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BEFORE THE IDAHO PUBLIC UTILITIES COMMISSION

IN THE MATTER OF THE APPLICATION	)	CASE NO. AVU-E-17-01
OF AVISTA CORPORATION FOR THE	)	
AUTHORITY TO INCREASE ITS RATES	)	
AND CHARGES FOR ELECTRIC AND	)	
NATURAL GAS SERVICE TO ELECTRIC	)	DIRECT TESTIMONY
AND NATURAL GAS CUSTOMERS IN THE	)	OF
STATE OF IDAHO	)	CLINT G. KALICH
	)	

FOR AVISTA CORPORATION

(ELECTRIC ONLY)

I. INTRODUCTION

Q. Please state your name, the name of your employer, and your business address.

A. My name is Clint Kalich. I am employed by Avista Corporation at 1411 East Mission Avenue, Spokane, Washington.

Q. In what capacity are you employed?

A. I am the Manager of Resource Planning & Power Supply Analyses in the Energy Resources Department of Avista Utilities.

Q. Please state your educational background and professional experience.

A. I graduated from Central Washington University in 1991 with a Bachelor of Science Degree in Business Economics. Shortly after graduation, I accepted an analyst position with Economic and Engineering Services, Inc. (now EES Consulting, Inc.), a Northwest management-consulting firm located in Bellevue, Washington. While employed by EES, I worked primarily for municipalities, public utility districts, and cooperatives in the area of electric utility management. My specific areas of focus were economic analyses of new resource development, rate case proceedings involving the Bonneville Power Administration, integrated (least-cost) resource planning, and demand-side management program development.

In late 1995, I left Economic and Engineering Services, Inc. to join Tacoma Power in Tacoma, Washington. I provided key analytical and policy support in the areas of resource development, procurement, and optimization, hydroelectric operations and re-licensing, unbundled power supply rate-making, contract negotiations, and system operations. I helped develop, and ultimately managed, Tacoma Power's industrial market access program serving one-quarter of the company's retail load.

In mid-2000 I joined Avista Utilities and accepted my current position assisting the Company in resource analysis, dispatch modeling, resource procurement, integrated resource planning, and rate case proceedings. Much of my career has involved resource dispatch modeling of the nature described in this testimony.

Q. What is the scope of your testimony in this proceeding?

A. My testimony will describe the Company's use of the $AURORA_{XMP}$ dispatch model, or "Dispatch Model." I will explain the key assumptions driving the Dispatch Model's market forecast of electricity prices. The discussion includes the variables of natural gas, Western Interconnect loads and resources, and hydroelectric conditions. I will describe how the model dispatches its resources and contracts to maximize customer benefit and tracks their values for use in pro forma calculations. Finally, I will present the modeling results provided to Company witness Mr. Johnson for his power supply pro forma adjustment calculations.

Q. Are you sponsoring any exhibits in this proceeding?

A. Yes. I am sponsoring one exhibit marked Exhibit No. 5, Confidential Schedule 1C. It provides summary output from the Dispatch Model and data that are used by Mr. Johnson as input for his work. All information contained in the exhibit was prepared under my direction.

II. THE DISPATCH MODEL

Q. What model is the Company using to dispatch its portfolio of resources and obligations?

A. The Company uses EPIS, Inc.'s $\text{AURORA}_{\text{XMP}}$ market forecasting model ("Dispatch Model") and its associated database for determining power supply costs.[1] The Dispatch Model optimizes Company-owned resource and contract dispatch

[1] The Company uses $\text{AURORA}_{\text{XMP}}$ version 12.2.1050 with a Windows 7 operating system.

during each hour of the January 1, 2018 through December 31, 2018 pro forma year.

Q. Please briefly describe the Dispatch Model.

A. The Dispatch Model was developed by EPIS, Inc. of Sandpoint, Idaho. It is a fundamentals-based tool containing demand and resource data for the entire Western Interconnect. It employs multi-area, transmission-constrained dispatch logic to simulate real market conditions. Its true economic dispatch captures the dynamics and economics of electricity markets—both short-term (hourly, daily, monthly) and long-term. On an hourly basis the Dispatch Model develops an available resource stack, sorting resources from lowest to highest cost. It then compares this resource stack with load obligations in the same hour to arrive at the least-cost market-clearing price for the hour. Once resources are dispatched and market prices are determined, the Dispatch Model singles out Avista resources and loads and values them against the marketplace.

Q. What experience does the Company have using AURORA$_{XMP}$?

A. The Company purchased a license to use the Dispatch Model in April 2002. AURORA$_{XMP}$ has been used for numerous studies, including each of its integrated resource plans and rate filings after 2001. The tool is also used for various resource evaluations, market forecasting, and requests-for-proposal evaluations.

Q. Who else uses $AURORA_{XMP}$?

A. $AURORA_{XMP}$ is used all across North America, Europe, and the Middle East. In the Northwest specifically, $AURORA_{XMP}$ is used by the Bonneville Power Administration, the Northwest Power and Conservation Council, Puget Sound Energy, Idaho Power, Portland General Electric, PacifiCorp, Seattle City Light, Grant County PUD, and Snohomish County PUD.

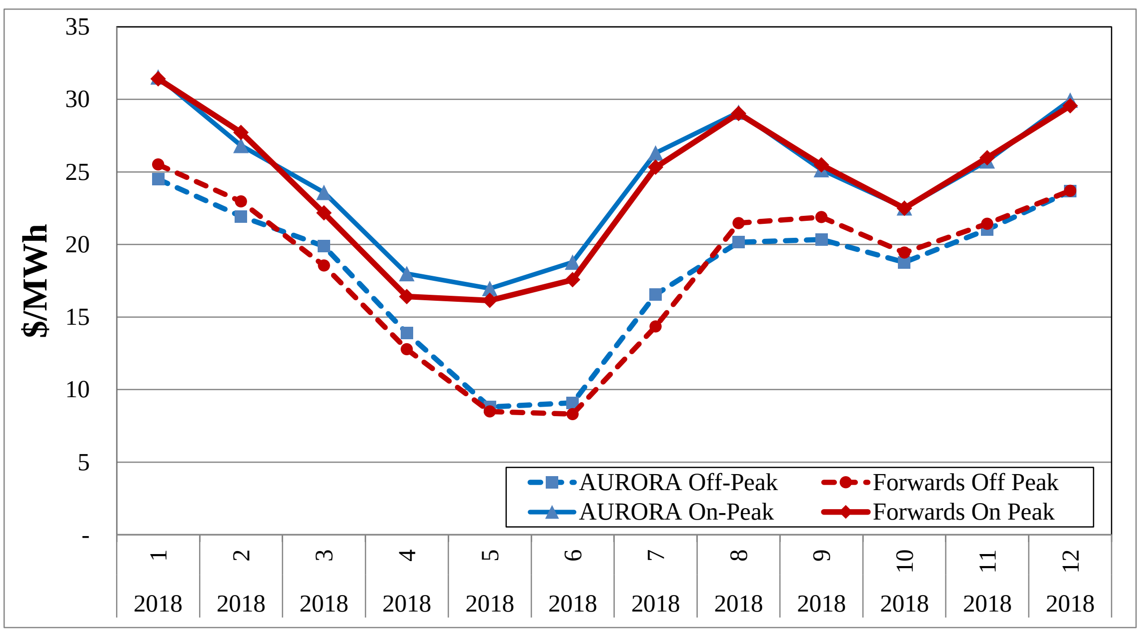
Q. What benefits does the Dispatch Model offer for this type of analysis?

A. The Dispatch Model generates hourly electricity prices across the Western Interconnect, accounting for its specific mix of resources and loads. The Dispatch Model reflects the impact of regions outside the Northwest on Northwest market prices, limited by known transfer (transmission) capabilities. Ultimately, the Dispatch Model allows the Company to generate price forecasts in-house instead of relying on exogenous forecasts.

The Company owns a number of resources, including hydroelectric plants and natural gas-fired peaking units serving customer loads during more valuable on-peak hours. By optimizing resource operation on an hourly basis, the

Dispatch Model is able to appropriately value the capabilities of these assets. Forward prices for the pro forma 2018 period are 32% higher in the on-peak hours than the off-peak hours at the time this case was prepared. The Dispatch Model forecasts on-peak prices for the pro forma period to average 35% higher than off-peak prices, a figure very close to forwards. A graphical representation of the differences in on- and off-peak prices over the pro forma period is shown below in Illustration No. 1.

Illustration No. 1 – Monthly AURORA modeled versus forward Mid-C Prices



Forward Mid-Columbia prices shown are the latest one month average (March 1, 2017 through Mar 31, 2017) of Intercontinental Exchange (ICE) quarterly prices at the time the study was prepared.

Dispatch Model and forward prices can and sometimes will differ, as forward prices are based on market expectations whereas the data used in the Dispatch Model are normalized for hydro, loads, and resource outages. Where the market expects a low hydro year forthcoming, forward market prices could be higher than Dispatch Model prices. Referring back to Illustration No. 1, the average price for the 2018 forward period is $21.53 per MWh; the Dispatch model result is $21.84 per MWh. These results explain that the market is not forecasting a bias in future conditions (e.g., a low hydro year). The Dispatch Model therefore provides a very close approximation to what the actual market is predicting, and provides a good data set for the pro forma.

Q. On a broader scale, what calculations are being performed by the Dispatch Model?

A. The Dispatch Model's goal is to minimize overall system operating costs across the Western Interconnect, including Avista's portfolio of loads and resources. The Dispatch Model generates a wholesale electricity market price forecast by evaluating all Western Interconnect resources simultaneously in a least-cost equation to meet regional loads. As the Dispatch Model progresses from hour to hour, it "operates" those least-cost resources necessary to meet load. With respect to the Company's portfolio, the

Dispatch Model tracks the hourly output and fuel costs associated with Avista's portfolio generation. It also calculates hourly energy quantities and values for the Company's contractual rights and obligations. In every hour, the Company's loads and obligations are compared to available resources to determine a net position. This net position is balanced using the simulated wholesale electricity market. The cost of energy purchased from or sold into the market is determined based on the electric market-clearing price for the specified hour and the amount of energy necessary to balance loads and resources.

Q. How does the Dispatch Model determine electricity market prices, and how are the prices used to calculate market purchases and sales?

A. The Dispatch Model calculates electricity prices for the entire Western Interconnect, separated into various geographical areas such as the Northwest and Northern and Southern California. The load in each area is compared to available resources, including resources available from other areas that are linked by transmission connections, to determine the electricity price in each hour. Ultimately, the market price for an hour is set based on the last resource in the stack to be dispatched. This resource is referred to as the "marginal resource." Given the prominence of natural gas-fired resources on the margin, this fuel is a key variable in the determination of wholesale electricity prices.

Q. How does the Dispatch Model operate regional hydroelectric projects?

A. The model begins by "peak shaving" loads using hydro resources with storage. When peak shaving, the Dispatch Model determines the hours with the highest loads and allocates to them as much hydroelectric energy within the constraints of the hydro system. Remaining loads are then met with other available resources.

Q. Has the Company made any modifications to the EPIS database for this case?

A. Yes. As we have in the past, Avista's resource portfolio is modified from EPIS' default database to reflect actual project operating characteristics. Also, natural gas prices are modified to match the latest one month average of forward prices over the pro forma period, regional resources and loads are modified where better information is made available, and Northwest hydro data are replaced with Bonneville Power Administration data. The EPIS database is modified to include various assumptions used in the Company's 2017 Integrated Resource Planning process and other new resource information where available.

Q. Has the Company made any changes to the way it models hydro in this case compared to prior cases?

A. No it has not.

Q. How does the AURORA$_{XMP}$ Dispatch Model operate Company-controlled hydroelectricity generation resources?

A. The Dispatch Model dispatches all hydro resources first through an algorithm that matches generation to load. To account for the actual flexibility of Company hydroelectricity resources, Avista develops individual hydro operations logic for each of its facilities. This separation ensures that the flexibility inherent in these resources is credited to customers in the pro forma exercise.

Q. Please compare the operating statistics from the Dispatch Model to recent historical hydroelectric plant operations.

A. Over the pro forma period the Dispatch Model generates 67% of Clark Fork hydro generation during on-peak hours (based on average water). Since on-peak hours represent only 57% of the year, this demonstrates a substantial shift of hydro resources to the more expensive on-peak hours. This is identical to the five-year historical average of on-peak hydroelectric generation at the Clark Fork through December 2016. Similar relative performance is achieved for the Spokane and Mid-Columbia projects.

III. OTHER KEY MODELING ASSUMPTIONS

Q. Please describe your update to pro forma period natural gas prices.

A. Consistent with past general rate case filings, natural gas prices are based on a one-month average of forward prices; in this case from March 1, 2017 through March 31, 2017 for calendar-year 2018 monthly forward prices. Natural gas prices used in the Dispatch Model are presented below in Table No 1.

Table No. 1 – Pro Forma Natural Gas Prices

Basis	Price ($2018/dth)	Basis	Price ($2018/dth)
AECO	2.01	Stanfield	2.62
Malin	2.70	Sumas	2.43
Spokane	2.77	Henry Hub	3.02
Rockies	2.63	S. Calif.	2.80

Q. What is the Company's assumption for rate period loads?

A. Consistent with prior general rate case proceedings, historical loads are weather-adjusted. For this filing weather normalized 2016 load is 1,042.9 average megawatts compared to actual loads of 1,030.3. In addition to the load adjustment, loads were reduced by 2.3 aMW each month to adjust for reduction of load at a large Idaho industrial customer. Table No. 2 below details data included in this proceeding. Further information on the weather normalization is within Company witness Ms. Knox's testimony.

Table No. 2 – Pro Forma Loads

Month	Actual Load	Customer Adjustment	Weather Adjustment	Modeled Load
Jan-18	1,187.2	-2.3	18.7	1,203.6
Feb-18	1,130.5	-2.3	51.8	1,180.0
Mar-18	1,021.8	-2.3	28.0	1,047.5
Apr-18	921.2	-2.3	50.4	969.3
May-18	910.0	-2.3	29.0	936.7
Jun-18	979.6	-2.3	-35.7	941.7
Jul-18	1,017.9	-2.3	31.2	1,046.8
Aug-18	1,063.2	-2.3	-25.2	1,035.7
Sep-18	918.0	-2.3	23.4	939.1
Oct-18	952.3	-2.3	4.4	954.4
Nov-18	1,018.3	-2.3	55.7	1,071.7
Dec-18	1,244.7	-2.3	-49.4	1,193.0

Q. Please discuss your outage assumptions for the Colstrip units.

A. As with our assumptions for other plants, and consistent with prior cases, Avista uses the most recent available five-year average forced outage rate to estimate long-run performance at the Colstrip plant. The 11.21% forced outage rate is based on the average outages for 2012 through 2016. Maintenance outages use the six-year average of planned outages. Six years is used because the plant maintenance schedule is every three years.

Q. Are there any other significant modeling changes from the last rate filing?

A. No.

<u>IV. RESULTS</u>

Q. Please summarize the results from the Dispatch Model.

A. The Dispatch Model tracks the Company's portfolio during each hour of the pro forma study. Fuel costs and generation for each resource are summarized by month. Total market sales and purchases, and their revenues and costs, are also determined and summarized by month. These values are contained in Exhibit No. 5, Confidential Schedule 1C and were provided to Mr. Johnson for use in his calculations. Mr. Johnson adds resource and contract revenues and expenses not accounted for in the Dispatch Model (e.g., fixed costs) to determine net power supply expense.

Q. Does this conclude your pre-filed direct testimony?

A. Yes, it does.