BEFORE THE

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UTILITIES COMMISSION

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IN THE MATTER OF THE APPLICATION OF IDAHO POWER COMPANY FOR AUTHORITY TO ESTABLISH NEW SCHEDULES FOR RESIDENTIAL AND SMALL GENERAL SERVICE CUSTOMERS WITH ON-SITE GENERATION	))))))))	CASE NO. IPC-E-17-13

DIRECT TESTIMONY OF MICHAEL MORRISON

IDAHO PUBLIC UTILITIES COMMISSION

DECEMBER 22, 2017

Q. Please state your name and address for the record.

A. My name is Mike Morrison. My business address is 472 West Washington Street, Boise, Idaho.

Q. By whom are you employed and in what capacity?

A. I am employed by the Idaho Public Utilities Commission (Commission) as a Staff Engineer.

Q. Please give a brief description of your educational background and experience.

A. I received a Bachelor of Science degree in Chemical Engineering from the University of Southern California in 1983, a Master of Science degree in Mechanical Engineering from the University of Idaho in 2002, and a Doctor of Philosophy in Geophysics with a Civil Engineering emphasis from Boise State University in 2014. I have been a registered professional engineer in Idaho since 1998. I attended the Electrical Utility Basic Practical Regulatory Program offered by New Mexico State University's Center for Public Utilities.

Between 1988 and 2009, I held a number of engineering positions at Micron Technology, Inc. From 1990 through 1996, I was also a facilities engineer in the Idaho Army National Guard. In that capacity, I oversaw the design, construction, repair, and maintenance of facilities and roads at Gowen Field, the National

Guard's Orchard Training Range, and other National Guard facilities in Southern Idaho.

I began work at the Idaho Public Utilities Commission in 2014. I am the Commission Staff's principal witness in cases involving Cost of Service.

Q What is the purpose of your testimony?

A. I will discuss the Company's proposal to establish two new rate classes for its Residential and Small General Service Net Metering Customers. I will also discuss the Company's proposal to require the installation and operation of smart inverters for all new customer-owned generator interconnections.

Q. Please summarize your testimony.

A. In its Application, the Company argues that there is an intraclass cost shift from net metering to non-net metering customers, and that the consumption patterns of net metering customers are sufficiently different from those of non-net metering customers to warrant the creation of two new net metering classes. I will show that any intraclass cost shift is due to the method by which net metering customers are compensated, and not to any inherent differences in the consumption patterns of net metering and non-net metering customers. I will present Staff's proposal to modify Schedule 84, Customer Energy Production Net Metering Service, so that net metering customers are compensated for the excess energy they provide at avoided cost rates while continuing to pay for the energy that they obtain from the Company under their current rate schedule. I will explain how Staff's proposal will correct any intraclass cost shift without requiring any new rate classes. I will recommend that the Commission initiate a docket in which all interested parties can work together to determine the appropriate avoided cost methodology used to compensate net metering customers.

I will show that the Company's analysis using its "net zero customer" overstates the differences in the consumptive patterns of net metering and non-net metering customers, and that there is actually little difference between the consumption patterns of these two groups.

The Company also proposes that all new customer-owned generator interconnections be equipped with smart inverters conforming to the grid requirements of the Institute of Electrical and Electronic Engineers (IEEE) standards 1547 and 1547.1. Unfortunately, both of these standards are still being drafted by the IEEE, and the Company was unable to provide draft copies for my review, so I am unable to provide an analysis of either the costs or benefits of the Company's proposal. I will recommend that the Commission postpone a decision on this proposal until such time as Commission Staff can review them.

The Company also seeks to revise Schedule 72, both to synchronize it with proposed changes to its net metering program and to permit on-site inspection of newly installed on-site generation systems when circumstances beyond the Company's control exist. In fact, the Company's proposed revisions to Schedule 72 are quite substantial, and I will recommend that they be considered in a separate docket.

Q. What factors justify establishment of new rate classes?

A. On pages 7 and 8 of its Application, the Company explains that different rates may be justified by factors such as cost of service, quantity of electricity used, differences in conditions of service, or the time, nature, and pattern of use.

Q. Has the Company met this standard?

A. No. The Company did not provide a Cost of Service Study. In its response to Staff's Production Request No. 3, the Company indicated that it does not intend to perform a Cost of Service study until after the Commission approves the Company's new rate classes (Exhibit No. 101).

As I will show, there are no meaningful

differences between net metering and non-net metering customers in the quantities of electricity used, differences in conditions of service, time, nature, and pattern of use.

Q. Who would be affected by the Company's proposal?

A. All Schedule 1 Residential and Schedule 7 Small General Service net metering customers would eventually be moved to the Company's proposed net metering schedules. In its Application, the Company indicated that existing Residential and Small General Service net metering customers would continue to take service under Schedule 84 (Application at 10 and 11); however, in its response to Staff's Production Request No. 4, the Company indicated that these customers would eventually be moved to the Company's proposed net metering schedules (Exhibit No. 102).

According to the Company's 2017 net metering report (Exhibit No. 9), the majority of the net metering systems in the Company's Idaho service territory are owned by Schedule 1 Residential customers (1,137). Commercial and Industrial customers comprise the next largest group of net metering customers (135). There are also five irrigation customers.

Solar photovoltaic generators constitute 94% of the net metering systems currently connected to Idaho Power's grid, followed by wind generators (5%), and hydro/other generators (1%); however, the Company's proposal would also apply to all Residential and Small General Service customers who generate their own power using biomass, geothermal, or fuel cell technology.

Q. What is the name plate capacity and growth rate of Idaho Power's net metering systems?

A. Between December 31, 2013 and March 31, 2017, the cumulative nameplate capacity of Idaho Power's net metering systems grew from 2.81 megawatt (MW) to 9.58 MW, which represents an annual growth rate of 45.8%. The total nameplate capacity of wind/hydro/other decreased slightly over this time period, so virtually all of this increase was due to increases in the number of solar systems installed in Idaho Power's service territory.

Q. Please explain how customers are compensated for the excess energy that they produce under Schedule 84.

A. Schedule 84 is open to customers from all Idaho Power rate classes except those taking service under Schedule 4 (Residential Energy Watch Pilot Plan) and Schedule 5 (Residential Time-of-Day Pilot Plan). Under Schedule 84, net metering customers remain in their rate class, but receive a kilowatt hour (kWh) credit for excess energy that they produce. Currently, the energy consumed and produced by net metering customers is netted monthly: That is, at the end of each monthly billing cycle, excess energy produced by the net metering customer is subtracted from the energy provided by Idaho Power, and the resulting difference applied to the rates appropriate for that customer's rate class. In the event that the customer produces more energy than they consume, a kilowatt hour credit is carried forward and applied to the subsequent billing cycle. Net metering customers receive no monetary compensation for the excess energy that they produce, but kilowatt hour credits may accrue indefinitely. Schedule 1 (Residential) and Schedule 7 (General Service) customers are limited to generation systems with a total nameplate capacity rating of 25 kW or less.

Q. Why is the energy consumed and produced by net metering customers netted monthly?

A. Prior to the advent of AMI (Advanced Metering Infrastructure), customer output was measured with a meter that spun in one direction when power was being consumed by a customer, and spun the other direction when power was being put onto the grid by that customer, so that the meter displayed the "net" energy consumed by the customer at the end of each monthly billing cycle. In its response to Staff's Production Request No. 7, the Company explained that its current AMI meters record net hourly consumption/generation, so it is now possible to net consumption and production for each hour (Exhibit No. 103).

Q. Under Staff's proposal, how would Schedule 84 be modified?

A. In short, Staff proposes that Section 1 of Schedule 84 be changed to take advantage of the Company's AMI meters by netting consumption/generation hourly rather than monthly. Under Staff's proposal, the net metering customer's billed consumption would be determined by summing the consumption from each hour in which there is net consumption, and the result applied to applicable Schedule 1 or Schedule 7 rates. The net metering customer's excess energy credit would be determined by summing the production from each hour in which there is net production and applying the result to an avoided cost rate. The net metering customer's bill would then be calculated by subtracting the excess energy credit from the customer's billed consumption.

Q. What intraclass cost shifting currently occurs within the Residential Schedule 1 and Small General Service Schedule 7 rate classes?

A. The Company's Residential and Small General

Service customers pay a $5.00 monthly service charge and a per kWh energy charge. The $5.00 monthly service charge is insufficient to cover either the Company's customer related costs such as billing, customer service, and service drops, or its fixed costs of generation, transmission, and distribution, so that the per kWh energy charge must be higher than the cost of energy in order to assure that the Company recovers its revenue requirement. Non-net metering customers with average billed consumption pay for the costs incurred by the Company on their behalf; however, customers whose billed consumption is below average don't completely pay for the costs that the Company incurs serving them, and customers whose billed consumption is above average pay more than their share. Very few customers are "average," so most Schedule 1 and Schedule 7 customers either subsidize, or are subsidized by other customers within their class.

Q. How does Schedule 84 create an intraclass cost shift from net metering to non-net metering customers?

A. Net metering customers are being overcompensated for the energy that they produce. The value of excess energy provided by net metering customers is due, primarily, to the energy costs that it allows the Company to avoid; however, net metering customers are effectively compensated at full retail rates. As discussed earlier, Idaho Power's Schedule 1 and Schedule 7 retail rates are substantially higher than the Company's energy costs. As explained on pages 6 through 9 of Ms. Aschenbrenner's testimony, this concern was raised by Staff in Case No. IPC-E-01-39 (Application for Approval of a New Schedule 84).

Q. Briefly describe the data that you used to evaluate potential cost shifting between net metering and non-net metering customers.

A. The Company provided hourly consumption data for all Idaho net metering customers who were connected to Idaho Power for the period January 1, 2016 through December 31, 2016. This included data for 565 Schedule 1 Residential customers and 23 Schedule 7 Small Commercial customers. Values were positive for hours during which net metering customers received power from the Company, and negative during hours in which customers provided excess energy to the Company (Staff Production Request No. 8, Exhibit No. 104).

The Company also provided hourly consumption data for a stratified random sample of 498 Residential non-net metering customers (Staff Production Request No. 12, Exhibit No. 105); however, data for 11 of these customers was incomplete and not used. I used data from the remaining 487 Residential non-net metering customers in my analysis.

Q. Please summarize your analysis.

A. Because residential customers account for most net metering generation capacity, and virtually all net metering growth, my analysis focused on Residential Schedule 1 customers. I used the Company's 2016 rates for all analyses. In order to estimate an average net metering customer's bill under Staff's proposal, I used 2016 DSM avoided cost rates; however, as I indicated earlier, I believe that the exact methodology for calculating net metering avoided cost rates should be determined in a separate docket. I have summarized my analysis in Table 1.

Annual Average	Non-NEM Customers	NEM Excluding Schedule 84 Credit	NEM with Schedule 84 Credit (Current Rates)	NEM Staff Proposal
kWh Consumed	11,781	13,113	13,113	13,113
Excess kWh	0	3,444	3,444	3,444
Billed kWh	11,781	13,113	9,669	13,113
Bill before Excess Generation Credit	$ 1,001.61	$ 1,161.34	$ 926.75	$ 1,161.34
Excess Generation Credit	N/A	N/A	N/A	$ 133.96
Final Bill	$ 1,001.61	$ 1,164.34	$ 926.75	$ 1,027.38

Table 1: Consumption and billing for average non net metering (Non-NEM) and Net Metering (NEM) customers under current rates and Staff's Proposal.

Q. Currently, what is the magnitude of the cost shift under Schedule 84?

A. Under Schedule 84, a net metering customer's monthly excess generation is subtracted from her monthly consumption, and so an average net metering customer pays substantially less ($926.75/yr) than she would pay without the Schedule 84 excess energy credit ($1,164.34/yr). A portion of the $237.59 difference represents the avoided cost due to excess energy provided by the net metering customer ($136.96), and is therefore not a subsidy. The remaining $100.63 represents the cost shift from an average residential net metering customer to the general body of residential ratepayers. A summary of consumption, excess generation, and billing information can be found in Table 1.

Q. Does Staff's proposal eliminate all intraclass subsidies?

A. Staff's proposal eliminates all intraclass subsidies that are due to the Schedule 84 Net Metering program; however, intraclass subsidies that are not related to net metering remain in place. By virtue of their slightly greater average consumption (Table 1), there would be a small subsidy from average net metering customers to non-net metering customers; however, as discussed earlier, this type of cost shift is not unique to net metering customers.

THE COMPANY'S NET ZERO CUSTOMER ANALYSIS

Q. What are net zero customers, and why are they important?

A. As we have already discussed, Schedule 84 allows net metering customers to "bank" energy credits for use at a later time, day, or month. Under Schedule 84, some net metering customers are able to bank enough credits during one time period to cover their consumption for the entire year: These customers, with no net annual consumption, are called net zero customers. Net zero customers only pay their $5.00 monthly service charge, and because the monthly service charge is insufficient to cover the Company's fixed and customer related costs, net zero customers are recipients of a large intraclass subsidy from other members of their rate class.

Q. In their testimonies, Ms. Aschenbrenner and Mr. Angell discuss the effects of net zero customers on the system (Aschenbrenner Di, pages 32 through 36; Angell Di, pages 11 through 14). What is wrong with this analysis?

A. The Company's analysis compared consumption of a single net metering customer to that of a nearby non-net metering customer (Angell Di, page 11). Neither the net zero net metering customer nor the non-net metering customer used for comparison were typical customers. Given the tremendous diversity within the Residential class, it isn't surprising that the Company was able to find a pair of customers to demonstrate its point; however, it is inappropriate to use data from a single pair of customers to establish a new rate class.

About 11.5% of Idaho Power's Residential Schedule 1 Net Metering customers are net zero customers, so while net zero customers constitute an important group, their consumption patterns are not representative of typical net metering customers. A more representative comparison is obtained by comparing consumption patterns of average net metering customers with those of average non-net metering customers.

On page 12 of his testimony, Mr. Angell provides a graph comparing the hourly consumption of the Company's selected net metering customer to that of a nearby non-net metering customer on its system peak day (June 29, 2016). I have reproduced Mr. Angell's graph as Figure 1 of my testimony. For comparison, Figure 2 is a graph of hourly consumption of average net metering and average non-net metering customers on the same day. We note that peak consumption of the Company's selected customers (Figure 1) is much greater than that of average customers (Figure 2). The most striking difference between these two graphs is seen at 1:00 pm when the Company's selected net zero customer's net production peaked at about 4.5 kW (Figure 1). By contrast, the average net metering customer's generation peaked at 0.74 kW, or only about one sixth the peak generation of the Company's net zero customer (Figure 2).

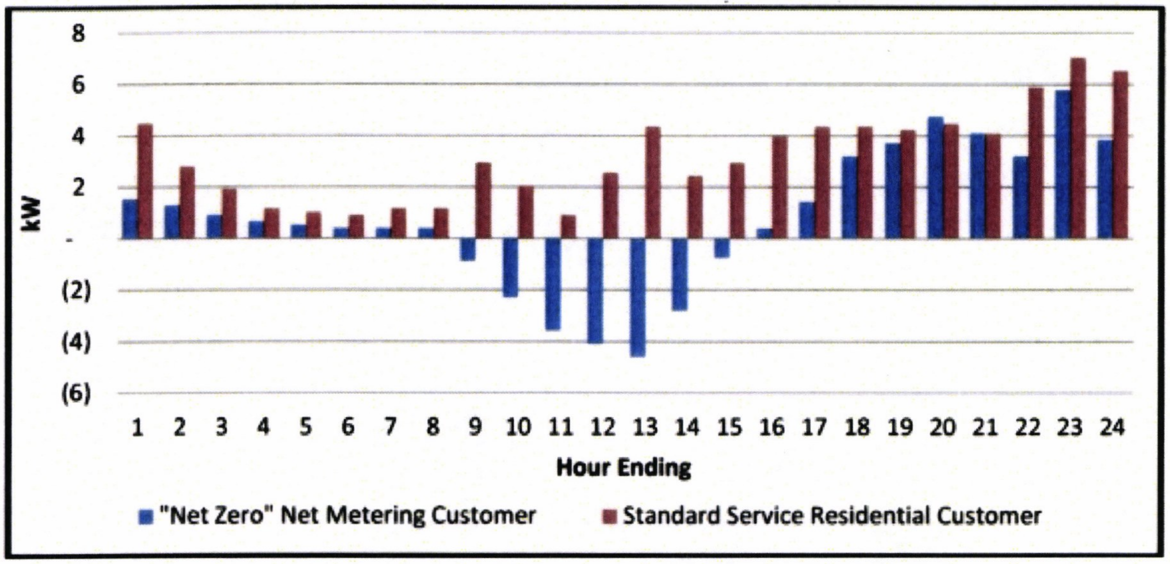

Figure 1: Company's comparison of hourly consumption for a selected net zero customer to a nearby non-net metering customer on the Company's system peak day. Reproduced from Angell Di, Figure 1.

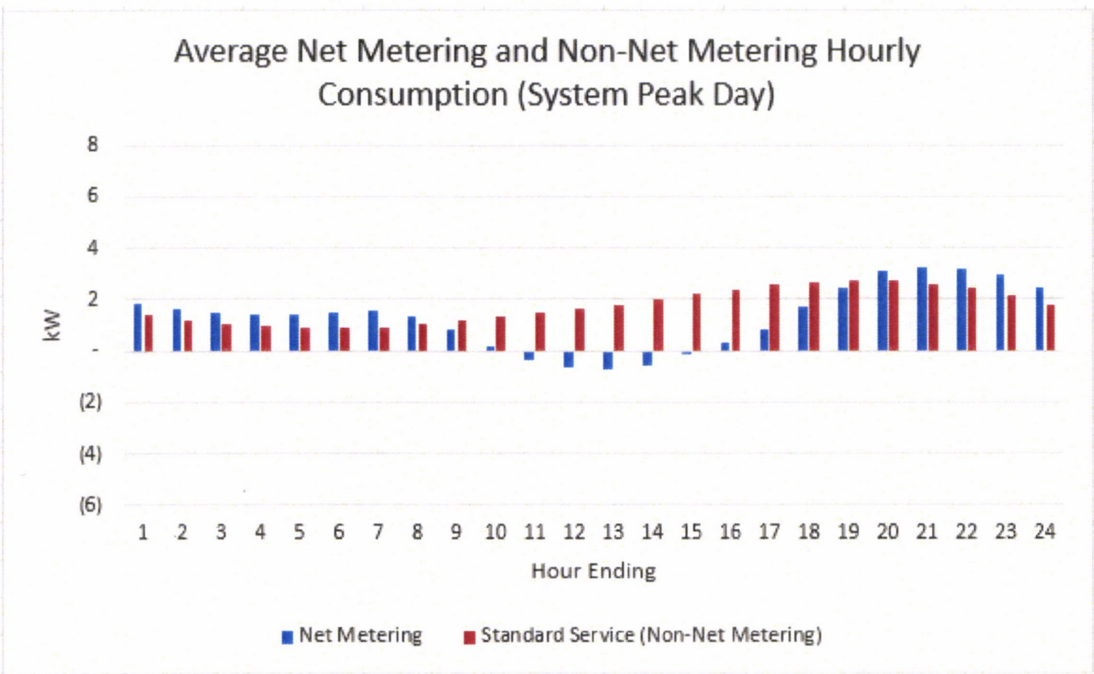

Figure 2: Staff's comparison of consumption of average net metering customers to average non-net metering customers on the Company's system peak day (June 29th, 2016).

Q. Would Staff's proposal correct the intraclass cost shift from net zero customers to non-net metering customers?

A. Yes. Under Staff's proposal, net zero customers would pay full retail rates during hours in which they are net consumers of energy, and receive credit for excess energy at avoided cost rates. Because avoided cost rates compensate customers only for costs that they allow the Company to avoid, there would be no impact to non-net metering customers.

NET METERING VS. NON-NET METERING CONSUMPTION PATTERNS

Q. How do consumption patterns of net metering customers differ from those of non-net metering customers?

A. There is little difference in the consumption characteristics that cause the Company to incur fixed costs. The primary consumption characteristics that cause the Company to incur fixed costs are contribution to coincident peak (CP), group non-coincident peak (NCP), and individual peaks. These are summarized in Table 2.

Peak Type	Non-Net Metering (kW)	Net Metering (kW)
Average Individual Peak (kW)	9.13	11.42
Average Contribution to System CP (6/29/2016, 7:00 pm)	2.861	2.311
Non-Net Metering Group Non Coincident Peak (7/26/2016 7:00 pm)	2.992	
Net Metering Group Non Coincident Peak (12/18/2016, 9:00 am)		2.33

Table 2: Peak magnitudes and times for net metering and non-net metering customers.

Schedule 1 Residential customers are a diverse class; however, the distribution of individual consumption patterns from both groups is nearly identical. Figures 3 and 4 allow us to compare the magnitude and timing of individual customer peaks. Consumption patterns of both groups are similar, with individual peaks occurring throughout the year and concentrations of peaks occurring in summer and winter months. For both net metering and non-net metering customers, most individual peaks are less than 35 kW.

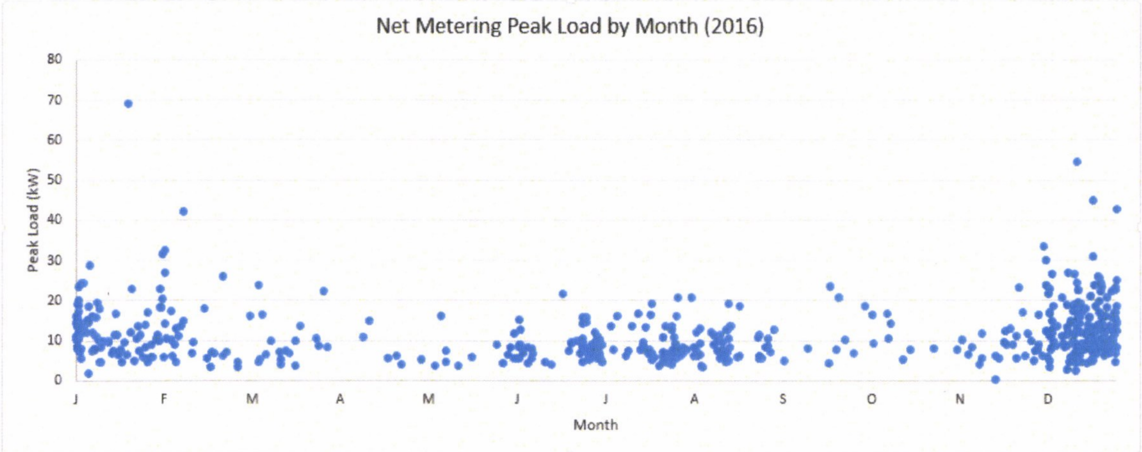

Figure 3: Net metering Peak Load by Month for all 2016 residential net metering customers.

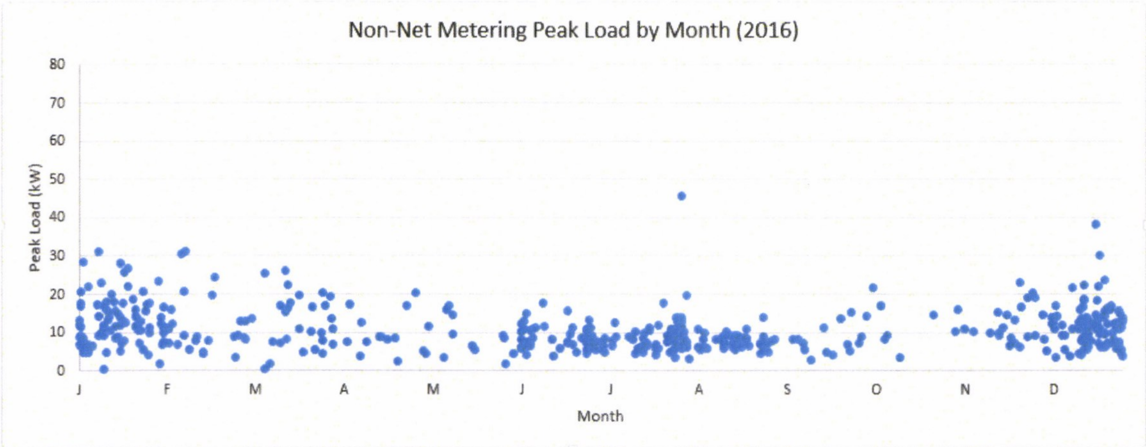

Figure 4: Non-Net Metering Peak Load by Month for Stratified Random Sample of residential non-net metering customers.

There are some small differences between the two groups. On average, net metering customers demand less power (2.311 kW) than non-net metering customers (2.861 kW) at system coincident peak (June 29th between 6:00 pm and 7:00 pm). Power consumed at coincident peak is an important component of the Coincident Peak factor used to allocate fixed generation and transmission costs in Cost-of-Service studies. Had the Company performed a Cost-of-Service Study, it would likely have allocated slightly less generation and transmission plant cost to net metering customers. Given the large fraction (94%) of residential net metering systems using solar generation, it isn't surprising that summertime coincident peak consumption of net metering customers is reduced.

Class non-coincident peak is an important component of the Non Coincident Peak factor used to allocate distribution plant in cost-of-service studies. Using data provided by the Company, we find that net metering customers' average non-coincident peak was less (2.330 kW) than that of non-net metering customers (2.992 kW). As a group, net metering customers peak during the winter rather than during the summer.

On the other hand, individual peak loads are important determinants of costs that the Company expends on distribution plant, and in particular, on the costs of secondary transformers and service drops. Average individual net metering peaks are somewhat higher (11.420 kW) than those of non-net metering customers (9.130 kW).

Had the Company performed a Cost-of-Service Study, it is difficult to determine whether it would have allocated more or less distribution plant to net metering customers than to non-net metering customers.

I should reiterate that these differences are quite small relative to the total variability among Schedule 1 customers. Had the Company conducted a Cost-of-Service study, it is likely that they would have determined the differences in the overall costs of serving these two groups to be very small.

THE COMPANY'S PROPOSAL TO REQUIRE ALL NEW NET METERING CUSTOMERS TO INSTALL AND OPERATE SMART INVERTERS

Q. Why do you oppose the Company's proposal to require all new net metering customers to use smart inverters?

A. The Company proposes that all new net metering customers be required to install and operate smart inverters as defined by the Institute of Electrical and Electronic Engineers. Unfortunately, the applicable IEEE Standards and definitions (IEEE 1547 and IEEE 1547.1) won't be published until 2019 (Company's Response to Production Request No. 1, Attachment 2, Page 15, Exhibit No. 106), so there is no way to evaluate either the benefits or costs of the Company's proposal. In fact, the IEEE hasn't even released a draft copy of the standard. In short, the Company is requesting that Commission adopt IEEE 1547 and IEEE 1547.1 before these standards have been released.

Q. Was the Company able to provide any information about the proposed content of IEEE 1547 and IEEE 1547.1?

A. The Company provided two draft power point presentations (Exhibit Nos. 107 and 108). Both presentations included disclaimers that the presentations and views expressed in them are those of individuals, and not the formal position of the IEEE, so the Company didn't provide any hard information about either of the proposed smart meter standards.

THE COMPANY'S PROPOSALS TO MODIFY SCHEDULE 72

Q. Please summarize the Company's proposed changes to Schedule 72.

A. In its Application, the Company states that it seeks to revise Schedule 72 to incorporate defined terms necessary to sync the interconnection requirements between Schedule 72 and proposed Schedules 6 and 8. The Company also states that it proposes to make one minor revision to Schedule 72 to allow the Company additional time to complete the on-site inspection of a newly installed on-site generation system when circumstances beyond the Company's control arise (Application at 11.)

In fact, the Company's proposed modifications are not minor, and constitute a major revision to Schedule 72 (Company Exhibit No. 5). Schedule 72 applies to all energy providers who interconnect with the Company's grid, including its PURPA and net metering customers. Because the Company's proposed modifications to Schedule 72 go far beyond the scope of its application, the Company's proposed changes should be considered in a separate case that would ensure input from all stakeholders.

CONCLUSIONS AND RECOMMENDATIONS

Q. Please summarize your recommendations regarding the Company's proposal to establish two new rate classes for its Residential and Small General Service net metering customers.

A. The new rate classes provided by the Company are unnecessary. Any intraclass cost shift from net metering to non-net metering customers arises from Schedule 84's compensation methodology, which effectively compensates net metering customers at rates that are greater than the value of the energy that they provide to the Company. The simplest way to eliminate this intraclass subsidy is to modify Schedule 84 so that net metering customers pay full retail rates for the hours in which they are net consumers of energy, and receive credit at avoided cost rates for the hours in which they produce excess energy. I recommend that the Commission initiate a docket in which the Company and interested parties can work together to determine the appropriate avoided cost methodology used to compensate net metering customers.

Q. Please summarize your recommendations regarding the Company's proposal to require all new net metering installations to use smart inverters.

A. The Company is asking the Commission to approve a standard that has not been released, and is thus unavailable for review. I recommend that the Commission deny the Company's request to require all new net metering installations to use smart inverters.

Q. Please summarize your recommendations regarding the Company's proposed modifications to Schedule 72.

A. The Company's proposed modification to Schedule 72 includes a large number of revisions that were not described in the Company's Application or testimony. Because Schedule 72 affects all generation facilities who connect to the Company's grid, and not just net metering customers, I recommend that these changes be submitted and considered as part of a separate case.

Q. Does this conclude your testimony in this proceeding?

A. Yes, it does.

REQUEST NO. 3: On page 9 of its Application, the Company states that "Establishing separate customer classes now will position the Company to study this segment of customers, providing the data necessary to understand how this customer segment utilizes this system." What information will the Company be able to gather that is not currently available for these customers?

RESPONSE TO REQUEST NO. 3: To provide context, the full quote from page 19 of Mr. Timothy E. Tatum's testimony stated that:

> The establishment of similarly situated customers or customer classes has been a long-standing and important first step in the ratemaking process. Taking this important first ratemaking step now will position the Company to study this segment of customers, providing the data necessary to understand how this customer segment utilizes the Company's system. The data quantifying the usage of the system will inform what costs (revenue requirement) are appropriately allocated to the newly established customer classes in a future rate proceeding (class cost-of-service process).
>
> Tatum DI, p. 19, lines 14-24.

The Company is currently able to gather the information that is necessary to study various segments of customers; however, should the Commission decline to authorize the establishment of the requested new customer classes, the Company would have no reason to modify its class cost-of-service study or ratemaking processes. If the Idaho Public Utilities Commission ("Commission") determines there are differences that warrant the establishment of new customer classes, the Company will assign costs to the new customer classes in the class cost-of-service study and design rates specific to those classes as part of a future rate proceeding. If the Commission determines no differences exist that warrant the creation of a new customer class for customers with on-site generation, the Company will continue to allocate costs to the residential and small general service customer classes that exist today.

The response to this Request is sponsored by Tim Tatum, Vice President of Regulatory Affairs, Idaho Power Company.

<u>REQUEST NO. 4</u>: On pages 9 and 10 of its Application, the Company states that "The data quantifying the usage of the system will inform what costs and benefits (revenue requirement) are appropriately allocated to the newly established customer classes in a future rate making process (class cost-of-service process)". Given that the Company's proposed Schedules 6 and 8 would initially have zero customers, how many years will be required before there are sufficient customers in these new classes to develop accurate cost-of-service allocators?

<u>RESPONSE TO REQUEST NO. 4</u>: The Company cannot determine how many years will be required before there are sufficient customers in Schedules 6 and 8 to perform a stand-alone cost-of-service study. However, all customers with on-site generation will be used to develop cost-of-service allocators for the new customer classes, those who remain on Schedule 84 and those taking service under Schedules 6 and 8. The Company has proposed that existing residential and small general service net metering customers remain on Schedule 84 for a period of time, where the term of the transition period be determined by the Commission as part of a future rate proceeding; however, they will transition to Schedules 6 and 8 at the end of the transition period. Their usage characteristics accurately represent the segment of customers with on-site generation, regardless of which tariff schedule they take service under during the transition period.

The response to this Request is sponsored by Tim Tatum, Vice President of Regulatory Affairs, Idaho Power Company.

<u>REQUEST NO. 8</u>: In Exhibit 9, the Company states that, as of December 31, 2016, Idaho Power's net metering service consisted of 1,067 active systems. For each system that was connected to Idaho Power for the entire period between January 1, 2016 through December 31, 2016, please provide the following information:

a. The schedule under which the net metering customer takes power.

b. The County in which the customer is located.

c. Net hourly power consumption/production data for the 2016 calendar year.

<u>RESPONSE TO REQUEST NO. 8</u>: Please see the attached Excel file which includes the hourly net energy consumption for all net metered customers who had an AMI meter and who were taking net metering service for the entire period between January 1, 2016, through December 31, 2016. The Company has provided the schedule under which the net metering customer was taking service and the county in which the customer was located.

It is important to note that the attached data is net hourly energy consumption/production data by <u>customer</u>, not by <u>system</u>. A customer may have multiple systems, possibly with different generation sources, attached to a service point (meter). In that case, each generation source is considered a different system; however, because the energy consumption is metered at a single point, a customer with multiple systems is one customer. Please reference footnote No. 3 in Exhibit 9.

The response to this Request is sponsored by David Angell, Transmission and Distribution Planning Manager, Idaho Power Company.

<u>REQUEST NO. 7</u>: On page 4 of its Application, the Company states that it has deployed Advanced Metering Infrastructure (AMI) in its service area enabling the Company to achieve more precise usage measurement and facilitate more sophisticated, cost-based rate designs. Please explain how AMI might be used to achieve more sophisticated, cost-based rate designs for its net metering customers. Does the Company also propose updating rate designs for its non net metering classes?

<u>RESPONSE TO REQUEST NO. 7</u>: Prior to the deployment of Advanced Metering Infrastructure ("AMI"), Idaho Power used mechanical and solid-state meters to measure consumption for residential and small general service customers. These meters measured only the kilowatt-hour ("kWh") consumption, and the Company retrieved this data monthly according to the meter read date of the customer's billing cycle. Idaho Power's AMI system collects additional data from the AMI meters that enables the Company to better develop cost-based rate designs. The additional data provided by the AMI system is listed below:

- 15-minute max demand – Idaho Power's AMI meters record the 15-minute maximum demand. The 15-minute maximum demand enables the Company to implement demand rates for residential and small general service customers using a 15-minute maximum demand.
- Hourly kWh – Idaho Power's AMI meters record the net hourly energy consumption and/or generation. The hourly energy data enables the Company to implement time-of-use rates for residential and small general service customers with on-site generation.

- Hourly kilowatt ("kW") – The hourly kWh can be used as a 60-minute maximum demand. The 60-minute maximum demand enables the Company to implement demand rates for residential and small general service customers using a 60-minute maximum demand.

One of Idaho Power's objectives regarding rate design is to establish prices that primarily reflect the cost of the services provided. While the Company is not currently proposing pricing changes for net metering or standard service customers as part of its proposal, Idaho Power will continue to evaluate and propose modifications to the rate design of all customer classes in future rate case proceedings.

The response to this Request is sponsored by Tim Tatum, Vice President of Regulatory Affairs, Idaho Power Company.

REQUEST NO. 12: Please provide the following data for a stratified random sample of Idaho Power's residential non-net metering customers who were connected to Idaho Power for the entire period between January 1, 2016 through December 31, 2016:

a. The County in which each customer is located.

b. Hourly power consumption data. Please explain how the Company accounted for changes from MST to MDT and vice versa.

c. An explanation of the method used to determine sampling strata, sample sizes, and weighting factors.

d. An explanation of any missing data.

RESPONSE TO REQUEST NO. 12:

a. The following table lists the county associated with each stratum.

County	Strata
Ada	1, 2, 3, and 4
Blaine	5, 6, 7, and 8
Valley	9, 10, 11, and 12
Payette	13, 14, 15, and 16
Bannock	17, 18, 19, and 20
Twin Falls	21, 22, 23, and 24

b. Please see Attachment 2 to the Company's response to Vote Solar's Request No. 27 for the 2016 Idaho Residential Sample hourly data. To adjust for Daylight Savings Time ("DST"), the Company formatted the data so that there are 24 hours/per day in both the spring and the fall. For the spring DST shift, the hour ending 3 a.m. is left blank. For the fall DST shift, the hour ending 3 a.m. is repeated, and therefore, the Company calculates an average of the two hours, and reports the average in the hour ending 3:00 a.m.

c. Please see the Company's response to Vote Solar's Request No. 36(d) for a description of the sampling methodology used to determine sampling strata and sample sizes. The strata weights are provided with the hourly data.

d. Missing data can be categorized in the following three scenarios:

- The Company's Advanced Metering Infrastructure ("AMI") system, which uses power line carrier technology, experiences occasional communication issues when trying to retrieve data over the power line. For example, if a feeder is taken out of service for maintenance or if a section of line goes down due to an unplanned outage, the AMI system may be temporarily unable to communicate with the meters on that line depending on if there is an alternate path to get the readings. The Company does attempt to go back and retrieve missing data but may not be able to retrieve all missing data given that the system has limited bandwidth. It is important to note that the hourly data is not used for billing purposes for Schedule 1, Residential Service Standard Service, customers. The AMI system retrieves a different register, called the daily register read, that is used for billing. It is for this reason that the Company over-samples when the samples are designed. As stated in the Company's response to Vote Solar's Request No. 36, the Idaho residential sample was designed to include 449 sample points; however, the Company has a target sample size of 498 to ensure that it has data for 449 sample points for each hour in the event that there is missing data for some sample points.

- Demand response participants are removed from the sample in months that demand response events are called. In the case of the residential customer class, demand response events were called in June and July of 2016. This methodology is consistent with the filed class cost-of-service study from the Company's last general rate case.
- There is missing data on March 13, 2017, due to spring DST. Please see part (b) of this response for an explanation of how the Company handles the changes from Mountain Standard Time to Mountain Daylight Time and vice versa.

The response to this Request is sponsored by Dave M. Angell, Transmission and Distribution Planning Manager, Idaho Power Company.

DATED at Boise, Idaho, this 20th day of November 2017.

Lisa D. Nordstrom

LISA D. NORDSTROM
Attorney for Idaho Power Company

Tentative Timeline to Ballot for P1547.1

Dates	Activities	Status
June 16, 2016	P1547.1 WG meeting – Draft 1 initiated	Done
Summer 2016	P1547.1 subgroups work and complete Draft 1	Done
September 30, 2016	P1547.1 Draft 1 posted for WG consideration	Done
October 15, 2016	Comments posted to iMeet Central	Done
October 27-28, 2016	P1547.1 WG meeting – Draft 1 discussed	Done
January 31, 2017	P1547.1 Draft 2 posted for WG meeting	Done
March 2, 2017	P1547.1 WG meeting – Draft 2 discussed	Done
May 19, 2017	P1547.1 Draft 3 posted for WG meeting	Done
June 20-21, 2017	P1547.1 WG meeting – Draft 3 discussed	Done
September 2017	P1547.1 Draft 4 posted for WG meeting	Ongoing
November 2017	P1547.1 WG meeting – Draft 4 discussed	
January 2018	P1547.1 Draft 5 posted for WG meeting	
March 2018	P1547.1 WG meeting – Draft 5 discussed	
May, 2018	P1547.1 Pre-ballot draft sent to WG	
June, 2018	P1547.1 WG meeting – Finalize Draft 6 for ballot	
Aug-Sept 2018	P1547.1 Initial IEEE ballot	
Oct 2018 – Jan 2019	Resolve ballot comments	
2019	P1547.1 Published	

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Exhibit No. 106
Case No. IPC-E-17-13
M. Morrison, Staff
12/22/17

IEEE 1547, IEEE Standard for Interconnecting Distributed Energy Resources

for IEEE's Renewable Energy Standards Tutorial at 2017 IEEE EPEC

Charlie Vartanian, MEPPI,

IEEE 1547 Working Group Secretary

October 22, 2017
Saskatoon, Saskatchewan

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Exhibit No. 107
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Update on IEEE P1547.1 Revision:

Standard Conformance Test Procedures for Equipment Interconnecting Distributed Energy Resources with Electric Power Systems and Associated Interfaces

Dr. Anderson Hoke, P.E., NREL, Chair P1547.1 Working Group(WG)

October 30, 2017

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CERTIFICATE OF SERVICE

I HEREBY CERTIFY THAT I HAVE THIS 22ND DAY OF DECEMBER 2017, SERVED THE FOREGOING **DIRECT TESTIMONY OF MICHAEL MORRISON,** IN CASE NO. IPC-E-17-13, BY MAILING A COPY THEREOF, POSTAGE PREPAID, TO THE FOLLOWING:

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