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IDAHO PUBLIC
UTILITIES COMMISSION

BEFORE THE IDAHO PUBLIC UTILITIES COMMISSION

IN THE MATTER OF THE PETITION OF)
AVISTA CORPORATION FOR AN ORDER)
REVISING AVISTA CORPORATION'S) CASE NO. AVU-E-07-02
OBLIGATIONS TO ENTER INTO)
CONTRACTS TO PURCHASE ENERGY)
GENERATED BY WIND-POWERED SMALL)
POWER GENERATION FACILITIES)
)
)
)

**DIRECT TESTIMONY OF
KEN DRAGOON**

**ON BEHALF OF RENEWABLE NORTHWEST PROJECT AND NW ENERGY
COALITION**

1 Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

2 A. My name is Ken Dragoon. I am employed by the Renewable
3 Northwest Project ("RNP"), 917 SW Oak St., Suite 303,
4 Portland, Oregon 97205.

5 Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

6 A. I am testifying on behalf of RNP and NW Energy Coalition.

7 Q. PLEASE DESCRIBE RNP.

8 A. Established in 1994, RNP is a nonprofit organization
9 promoting the responsible expansion of solar, wind and
10 geothermal energy in the Northwest. RNP works to
11 establish policies that support renewable energy
12 development and nurture the development of a market for
13 renewables. RNP's day-to-day work includes active
14 participation in any type of energy policy proceeding in
15 the Northwest which may impact renewable energy
16 development.

17 RNP's unique coalition of members includes renewable
18 energy project developers, public and consumer interest
19 groups such as the Citizens Utility Board of Oregon,
20 turbine manufacturers, environmental organizations and
21 others. To my knowledge, the NW Energy Coalition is the
22 only other participant in this proceeding which is a
23 member of or otherwise formally affiliated with RNP.
24 Attached as Exhibit 301 is a current list of RNP's board

1 of directors. More information can be obtained at our
2 website, <<http://www.rnp.org>>.

3 Q. PLEASE DESCRIBE YOUR PROFESSIONAL BACKGROUND AND
4 EXPERIENCE.

5 A. I have bachelor's and master's degrees in physics from
6 Western Washington University and the University of New
7 Hampshire respectively. From 1982 to 1997, I worked at
8 Bonneville Power Administration as a Power Systems
9 analyst, and a Power Resources Division manager. From
10 1997 to 2006 I worked for PacifiCorp in a variety of
11 roles including power system planning, fundamentals
12 analysis, structuring and pricing analyst, and renewable
13 resource contract originator. In this capacity, I was
14 the lead analyst for developing pricing of PacifiCorp's
15 wind integration services and wind integration cost
16 analysis contained in PacifiCorp's 2003-2007 Integrated
17 Resource Plans. I have authored or coauthored papers on
18 a variety of power system topics, including wind
19 integration, streamflow forecasting, power system risk
20 management, power system reliability and adequacy
21 assessment.

22 Q. WHAT SPECIFIC EXPERIENCE DO YOU HAVE RELATED TO THIS
23 PROCEEDING?

1 A. I was the lead staff person at RNP in reviewing filings
2 and proposals in this matter since Avista filed its
3 application in April 2007. I served as the technical
4 analyst in this case both for RNP and for NW Energy
5 Coalition. Had this case proceeded to a technical
6 hearing, I would have served as expert witness before the
7 Commission in this case and the related cases involving
8 Idaho Power and PacifiCorp. I attended the public
9 workshops for the Northwest Wind Integration Action Plan,
10 as well as the workshops and settlement conferences in
11 this case and was very active in providing feedback,
12 criticism, and suggestions to Avista on the Wind
13 Integration Study. Outside of workshops and settlement
14 conferences, I had regular and frequent communications
15 with Avista technical staff concerning the Wind
16 Integration Study filed in this docket.

17 Q. WHAT IS THE SUBJECT OF YOUR TESTIMONY?

18 A. I will explain and express RNP's and NW Energy
19 Coalition's support for the settlement stipulation
20 ("Stipulation") in this docket.

21 Q. PLEASE SUMMARIZE YOUR PERSPECTIVE ON WIND INTEGRATION
22 ANALYSIS.

23 A. Utility integration of large amounts of wind energy
24 entails system costs due to the relative variability and

1 unpredictability of wind generation output. Wind
2 generation can change relatively rapidly on a timescale
3 of roughly several minutes to a few hours. When the wind
4 suddenly changes, other generating plants on the system
5 have to change their output to compensate. The
6 availability and movement of the balancing resources
7 represents a system level cost of wind integration. The
8 amount of such cost is dependent upon numerous factors,
9 including: (a) the quality and relative amount of wind
10 resources on the system; (b) the other resources
11 available to a utility; (c) the nature and accessibility
12 of energy markets, including whether sub-hour
13 transactions are possible; (d) the market price of energy
14 at any given time; (e) the nature and availability of
15 wind forecasting tools; and (f) the decisions of utility
16 system operators in managing wind on the power system.

17 Analysis of the cost of wind integration is a
18 relatively new endeavor, though the general problem is
19 not new. For example, mathematically, there is little
20 difference between how some run-of-river hydropower
21 projects and wind generation impact the power system and
22 wind. Nevertheless, few utilities have done a
23 comprehensive analysis of system costs associated with
24 run-of-river hydro, such as has been proposed for wind.

1 There is now a growing body of work on wind integration
2 that can be referenced. There is a range of
3 sophistication among the approaches, and Avista chose to
4 undertake a highly sophisticated, and highly complex
5 analysis. The obvious advantage of more complex analysis
6 is that it may capture nuances in power system
7 interactions that might be missed in a simpler analysis.
8 On the other hand, complex analyses such as Avista's
9 provide many more opportunities for disagreements on the
10 assumptions used in the analysis. The proposed
11 stipulation properly sets a path forward for wind
12 integration to be addressed in conjunction with the IRP
13 process. RNP looks forward to participating in that
14 process.

15 Q. DO YOU HAVE CONTINUING CONCERNS WITH THE RESULTS OF
16 AVISTA'S WIND INTEGRATION STUDY?

17 A. Yes. There are some outstanding issues of potentially
18 significant impact on the results of the analysis. I
19 offer these to demonstrate some of the ongoing disputed
20 issues among the parties, and to show why the integration
21 charges reflected in the settlement stipulation, together
22 with ongoing review of wind integration issues, represent
23 a reasonable resolution of this case.

1 One of the most difficult complexities in these
2 kinds of studies is related to the development of assumed
3 wind generation data for hypothetical wind projects that
4 have not yet been (and may never be) constructed. The
5 Avista study was based on historical wind speed data from
6 Northwest sites. The conversion from wind speed to wind
7 generation in computer modeling is a somewhat complex
8 and, in my view, poorly understood problem. In my
9 opinion, the resulting statistical characteristics of
10 Avista's generation data indicates that the process used
11 to produce wind generation data has overestimated the
12 variability that would be experienced by actual wind
13 resources. Wind integration costs are mainly dependent on
14 wind generation variability, so an overestimate in this
15 parameter would have a very significant effect on the
16 results.

17 The next area of substantial dispute is with
18 Avista's addition of the different components of reserve
19 requirements. The total reserve requirements should be
20 computed directly, or estimated as the square-root of the
21 sum of the squares. Avista maintains that these
22 alternative approaches do not significantly change the
23 result, and RNP disputes that.

1 Another area of dispute is over Avista's
2 optimization algorithm. Avista contends that it is
3 necessary to optimize the planned operation of their
4 power system based on wind forecasts produced more than
5 an hour prior to the operating hour. However, in my
6 experience it likely is not necessary for them to set
7 schedules for hydro operations until 20-30 minutes prior
8 to the hour. In my view, Avista's optimization algorithm
9 could better take advantage of the wind forecast
10 information, which would likely result in lower estimated
11 wind integration costs.

12 Resolution of these issues is best conducted through
13 the informal IRP-related processes described in the
14 Stipulation. Given the likely effect of all the
15 outstanding issues, the integration costs reflected in
16 the Stipulation are a reasonable compromise of disputed
17 issues.

18 Q GIVEN THE ADMITTED UNCERTAINTIES IN WIND INTEGRATION
19 STUDIES, ARE THERE CIRCUMSTANCES UNDER WHICH THE
20 CALCULATED COSTS ARE LOWER THAN THE COSTS ACTUALLY
21 INCURRED BY IDAHO POWER?

22 A. There a few factors that could push the costs higher than
23 the costs identified in the settlement stipulation.
24 Principal among these is wind plant construction at

1 penetration levels much higher than the upper tier in the
2 negotiated settlement. However, it is unlikely that the
3 penetration could reach such high levels prior to Avista
4 having an opportunity to review the integration cost
5 issue with the Commission. We welcome continuing
6 reviews of wind integration cost analysis.

7 Q. IN THIS CASE, HAVE YOU SIMPLY PUSHED FOR THE LOWEST
8 POSSIBLE INTEGRATION COST?

9 A. No. The most accurate estimate of wind integration is to
10 the advantage of all three affected parties: the
11 utilities, ratepayers, and the wind industry. If the
12 integration cost is assumed to be artificially high, less
13 wind will be built, and utilities and ratepayers will
14 miss out on the economic advantages of a competitively-
15 priced, clean generating resource with zero fuel costs.
16 However, it is to the wind industry's benefit to ensure
17 that utilities plan for, finance, and operate a power
18 system capable of accommodating wind as a significant
19 energy resource. It is important for the wind industry
20 to advance understanding of wind integration costs and
21 operations on utility systems. Wind's relative
22 variability presents a very surmountable challenge to
23 power system operators that must be addressed squarely
24 for the wind industry to continue its rapid maturation.

1 The wind integration workshops sponsored by Idaho Power
2 and the Northwest Wind Integration Action Plan technical
3 workgroups presented an excellent forum for both the wind
4 industry and power system operators to understand the
5 issues more clearly. All parties learned much from the
6 process, and we hope to keep those lines of communication
7 open as Idaho Power gains experience with additional wind
8 on its system. Any power system disturbance that can be
9 traced back to insufficient planning for wind will
10 ultimately be of enormous detriment to the wind industry.
11 We need to understand the costs, the challenges, and the
12 solutions as accurately as possible.

13 Q. PLEASE EXPLAIN WHY THE SETTLEMENT STIPULATION IN THIS
14 CASE PROPOSES A TIERED APPROACH, WHILE RNP'S SETTLEMENT
15 WITH PACIFICORP IS NOT TIERED.

16 A. In my view, both approaches are reasonable. All else
17 being equal, integration costs tend to rise with
18 increases in penetration level. PacifiCorp presently has
19 significant amounts of wind on its system and a goal of
20 reaching approximately 20% wind penetration that it is
21 actively pursuing through the additions of large wind
22 projects to the utility portfolio. A tiered approach
23 tailors integration costs better to intermediate
24 penetration levels, whereas PacifiCorp's single cost

1 simply averages the integration cost over a single large
2 tier. In addition, the results of PacifiCorp's wind
3 integration study are much less disputed than Avista's or
4 Idaho Power's. The tiered approach is a reasonable
5 compromise and sharing of risks in light of Idaho Power's
6 and Avista's studies and projected wind acquisitions.

7 Q. DO YOU HAVE A SPECIFIC RECOMMENDATION FOR THE COMMISSION?

8 A. Yes. RNP and the NW Energy Coalition recommend the
9 Commission approve the Stipulation.

10 Q. DOES THIS CONCLUDE YOUR TESTIMONY?

11 A. Yes.

Renewable Northwest Project

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