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January 6, 2017

Public Utility Commission of Oregon
Filing Center
201 High Street SE, Suite 100
P.O. Box 1088
Salem, Oregon 97301

RE: UM 1675 - Idaho Power Company's 2016 Smart Grid Report
Idaho Power's Reply Comments

Attention Filing Center:

Attached for filing is an electronic copy of Idaho Power Company's Reply Comments in the above-referenced matter.

Informal questions concerning this filing may be directed to me or Regulatory Affairs Analyst, Kristy Patteson, at 208-388-2982 or kpatteson@idahopower.com.

Sincerely,

Lisa D. Nordstrom

LDN:kkt

Enclosure

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BEFORE THE PUBLIC UTILITY COMMISSION OF OREGON

UM 1675

In The Matter of IDAHO POWER COMPANY, 2016 Annual Smart Grid Report.	**IDAHO POWER COMPANY'S REPLY COMMENTS**

I. INTRODUCTION

Idaho Power Company ("Idaho Power" or "Company") respectfully submits these Reply Comments to the Public Utility Commission of Oregon ("Commission"), in response to comments submitted by the Commission Staff ("Staff") and the Oregon Department of Energy ("ODOE") (collectively "Parties") on November 22, 2016, in regards to Idaho Power's 2016 Smart Grid Report ("Report").

The Report satisfies the Commission's requirements and responds to the recommendations adopted by the Commission in Idaho Power's 2015 Smart Grid Report proceeding.[1] Idaho Power requests that the Commission accept the Company's 2016 Smart Grid Report as having met the requirements of Order No. 12-158 established in Docket No. UM 1460 and Order No. 16-045 established in Docket No. UM 1675.

II. DISCUSSION

The Company appreciates the comments submitted by the Parties and in addition to responding to recommendations made by Staff and the ODOE, these Reply Comments provide more detail and clarification in specific areas where the Parties indicated they would like more information.

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[1]Re Idaho Power Company's 2015 Smart Grid Report, UM 1675, Order No. 16-045 (February 4, 2016)

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A. Time-of-Day Pricing Plan

Idaho Power has been working to design a time-of-day ("TOD") pilot that can be offered to Idaho Power's residential customers in Oregon in response to Staff's Recommendation No. 2.[2] As reported on pages 39 and 40 of the 2016 Smart Grid Report, the Company is in the process of developing seasonally differentiated time blocks and the associated TOD rates. In it comments, Staff expressed its concern that "without (the Company) bringing preliminary analysis to the attention of Staff, it will be too late for Staff and stakeholders to provide input on the programs."[3] While the Company has taken the initial steps to better understand the goals of a TOD pilot program and to analyze the underlying data, Idaho Power fully intends to work with Staff before finalizing the TOD design.

Idaho Power's experience has been that it is often more productive and efficient for the Company to prepare a draft proposal for Stakeholder consideration and to facilitate discussion and the Company is currently working on this. Idaho Power desires to approach this recommendation in two steps: (1) to collaborate with Staff on the TOD rate design and (2) to work with Staff on the behavioral component of the offering.

Idaho Power's analysis to date has primarily focused on studying the hourly net power supply expenses ("NPSE") in order to reflect accurate costs to serve its customers. The Company is using the variable power supply cost time block differentials to reflect the appropriate cost structure for the TOD pilot. Prior to the last few years, Idaho Power was not able to analyze hourly NPSE information due to the voluminous nature of this data. However, due to advances in the Company's ability to utilize the output of its AURORA

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[2] Staff's Recommendation No. 2 adopted in Order No. 16-045 recommended Idaho Power "work with Staff to investigate, design and implement a TOD pilot that may include behavioral components that can be offered to Idaho Power residential customers if determined feasible."

[3] Staff's Comments, p. 3.

modeling software, Idaho Power can now utilize this hourly data to shape time differentiated energy rates.

The AURORA model is a comprehensive electric resource dispatch model that simulates the economic dispatch of the Company's resources to determine NPSE. Normalized power supply expenses are calculated by modeling a test period under multiple water conditions. For the TOD design, the Company modeled NPSE over 87 water conditions for an April 2016-March 2017 test period. NPSE were modeled in AURORA on an hourly basis to reflect the cost of serving Idaho Power's customers at various times throughout the year on a seasonal, monthly, and hourly basis.

In its comments, Staff also referred to a discovery request[4] regarding the Company's TOD pilot. Staff commented that the Company "seems to imply that . . . it will identify which customers would benefit from a TOD offering."[5] The Company believes that there may have been a misunderstanding. After the time-of-use ("TOU") rates have been developed using historical, aggregated residential customer class usage data, Idaho Power will apply the proposed rates to actual, hourly customer billing data to assess potential bill impacts and identify which types of customers based on usage may benefit from a TOU rate offering.

As soon as Idaho Power has a draft proposal for the TOD rate design, the Company plans to meet with Staff to get its feedback and suggestions before finalizing the TOD rate design and moving to develop the behavioral component of the offering.

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[4] The Company's response to Staff's Data Request No. 31.a stated that "Once the TOU rate design is finalized, Idaho Power will use actual, hourly customer billing data to assess potential customer bill impacts and identify which customers may benefit from a TOU rate offering."

[5] Staff's Comments, p. 3.

B. Transmission Situational Awareness

1. Optimal Phasor Measurement Unit ("PMU") Placement

In its response to Staff's Recommendation No. 4,[6] the Company provided a draft report titled, *Optimal PMU Placement to Achieve Full Observability of Idaho Power Co. System*. The report was prepared by V&R Energy Systems Research, Inc. and explains the methodology for finding optimal PMU placement. In its comments, Staff noted that it was satisfied that the Company properly responded to Recommendation No. 4 but asked that the Company "clarify whether it intends on installing PMUs in all of these locations or whether it is still in the process of evaluating optimal locations."[7]

Idaho Power does take into consideration the results of the observability study to identify future installation locations. This information is used in conjunction with several other sources of information including generation interconnection locations, which of Idaho Power's generation facilities are without PMUs, as well as selected synchrophasor applications. The initial plan for deploying PMUs is based on having visibility across Idaho Power's 230 kilovolt and above system. The plan is to eventually have a PMU at each one of these transmission stations.

Additionally, there is a parallel effort to install PMUs at all of Idaho Power's 20 megawatts ("MW") and above power plants; this will provide disturbance data that Idaho Power can use to validate model parameters for plant/generator control equipment to both comply with North American Electric Reliability Council Reliability Standard requirements and to improve the generator dynamic models used for Idaho Power's study work (i.e., when simulating system performance to potential disturbances).

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[6] Staff's Recommendation No. 4 adopted in Order No. 16-045 recommended Idaho Power "provide the observability methodology document as an attachment to the ensuing smart grid report."

[7] Staff's Comments, p. 5

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The priority at this point is to install the five PMUs identified in the following table for the Transmission Situational Awareness Oscillation Monitoring Pilot and generator model validation program.

Location	Installation Date	Justification
Bennet Mountain	By May 2017	Power plant above 20 MW
Danskin	By May 2017	Power plant above 20 MW
North Powder	By May 2017	Power plant above 20 MW
CJ Strike	By May 2017	Power plant above 20 MW
American Falls	By May 2017	Power plant above 20 MW

The installation of the PMUs listed above will complete the Company's present installation plan. Idaho Power will focus on deployment of operational synchrophasor applications before developing a plan for future PMU installations.

2. Voltage Stability Monitoring and Control Pilot

Staff's Recommendation No. 5 adopted in Order No. 16-045 recommended that Idaho Power "provide updates on the LSE and the real-time voltage stability monitoring and control (RT-VSMAC) application in future Smart Grid Reports." To satisfy this recommendation, Idaho Power included the quarterly Peak Reliability Synchrophasor Program ("PRSP") project status report as Appendix J of the 2016 Smart Grid Report. In its comments, Staff requested that the Company "provide a narrative explaining Appendix J and include any updates as to the RT-VSMAC."[8]

Appendix J of the 2016 Smart Grid report is the 2016 second quarter progress report, "Quarterly PRSP Project Status" submitted to Peak RC on July 8, 2016, concerning the work that Idaho Power completed during the quarter as a participant of the PRSP. This progress report was Idaho Power's update on the Linear State Estimator ("LSE") and the RT-VSMAC application.

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[8] *Id.*

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To date, there are no new developments with the LSE and the RT-VSMAC applications. Presently, Idaho Power has a working version of the Region of Stability Existence program without the LSE. Idaho Power continues to work with the vendor on the LSE portion of this tool without a specific timeline for implementation. Idaho Power appreciates Staff's comments and will continue to provide updates on the LSE and the RT-VSMAC application in future smart grid reports.

In its comments, the ODOE requested that Idaho Power "share insights gained through participation in the U.S. Department of Energy research and demonstration grant for a new synchrophasor-based grid management software application."[9] While collaborating with other utilities across the West to enhance grid reliability, Idaho Power has gained the following insights through the demonstration grant.

- The reliable measurement of, transmission of, and management of synchrophasor data is the required foundation for any synchrophasor-based grid management software application.
- Utilities have developed custom synchrophasor applications or worked with universities and vendors to develop utility specific applications.
- There are few vendor supported synchrophasor applications for real-time operations support.
- The present vendor supported applications provide nominal additional operating value to the existing state estimator and SCADA systems.
- The future holds promise for advances in operations-specific synchrophasor applications.

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[9] ODOE's Comments, p. 5.

3. Peak RC Hosted Advanced Application

In its comments, the ODOE requests that Idaho Power "share its industry leadership in overcoming internal challenges and barriers to the increased use of data streams to better manage the transmission system."[10] Idaho Power appreciates ODOE's interest in understanding these challenges. The development and deployment of new data stream applications, e.g., Peak RC Hosted Advanced Applications and synchrophasors that support Idaho Power transmission operations has been a collaborative effort between its Planning and Grid Operations departments. New applications are used by planning engineers prior to deployment for grid operators due to the higher dependability requirements of real-time operations. The Company has not experienced any internal challenges based on this collaborative approach. Present challenges lie with university applications that have been novel but are not robust enough for operational use, along with the slow development of robust vendor supported applications.

C. <u>Quantification of Smart Grid Benefits</u>

In its response to Staff's Recommendation No. 6,[11] Idaho Power referred to a table in Appendix H where it identified the metrics used to quantify the benefits for all smart grid projects. In its comments, Staff requested that Idaho Power "address whether it differentiated between cost-savings metrics and quantified benefits in Appendix H."[12] The Company did not identify different metrics to determine possible AMI-related cost-savings. The Company determined the benefit and cost associated with each smart grid project

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[10] *Id.*

[11] Staff's Recommendation No. 6 adopted in Order No. 16-045 recommended Idaho Power "work with Staff to determine possible AMI-related annual cost saving metrics for future smart grid reports."

[12] Staff's Comments, p. 6.

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and then defined what metric could be used to quantify the benefit. If the benefit was quantifiable in dollars, then the metric is a cost-savings metric.

D. myAccount

In its comments, Staff requested that Idaho Power "identify possible opportunities for future DSM personalization features in myAccount."[13] Idaho Power believes a Customer Relationship Management ("CRM") application, with access to multiple data sources and with advanced analytics, has the potential to provide the DSM program personalization that Staff is interested in. DSM program personalization could be accomplished based on a number of customer specific characteristics, including metering data. myAccount could be one of the channels used to educate and inform customers. Idaho Power believes the enhancements made to the graphical display of current-month bill-to-date estimates are an important personalized DSM function within myAccount. Customers have access to their actual energy consumption throughout the current billing period and can manage their demand for energy. Idaho Power is working to implement customized alerts, including energy usage alerts, within myAccount. Customers will have the ability to set usage thresholds, and will be notified if they exceed their set threshold. Finally, customers who complete a home profile within the Savings Center will have access to specific personalized energy savings recommendations. The Savings Center will be a robust tool where customers can drill down to very specific savings opportunities.

E. Solar End-of-Feeder Project

In its comments, Staff requested that the Company "attempt to address the issue of capturing additional benefits of an end-of-feeder project, if such a process exists."[14] The scope and intent of Idaho Power's solar end-of-feeder pilot project is to demonstrate

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[13] *Id.*

[14] *Id.*

that a photovoltaic ("PV") system can be used to cost-effectively raise customers' voltage during peak loading conditions to avoid more expensive mitigation measures such as conductor replacement. The project was optimized for this application and resulted in an 18 kilowatts ("kW") PV system being installed at the end of a distribution circuit. However, this small, optimal system size precluded any benefits beyond deferring a conductor replacement on this distribution circuit. Therefore, based on this result, Idaho Power has not captured any additional benefits of an end-of-feeder project and does not intend to investigate further.

ODOE also commented on Idaho Power's solar end-of-feeder pilot project and requested that Idaho Power "release a more detailed accounting of its cost-benefit analysis for deploying a PV + battery system . . . ."[15] The 12 candidate distribution circuits were merely preliminary candidates for the project based solely on Advance Metering Infrastructure ("AMI") low voltage readings. Each circuit was further evaluated to determine its suitability for the project. In 11 of the 12 circuits, the low voltage was mitigated by more economical means such as adding a regulator, optimizing device settings, or rebalancing load. For the circuit that was chosen, no formal cost-benefit analysis was prepared; rather a simple cost comparison was performed to compare the cost to install the 18 kW PV system versus the cost to reconductor the feeder. The following table lists the evaluation for the 11 other circuits.

Table: Feeder Candidates Not Chosen for Solar end-of-feeder Pilot Project	
Feeder	Evaluation Results
BKAT13	The low voltage on this circuit may be corrected with a voltage regulator setting change or by transferring load to an adjacent feeder.
BOMT41	The low voltage on this circuit may be corrected with the addition of a voltage regulator.

[15] ODOE's Comments, p. 5.

ELMR41	The low voltage on this circuit may be corrected with changing regulator settings, load reallocation, as well as the addition of a voltage regulator.
GOWN42	The low voltage on this circuit was caused by a malfunctioning capacitor controller which was corrected.
HPVY12	The low voltage on this circuit was caused by a load imbalance and was remedied by load reallocation.
NMPA20	The low voltage on this circuit was caused by a malfunctioning voltage regulator which was corrected.
MORA41	The low voltage on this circuit may be corrected with the addition of a voltage regulator.
NMPA19	The low voltage on this circuit may be corrected with the addition of a voltage regulator.
NWPM11	The low voltage on this circuit may be corrected with the addition of a voltage regulator.
PAET11	The low voltage on this circuit may be corrected with the addition of a voltage regulator.
SCSU42	The low voltage on this circuit may be corrected by a voltage regulator setting change.

F. Customer Relationship Management Pilot

In its comments, Staff requested that the Company "provide more details about the CRM pilot program."[16] The Company plans to integrate the CRM Campaign Management functionality in 2017. The CRM project is a component of Idaho Power's Customer Relationship and Billing ("CR&B") system. In order to integrate the CRM module, the Company must first install an enhancement package to the CR&B system. The CR&B upgrade is expected to be complete in early 2017. The integration of the CRM will follow when the CR&B upgrade is complete. Idaho Power foresees that future functionality and ongoing design and structure will be an iterative process. Once the Campaign Management functionality is installed, it will take some time for the Company to populate the system with data as well as familiarize itself with all the capabilities afforded by this product.

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[16] Staff's Comments, p. 7.

The Customer Service Center is currently using some of the other functions of the CRM including Customer Data Management (e.g., phone numbers, email addresses, mailing addresses, identification numbers, and relationships), Customer Movement Management, and as a repository for all customer interaction records. Customer Operations is using CRM to initiate engineering and construction charges. Idaho Power has also begun utilizing CRM to capture the customer preference of utility billing method with paperless billing.

On page 35 of the 2016 Smart Grid Report, the Company provided detail that describes the potential uses for the CRM and also lists the data that the Company expects this pilot project to provide. In summary, the report stated that the objective of incorporating a single CRM system with the CR&B system is to allow Idaho Power to manage and track customer interactions related to energy efficiency and other customer relations activities. The ultimate goal is to increase the effectiveness of Idaho Power's program and service offerings. The Company anticipates that the CRM will retrieve meter usage data, customer data, demographics, program data, and customer preferences. The Company expects that the information will allow Idaho Power to better market its customer programs and service offerings. Idaho Power will continue to provide updates in future smart grid reports after the Campaign Management functionality is installed and the Company begins to realize the benefits of the CRM.

G. Electric Vehicles ("EV")

Idaho Power appreciates ODOE's interest in the Company's corporate fleet of EVs and its deployment of EV chargers. In its comments, ODOE suggested that the Company "evaluate advanced functionality with regard to EVs and EV charging station use by Company employees."[17] Idaho Power continuously monitors the EV and utility industries

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[17] ODOE's Comments, p. 5.

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for advances in capabilities, and use cases that evaluate EV-related advances. Based on this monitoring, Idaho Power does not believe the advanced functions are currently mature enough to consider for evaluations with employees.

The ODOE also suggested in its comments that the Company "evaluate the potential benefits that could be achieved by requiring its employee EV drivers to pay for charging based on time-of-use (TOU) rates."[18] The goal of the employee EV workplace charging pilot program is to gain experience in establishing and operating workplace charging. This will allow Idaho Power to share its experience with business customers who consider workplace charging programs. The Company will track the number of charging events and the amount of energy used by employees at each workplace charging station. This data will be shared with business customers who consider work place charging and assist in future assessments of EV charging demand and fees. Idaho Power will re-evaluate the guidelines for the pilot program as the Company gains experience.

H. Advanced Metering Infrastructure

1. Real-Time Data

In its comments, the ODOE suggested that Idaho Power "explore opportunities to deliver real-time data to customers . . . ."[19] Idaho Power's automated meter reading system deployed for primary service customers (typically loads over 750 kW) provides energy pulse output directly from the meter to the customer at no additional charge. However, in order for the customer to receive the data real-time, the customer would need to purchase and install a system to receive the data. These systems are commercially available and will transmit the data wirelessly to a display.

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[18] ODOE's Comments, p. 3.

[19] ODOE's Comments, p. 5.

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The AMI deployed in Oregon (and Idaho) for mass market retail customers does not have the wireless communication capability required to support the local delivery of real-time or near real-time meter data. Customers who have secondary service can request to receive pulse output data. This service would be provided to them for an additional monthly charge.

2. Leveraging Smart Grid Data

The ODOE also commented on the potential for Idaho Power to "leverage smart grid data to target customer participation in a broader array of programs."[20] Idaho Power is seeking to enhance current internal marketing applications and processes to allow the Company to manage and track customer interactions related to energy efficiency in order to increase the effectiveness of Idaho Power's program and service offerings. This will be accomplished with the upcoming integration of the CRM with Idaho Power's CR&B system. The integration is expected to be complete during 2017. The Company will include updates in future smart grid reports as Idaho Power makes progress in this area.

I. <u>Photovoltaic and Feeder Peak Demand Alignment Pilot</u>

Idaho Power appreciates ODOE's support of the Company's evaluation of non-south facing solar PV systems. In its comments, ODOE requested that Idaho Power "share the results of its evaluation of non-south facing PV in charts or graphs for greater impact."[21] Figure 1 below includes the kernel density graphs for the southerly facing sensor at one of the weather stations used for this study and Figure 2 includes the kernel density graphs for the westerly facing sensor. These graphs represent the cross correlation of solar irradiance and feeder load for all summer season days of the study both two-dimensionally and three-dimensionally. Both graphs are included to show the

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[20] *Id.*

[21] *Id.*

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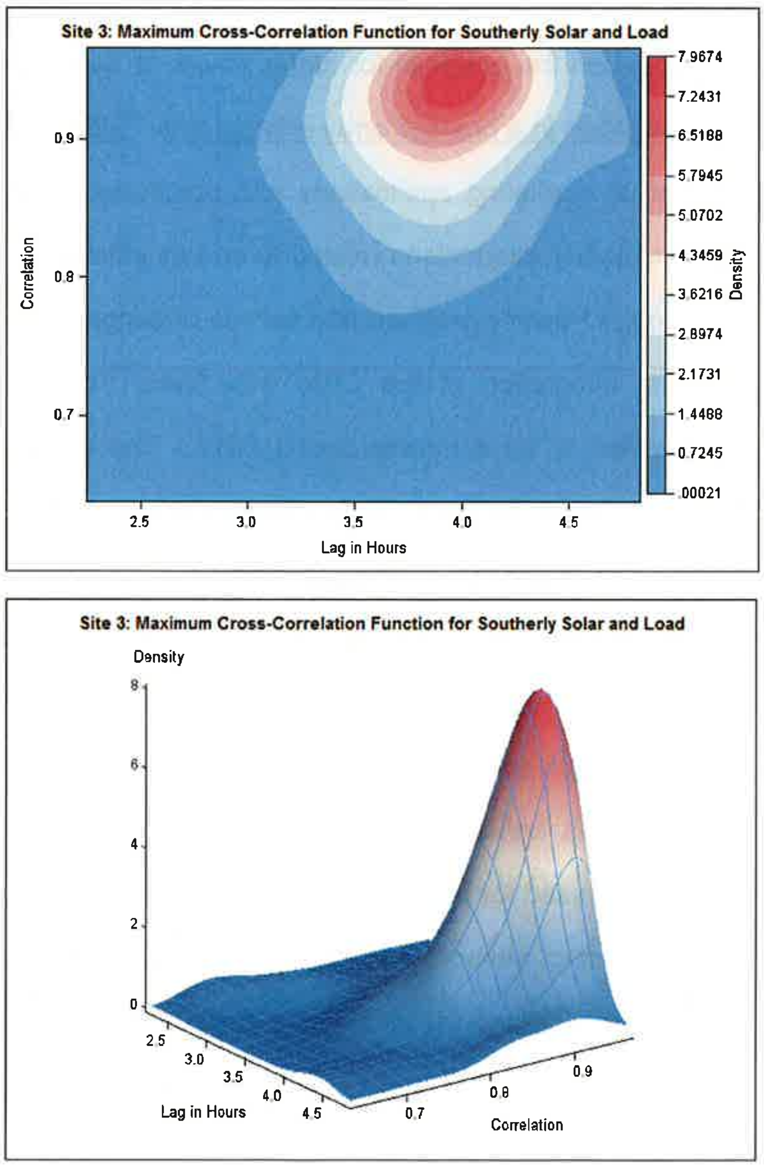
contrast of the southerly facing and westerly facing sensors. Both show a good solar irradiance correlation, greater than 0.9 with feeder load, with the southerly facing sensor irradiance leading the load by about four hours and the westerly facing sensor irradiance

Figure 1: Southerly Cross-Correlation



Lag	Correlation
3.957627	0.943656

leading the load by less than two hours.

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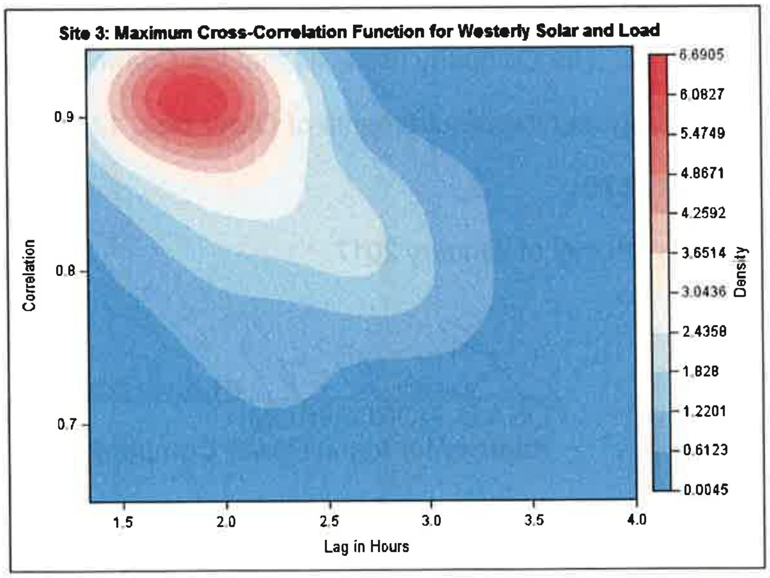
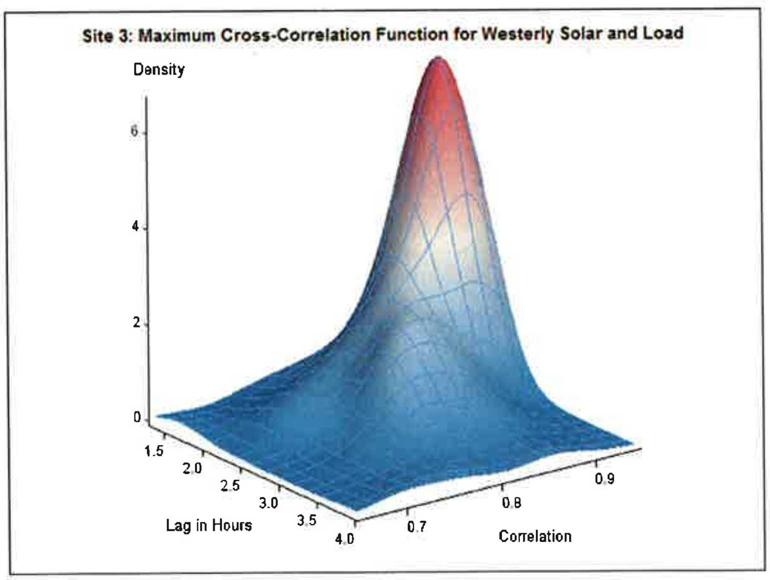
Figure 2: Westerly Cross-Correlation



Lag	Correlation
1.830508	0.914068



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III. **CONCLUSION**

The Company appreciates the opportunity to file these comments and respond to questions raised by Staff and ODOE. The Company requests that the Commission accept its *2016 Smart Grid Report* as having met the requirements of Order Nos. 12-158 and 16-045 established in Docket No. UM 1675.

Respectfully submitted this 6th day of January 2017.

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