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TO: The Idaho Public Utilities Commissioners

FROM: John F. Gardner, Ph.D., P.E., Professor of Mechanical Engineering

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IDAHO PUBLIC
UTILITIES COMMISSION

RE: IPC-E-07-03

Date: 21 September 2007

I offer these comments regarding the above-referenced case currently before the commission dealing with the future of wind energy projects under the provisions of the federal PURPA law.

I am a professor of mechanical engineering, currently at Boise State University, but have been a professor for over 20 years with more than 50 referred publications and 2 textbooks to my name. For the past 4 years, my research has been focused on wind turbine technology. Most recently, my team has been focusing on local energy storage for wind farms, a technology that has the potential for mitigating the intermittency problems which lie at the root of the cases you now consider.

I am considered an expert in dynamic modeling of energy systems and I have a thorough understanding of the intricacies involved in the issues presented here. I have read the wind integration studies offered by the utilities as well as several others commissioned throughout the country in the past years.

I have no financial interest (that I know of) in a wind farm, current or planned. Neither am I a shareholder (to the extent that I'm aware, some of my retirement investments may well hold some stock in one of the utilities) in any of the companies who are party to the complaint.

I offer my comments as a state employee who has particular expertise in the matter in front of the commission and I do so in a sincere attempt to be impartial and unbiased.

That said, I would like to address the request of this petition point-by-point.

Point 1: Raising the cap on entitlement to published avoided cost rates for intermittent wind powered small power production facilities that are qualifying facilities (QFs) under Sections 201 and 210 of the Public Utility Regulatory

Policies Act of 1978 PURPA") from the current level of 100 kW to 10,000 average kWhs per month ("average MWhs/mo" or "10 aMW");

The lowering of the cap for wind-powered PURPA projects to 100kW effectively halted all development of small wind farms in the state of Idaho. This seems to run counter to the current Idaho Energy plan (2007) which calls for, among other things, the protection of "Idaho's public health, safety and natural environment and conserve Idaho's natural resources" (objective 3) and the promotion of "sustainable economic growth, job creation and rural economic development" (Objective 4). In addition, the development of wind-powered projects under the provision of PURPA promotes a distributed, diverse and robust power generation system in Idaho. Finally, as the country and the world moves toward a system of constraining the way in which carbon dioxide is introduced into the atmosphere, we should be embracing and encouraging the development of energy systems not subject to the inevitable constraints (and related price increases) that will be placed on fossil fuels. I would welcome the granting of this request.

Point 2: Reducing the published avoided cost rates applicable to intermittent wind powered QFs to compensate for the increase in system costs due to wind variability. The Company's proposed new published avoided cost rates are set out in Attachment 2 enclosed with this Petition;

This, of course, is the core of the complaint. The interconnect plans commissioned by Avista and Idaho Power concur that a) the cost associated with wind energy rises with the market energy costs and b) those costs are currently in the neighborhood of \$11/MWhr. As I'm sure you're aware, these results stand in stark contrast with the vast majority of the results of similar studies done throughout the United States in the past 5 years. In particular, I refer you to a study done by the National Renewable Energy Laboratory, part of the US Department of Energy, summarizing the recent results of wind interconnect studies, summarized in Table I.

Table 1: Key Results from Major Wind Integration Studies (2003-2006)

Date	Study	Wind Capacity Penetration	Regulation	Cost (\$/MWh)			TOTAL
				Load Following	Unit Commitment	Gas Supply	
2003	Xcel-UWIG	3.5%	0	0.41	1.44	na	1.85
2003	We Energies	4%	1.12	0.09	0.69	na	1.90
2003	We Energies	29%	1.02	0.15	1.75	na	2.92
2004	Xcel-MNDOC	15%	0.23	na	4.37	na	4.60
2005	PacifiCorp	20%	0	1.6	3	na	4.60
2006	CA RPS (multi-year)	4%	0.45*	trace	na	na	0.45
2006	Xcel-PSCo	10%	0.2	na	2.26	1.26	3.72
2006	Xcel-PSCo	15%	0.2	na	3.32	1.45	4.97
2006	MN-MISO 20%	31%	na	na	na	na	4.41**

* 3-year average

** highest over 3-year evaluation period

Source: National Renewable Energy Laboratory.

Note the total cost of integration per MWh (right-most column) ranges between \$1.85 and \$4.97. This is consistent with the results of the study done by the Bonneville Power Administration in which the cost of wind integration was found to vary from \$1.90 (at 5% wind penetration) to \$4.60 at 30%. Finally, the study commissioned by the Minnesota Public Utilities Commission in 2005, in which the utility companies took part, arrived at a cost of \$4.20 per MWh.

One of the patterns that emerge from consideration of these varying studies is that the lower numbers tend to come from studies commissioned by independent and government agencies. Whereas studies commissioned by the utilities themselves tend to result in higher numbers.

A reasonable and probable explanation of this correlation is that the utilities are attempting (as well they should) to find the best way to integrate wind, both into their technical management plan and their business model. I have no doubt that the studies commissioned by Idaho Power and Avista are accurate projections based on the assumptions and constraints provided by the utilities at the outset of the study.

More to the point, however, both studies have serious drawbacks which bring their conclusions under suspicion. The Idaho Power interconnect study contains at least one serious flaw which was actually explicitly admitted in the Executive Summary (page 4):

"Simulations for calendar year 2000 revealed very high integration costs, which after additional analysis were determined to be a function of the anomalous market prices that were the result of the California power crisis."

Finally, it is interesting to note that PacifiCorp's related petition sets the cost of integration at \$5.04/MWhr, which is much more in line (albeit still slightly higher) with the national average. In an effort to provide a uniform environment for wind development throughout Idaho, I would argue that the integration rate requested by Pacificorp be implemented for all PURPA wind projects in the state.

Point 3: Authorizing Idaho Power to purchase state-of-the-art wind forecasting services that will provide Idaho Power with forecasts of wind conditions in those geographic areas in which wind generation resources are located. The order should further provide that QFs will reimburse the Company for their share of the on-going cost of the wind forecasting service.

It's important to note that, according to the best experts in the field of wind forecasting, the best current predictor of wind is persistence. That is, your highest chance of being correct in prediction what the wind will do in the next hour is to say that it will continue to do what it has been doing in the previous hour. Clearly, such a prediction is often wrong, yet we can do no better than that.

Therefore, it is unclear that such 'state of the art' forecasting models are effective enough to justify their cost. But more to the point, there are several problems associated with this request. First, it would provide an unfair barrier to the early developers of PURPA wind farms in Idaho. The language is unclear, but it might be a reasonable interpretation that 'their fair share' of the costs of a single wind farm would be 100%. It is also not clear how these forecasting efforts relate to similar efforts that must be carried out for larger wind farms with separate PPA's. Clearly there is opportunity for economy of scale here. I believe the utilities need to make a better case and be more explicit about both the efficacy of these models and the actual costs associated with them, and how they are to be charged.

Point 4: Authorizing the Company to include a "mechanical availability guarantee" in all contracts with new intermittent wind powered QF resources. The mechanical availability guarantee would require wind powered QFs to demonstrate monthly that except for scheduled maintenance and events of force majeure the QF wind project was physically capable and available to generate at full output during 85% of the hours in the month.

This request seems both reasonable and prudent.

Point 5: If the Commission orders the changes to the published rates presented in Attachment 2, authorizes the acquisition and funding of the wind forecasting services and authorizes the inclusion of mechanical availability guarantees in future contracts for purchases of energy from intermittent wind powered OFs, Idaho Power proposes that the Commission remove the requirement that the 90%/110% performance band be included in new contracts for energy purchases from intermittent wind powered QFs.

On the elimination of the 90/100 rule, most people are in complete agreement. My colleagues involved in wind energy research (not commercial operations) across the country are perplexed and troubled by the existence of this requirement. It requires that small wind farm operators (spanning in size from the approximately 300 kW Lewandowski Farm to the 10.5 MW Fossil Gulch installations) predict the wind conditions 4 to 6 months in advance. Anyone who watches the nightly weather report and looks out the window the following morning understands the impossible nature of that requirement.

Therefore, I would argue that the rule should be eliminated regardless of the other actions by the commission. It provides no real value to the utilities or the QF operators and serves only to penalize the operators of small wind farms, and does so in an arbitrary and unpredictable manner. A more cynical observer than myself might conclude that the Idaho Power is using this as a 'bargain chip' to encourage support of their position regardless of the substance of the request.

In closing, I respectfully remind the commissioners of the 2007 Idaho Energy plan, which calls for the following actions:

1. Idaho utilities should acquire reliable, diverse, cost effective and environmentally sound resource portfolios sufficient to meet their customers' long-term electricity needs.
2. Idaho utilities should have access to a broad variety of resource options consistent with Idaho's policy objectives, including both renewable and conventional resources.
5. When acquiring resources, Idaho and Idaho utilities should give priority to: (1) Conservation, energy efficiency and demand response; and (2) Renewable resources; recognizing that these alone may not fulfill Idaho's growing energy requirements.
7. It is Idaho policy to encourage the development of customer-owned and community-owned renewable energy and combined heat and power facilities.
10. Idaho and Idaho utilities should encourage technologies that minimize emissions of harmful pollutants and consumptive use of water.
11. Idaho and Idaho utilities should prepare for the possibility of federal regulation of greenhouse gas emissions.

Clearly, any policy that encourages the development of wind farms in Idaho is consistent with all of these policy goals. Conversely, policies which discourage, or preclude the economic viability of wind farms in Idaho stand in direct conflict with these goals.

Finally, I encourage the commission to take a long view in debating these requests. The question we should ask is: What path will lead to lower power rates 5 or 10 years from now? Like any prudent investment portfolio, an approach in which geographic, fuel source and ownership is diversified is the most conservative and safest approach.

I would be pleased to make myself available to the Commissioners or the staff of the Public Utilities Commission at any time in the future.

Sincerely,

A handwritten signature in black ink, appearing to read "John F. Gardner". The signature is written in a cursive, flowing style.

John F. Gardner, Ph.D., P.E.
Professor of Mechanical & Biomedical Engineering