] 76% were not members of a conservation or environmental organization.[BHI study, page 34]. Their main reasons for living in the area were the 'beauty c the region,' 'the beaches,' and 'the ocean views.'[BHI study, page 31].

In 2002, two properties outside Berlin, PA near Somerset Wind, LLC were sold to the wind developer for considerably less than fair market value. According to witnesses and deed recor Somerset Wind (incorporated in Delaware with offices in Texas—an Enron spawn), in order t discourage lawsuits brought by owners who felt that Somerset's wind turbines were disturbing the quiet enjoyment of their property, bought these properties for fair market value—one in May, 2002 for $101,049, reselling it in August to a lessor who had initially leased land to the wind company for $20,000□ percent of the previous sale price! In May, 2002, Somerset Winc purchased the other property for $104,447, selling it in August for $65,000--62 percent of the purchase price!

The prices Somerset Wind paid for these properties were comparable to prices paid for simila properties in the area and in line with the price previous buyers had paid. Although the properties were assessed for tax purposes at around $20,000 (as of 1997), they initially had so for fair market value at $80,000 and $74,000 respectively—in 1998 and 1997. The quotes of t prices listed in the documentary are those listed in the deeds, which are public records. And th reason the developer bought the properties in the first place was to forestall a lawsuit brought because of the very real nuisances that the windplant created.

The new owners, moreover, signed a "memorandum of non-disturbance easement agreement,"

which absolves the wind company from liability for what the owners might regard as wind turbine-caused nuisances such as "noise, lights, air movement, odor, dust, vibration, traffic, obstruction of view, [and] light or air currents."

Let's be clear about the difference between the assessed value for tax purposes of these properties and the fair market value involved in the purchase. It is virtually a universal verity that tax assessments for property lag well behind the current market value. The price Somerset Wind paid for both properties was well within the average range of comparable market prices. Clearly, Somerset Wind was willing to pay this price to head off a nuisance suit. And the price sold the properties for should be instructive as to the company's assessment of their worth, giv such proximity to the windplant and the exculpatory non-disturbance easement agreements in the new deed.

Russell Bounds, one of Garrett County's (Maryland) leading realtors in large property transactions, has already lost sales in the area of proposed windplants. He has stated that huge industrial windplants "would be devastating not only to the real estate values in the Pleasant Valley viewshed, especially to neighboring properties, but would also negatively affect the entire county economy, since so much of that economy is tied up with tourism drawn by the county's natural views." Mr. Bounds has recently testified at a Maryland Public Service Commission wind hearing that, over the last several years, he has had at least 25 people who expressed interest in buying land in the area targeted by wind developers. However, when he advised them about the plans for the wind facilities, not one of those people expressed any further interest.

In the face of these transactions, it is ridiculous to believe the spurious claims the wind industr makes about how their facilities will enhance neighboring properties.

A number of appraisers in the United States and Europe have shown that wind projects locate within several miles of exiting residential properties will devalue them by at least a third and a much as 50% of their present market value.

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7. The wind industry will create many local jobs.

This is a cruel untruth, especially in economically depressed areas... More...

7. The wind industry will create many local jobs.

This is a cruel untruth, especially in economically depressed areas. Very few permanent jobs will likely be created—perhaps a couple of low wage maintenance employees. According to a report by the National Renewable Energy Lab on windplant jobs, the national average is one maintenance employee for every 12-15 turbines. A 20-turbine windplant in Meyersdale,

Pennsylvania now employs only two maintenance employees. Forty miles south, the Mountaineer wind facility in West Virginia, with over 45 turbines, employs three to four workers. For two windplants proposed for Western Maryland (Clipper Windpower and Synergics Wind Energy, both LLCs), the developers have pledged to pay each of their maintenance employees little more than $18,000 annually, less than a living wage for a family of four in this country. The collective capital value of their facilities, however, is projected to l in the neighborhood of $350 million...

During windplant construction, a few security guards and some local earth moving crews will hired for a few months, while the bulk of construction is typically completed by primarily foreign labor, since the turbines are often manufactured in Europe with warranties serviced by the manufacturer. A recent study by the Iowa Department of Natural Resources on the "Top o Iowa" windplant showed that, of the 200 total construction jobs, only 20 were local—and all disappeared within six months.

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8. Wind technology is noiseless and creates few disturbances.

Large wind turbines... create profound noise reverberations extending out... More...

8. Wind technology is noiseless and creates few disturbances.

Tall wind turbines in concert with each other, especially those sited on prominent ridgetops, create profound noise reverberations extending out for more than a mile, sounding like "a boo tumbling in a dryer" or the revving of jet engines on a runway. It is very difficult to predict noise levels in the mountains compared to flat land. Noise levels will be amplified in some are and diminished in others depending on the shape of the terrain, the wind direction, the change in wind velocity, and so on.

The impact on people also depends on whether wind turbines operate in synchronization and whether the noise "beats" or throbs. This also depends on wind direction and velocity. Who w get bombed? Who knows? That is likely very hard to predict. The travel of sound waves and their behavior is similar to the way water waves travel. Most of us have seen how water behav when waves enter into a gap or a split or channel of rocks in the ocean. The waves travel inwa and pile up-and-up as the channel restricts them. The more the channel narrows, the greater th piling of the wave. Sound behaves in the same way. The more it piles up, the louder it gets.

A letter from Meyersdale, Pennsylvania resident Bob Laravee, who lives 3,000 feet from the windplant, documents how he measured the noise over a 48-hour period. The results "showed average reading of about 75 decibels during that period." "According to the EPA, noise levels above 45dB(A) disturb sleep and most people cannot sleep above noise levels of 70 dB(A)." Turbine noise is so irritating and disconcerting that it often causes people to seek medical

attention, as Rodger Hutzell in Meyersdale had to do. Wind leases typically contain "noise easements" to protect the company from liability.

Noise from European windplants is a notorious and well-documented nuisance there. The win industry is very aware of this problem but often tries to "hide" it by taking visitors during the day directly under the turbines where there is typically little noise or by conducting tours from May-September when wind speeds are typically lower.

A leading acoustical researcher of the noise problem, G.P. van den Berg of the University of Groningen in the Netherlands, believes loud aerodynamic sounds are generated when the moving propeller blade passes the turbine tower mast, creating sound pressure fluctuations. Such fluctuations may not be great from an individual turbine, but when several turbines oper "nearly synchronously, the pulses... may occur in phase," significantly magnifying the sound. Van den Berg also notes a "distinct audible difference between the night and daytime wind turbine sound at some distance [more than one mile] from the turbine"—a finding consistent with the experiences of Meyersdale residents. (Both quotes were taken from G.P. van den Ber Effects of the Wind Profile at Night on Wind Turbine Sound: Journal of Sound and Vibration (November 2004) 277:955-970.)

The problem is so acute and well documented that the First International Conference on Wind Turbine Noise was held in Berlin, Germany on October 17 and 18, 2005. Organized by INCE/Europe in collaboration with the European Acoustics Association, the conference addressed "Wind Turbine Noise: Perspectives for Control"

A New York physician, Nina Pierpont, has called the phenomenon, Wind Turbine Noise Syndrome; her book on the subject will be available to the public soon.

Regulatory agencies and county zoning ordinances should insist upon acoustical field researcl to assess this noise phenomenon, requiring independent measurements and interviewing nearb residents. They should pay particular attention to noise measurement averages. Averages woul not mean much if they were applied, say, to residents living next door to an outdoor pavilion during a rock concert. And it will not mean much to the residents of a rural community, either who are used to the enjoyment of a quiet landscape.

An exemplary noise testing protocol for windplants was recently approved as part of the Shawano County, WI wind ordinance. Other polities should strongly consider adopting this standard to protect citizens from windplant noise. This county had been targeted for industrial wind development and the citizens there, aware of problems with wind technology, vowed to protect the public by establishing regulations and testing protocols that the wind industry and enabling agencies now must follow.

Other nuisances industrial windplants may cause are:

- **Shadow Flicker and Strobe Lighting.** When turning with the sun behind them, turbine blades

cast moving shadows across the landscape and into houses in ways that may affect surroundi properties at a considerable distance; these are commonly described as a strobe effect withir houses that can be difficult to block out. "Some people lose their balance or become nauseat from seeing the movement. As with car or sea sickness, this is because the three organs of position perception (the inner ear, eyes, and stretch receptors in muscles and joints) are not agreeing with each other: the eyes say there is movement, while the ears and stretch recepto do not. People with a personal or family history of migraine, or migraine-associated phenomena such as car sickness or vertigo, are more susceptible to these effects. The strobe effect can also provoke seizures in people with epilepsy." (Nina Pierpont, in a personal conversation. Dr. Pierpont was formerly a clinical professor of pediatrics at Columbia, University and is now in private practice in Malone, New York).

- **Lightning and power surges.** Wind turbines themselves may cause irregularities in the power supply as wind speed changes. Within the power grid, supply and demand must always be balanced; there is no storage of electricity on this scale. When the wind dies, there is less power (brown-out) until a plant using a more reliable resource powers up to increase production. When the wind gusts, there may be power surges. Residents living near the installation in Meyersdale, which came on-line in December 2003, have had to replace stove elements and small appliances due to power surges which started at that time. Residents of Lincoln Township, Wisconsin, near a wind installation noticed an increase in power surges associated with lightning strikes in their area after the turbines went on-line in June 1999. [Tv computers protected by surge protectors and a TV set, all in different houses, were simultaneously "fried" one evening when lightning struck a nearby wind turbine tower.]
- Shoddy site construction practices can also cause serious erosion problems, especially if built along steep slopes. There is much documentation about how turbine blades throw bolder-siz ice that has accumulated on the blade surface during winter. There are documented—and ve dangerous—fires caused by malfunctioning turbine equipment.

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9. Wind technology consists of "windmills" on "wind farms."

The reality is that they are mammoth industrial factories... More...

#9. Wind technology consists of "wind mills" on "wind farms."

As if 400-foot tall differentially moving turbines were bucolic Dutch windmills, and their arrangement—eight to a mile on tall ridgetops, each with a four acre clear-cut when sited in th forest, and spread out in rows over many miles of upland habitat—was akin to a family farm.

The reality is that the technology consists of mammoth industrial factories often targeted for areas that pride themselves on their natural beauty. This inherent incompatibility makes for a hard sell. Consequently, the wind industry has commandeered the terms "windmill" and "winc farm" to make its outsized machinery more attractive to rural areas. But when a windplant is built, the rift between promise and reality becomes stark. Contemporary industrial wind turbin

are taller than most urban skyscrapers, rivaling the size of the Statue of Liberty. Pittsburgh has but one building near 400 feet, while Cleveland has none.

Wind developers sometimes misrepresent their turbines' size in the press to make the machine appear even more hospitable. Press releases describing "wind farms" occasionally state the turbines' size in meters, causing some readers to think that a 125-meter turbine is really only 1 feet—and not over 400 feet. More often, they will only refer to the height of the turbine tower, not mentioning the size of the enormous propeller blades. However, a turbine tower that is 26 feet tall with a propeller blade that is 135 foot long is 400 feet tall. Even when they concede th actual size, they maintain wind facilities won't be intrusive because the turbines will be hidden in the trees, as if trees over 400 feet tall exist on forested ridges.

Watch for this classic bait-and-switch technique. Wind developers will often initially propose facility consisting of a number of "smaller" turbines, typically 1.5 MW-340-400 foot machine When the public begins to realize the threat to its basic qualities of life, and rushes to oppose t project, the wind developer will appear to offer appeasement—in the form of lesser numbers c turbines but 10-15 percent larger (430-465 foot--2.5 MW) with a much greater rotor sweep (th propeller blade will be more than 310 feet long). The developer will claim this is possible because of "newer technology." It is more likely, however, that this is a cynical ploy to make t industry seem more congenial to the communities it seeks to exploit, always "ready to compromise." In fact, however, this is a tactical move that will actually increase industry profi while playing havoc with the community.

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10. Those who are concerned about windpower are not true environmentalists.

The facts demonstrate otherwise. Notable environmentalists who have studied... More...

10. Those who are concerned about windpower are not true environmentalists.

The facts demonstrate otherwise. Notable environmentalists such as Robert Kennedy, Jr. and Chandler S. Robbins have studied the issue and urge that wind technology be carefully evaluated before implementation decisions are made. Many are mindful that the claims for windpower mirror those made one hundred years ago for hydroelectric dams, another clean, renewable power source now known to be environmentally devastating. One should note especially that John Muir used his newly found Sierra to protest the destruction of the Hetch-Hetchy valley viewshed by a hydroelectric dam—because he so valued the vallye's aesthetic qualities.

Today, the dean of American ornithologists, Chan Robbins, is outspoken in his concern for placing thousands of wind turbines along the Allegheny ridges, which are well known for hosting billions of migrating songbirds. The American Bird Conservancy's Michael Fry has

testified before Congress about the threats to especially vulnerable species of wildlife. Bridget Stutchbury, a Canadian ornithologist and author of the recent book, Silence of the Songbirds, has called for an end to industrial wind projects on the mountains of the East. And Donald Heinzelman, the noted raptor specialist from Pennsylvania is organizing efforts to protect key mountaintops in his state, New York, and Maryland from industrial wind development.

An environmental group, The Center for Biological Diversity has sued twelve windplant companies to stop the slaughter of eagles, hawks, and owls at Altamont Pass in California. Moreover, because of the many thousands of bats and birds killed at a recently constructed windplant atop an Appalachian ridge, Congressmen Alan Mollohan and Nick Rahall of West Virginia have called for a windplant moratorium in their state, while the governor of New Jers has mandated a moratorium on wind along the Jersey shore to prevent unintentional harm to wildlife and the viewshed.

Other environmentalists urge construction of smaller scaled, locally distributed wind projects that pose significantly less risk to wildlife, habitat, viewsheds and property values. This shoul not excuse, however, wind prospectors who seek to place a few 400 foot tall wind turbines on their property merely to obtain tax credits. Such prospecting is at best unneighborly and insigh civil discord. Many environmentalists also point out the similarities between factory farms an contemporary industrial windplants, and note how the size and scale of each corrupts the economy, diminishes the ecosystem, and blights the landscape.

What all these environmentalists have in common is a concern that deployment of massive, irresponsibly sited windplants poses unacceptable risks to much they hold dear, with correspondingly little benefits. See Notable Quotes.

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Stopillwind.org - An educational resource about industrial wind

As an artist and environmentalist who values aesthetics and the methods of science—and wants an effective energy policy—I've looked for evidence substantiating claims made for wind technology by those who would profit from it, financially and ideologically. By evidence, I mean real world encounters with actual performance to see if its key premises are true. Of all people, environmentalists should embrace the skepticism of science, rather than be seduced by deceits of fashion. They should not confuse the trappings of science-the engineering grandeur of a huge wind turbine, for example—with the real work of science, which would insist upon verifying the machine's performance. My values are green; I believe we should conserve, minimizing our footprint on the earth, not intruding on it with bombast and self-serving incivility. Although I understand why well-intentioned people support the wind industry, I'm mindful the road to hell is often paved with good intentions. Environmental history is the chronicle of how adverse consequences flowed from the uninformed decisions of the well intentioned. And simply because a power source is renewable and produces cleanly without burning carbon does not mean it is green.

The purpose of Stopillwind is to provide evidence exposing the limitations of wind technology, both as a system for producing energy and because its massive scale too often threatens sensitive ecosystems and vulnerable wildlife while producing numerous nuisances that erode quality of life for nearby residences and, in many locations, destroy historically significant natural views. Moreover, as an intervenor in two Maryland Public Service Commission wind hearings, I've not been able to substantiate a single claim that wind developers make for their enterprise, including claims about the jobs, local revenues and taxes, and especially the ability of the wind industry to mitigate our dependence on fossil fuels and improve public health. On the other hand, I have been able to validate the substantial income that the industry generates for corporate investors.

Believing the best society should seek informed, enlightened public policy, I'm pleased to share my findings about industrial wind technology as educational resources, so that those who wish to know more about what I've called the wind scam may do so without the investment of years of their time. To facilitate inquiry, this site will continue to include, along the left margins of the home page, a summary statement about Irresponsible Wind Development; a top-ten listing of the most Misleading Wind Industry Claims; a brief statement about what it might take to make the industry "Responsible," although this is increasingly becoming an oxymoron. One may also click on Notable Quotes to see the range of knowledgeable people who have spoken out about the

industry's excesses, and also Link to other important websites. To hear how a wind plant will sound to most people over one-half mile away, click on the Simulation of a Proposed Wind Plant in Western Maryland. Finally, under the Commentary section, there will be posted topical articles and ideas on the subject that may be of interest to readers.

The rest of the material will be placed within one of five categories, under Documentation and Downloads:

- Jon Boone's Maryland Public Service Commission Testimony
- Sample Contracts and Wind Easement Agreements
- Speeches and Presentations
- Research and Essays
- Video and Multimedia

The first, the PSC Testimony, provides comprehensive information contained within a typical PSC regulatory hearing, and includes a 40-page document of direct testimony covering a range of issues, along with supplementary testimony, as well as important documents such as responses to data requests and various rebuttal and summary commentaries. These should be invaluable to those seeking information about how to engage a regulatory hearing—and for those who simply want a logical and thorough acquaintance with the many and varied aspects of this complicated business.

Sample Contracts and Easement Agreements will show how one-sided entering into legal relationship with a wind project is likely to be.

Speeches and Presentations will include The Wayward Wind and A Bill of Goods, as well as letters and op ed features made over the years to prominent individuals and organizations.

Research and Essays will include many links to the most recent scientific analyses about industrial wind technology, including The Aesthetic Dissonance of Industrial Wind Machines; Less for More: The Rube Goldberg Nature of Industrial Wind Development; Rockefeller University's Jesse Ausubel's Nuclear and Other Renewable Heresies; the National Research Council's Environmental Effects of Wind Energy; David White's Reduction in Carbon Dioxide Emissions: Estimating the Potential Contribution from Wind-Power; Tom Adam's Review of Wind Power Results in Ontario: May to October 2006; both E.On Netz Wind Reports from 2004 and 2005 in Germany, several articles by Glenn Schleede, and many others.

Video and Multimedia will include links to the documentary, Life Under a Windplant, and a photo gallery.

Jon Boone
Oakland, MD

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JAN 13 2011

ENERGY FACILITY SITE
EVALUATION COUNCIL

Whistling Ridge
Public Comment
#189

1-8-11
CARSON, WA

TO COUNCIL—

I AM 100% IN
FAVOR OF THE WHISTLING
RIDGE PROJECT—
WE NEED THE TAXES
PLUS CLEAN ENERGY—

THANK YOU—

JACK-E. JOHNSON
[redacted] HOT SPGS. AVE
PO BOX [redacted]
CARSON, WA 98610

Whistling Ridge
Public Comment
#190

Michelle, Kayce (UTC)

From: Daniel Dancer [redacted]@artforthesky.com]
Sent: Sunday, January 09, 2011 5:55 AM
To: EFSEC (UTC)
Subject: testimony regarding propsed Whistling Ridge Project
Attachments: WhisRidgeTestimony.doc

Thanks for allowing me to send my testimony against this project. Here it is attached.

Daniel Dancer
POB [redacted]
Mosier, OR 94740

EFSEC
905 Plum St. SE
Olympia, WA 98504-3172

January 8, 2011

Dear Folks,

I have lived in the Gorge for 20 years now and have traveled all over the world. The Gorge is uniquely beautiful and special as is recognized in it's being a federally designated National Scenic Area. The thought of putting 25 or more 420-foot-tall wind turbines on the edge of the Scenic Area on the slopes of a mountain clearly visible to Gorge residents and tourists as proposed in the Whistling Ridge Energy project is disgusting and would be a travesty to the purposes of the National Scenic Area Act.

Based on the irreparable harm that would to our the Columbia Gorge's natural heritage that would result from the implementation of this project, I urge you to deny or extremely modify their application.

Sincerely,

Daniel Dancer