Virginia State Corporation Commission
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240907900

Case Number (if already assigned)

Case Name (if known) Petition of Appalachian Power Company for Approval to Revise its Net Metering Program Pursuant to § 56-594 of the Code of Virginia

Document Type EXPE

Document Description Summary Petition of Appalachian Power Company for Approval to Revise its Net Metering Program Pursuant to § 56-594 of the Code of Virginia

Total Number of Pages 87

Submission ID 31657

eFiling Date Stamp 8/30/2024 4:55:36PM

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August 30, 2024

BY ELECTRONIC FILING

Hon. Bernard J. Logan, Clerk
State Corporation Commission
Document Control Center
Tyler Building, 1st Floor
1300 East Main Street
Richmond, VA 23219

Re: Petition of Appalachian Power Company for Approval to revise its net metering program pursuant to § 56-594 of the Code of Virginia – Case No. PUR-2024-00 [illegible]

Dear Mr. Logan:

On May 6, 2024, the Commission issued an order in Case No. PUR-2024-00047 directing Appalachian Power directing Appalachian Power Company (the "Company") to file a petition regarding its net metering program by September 2, 2024. Pursuant to that order, please see attached for electronic filing the Company's Petition to revise its net metering program pursuant to § 56-594 of the Code of Virginia. The Company understands that the Commission will assign a separate case number and docket for this Petition.

If you have any questions or need further information, please feel free to contact me.

Sincerely,

Andrew J. Flavin

Enclosures
cc: Noelle J. Coates, Esq.
William H. Chambliss, Esq.
C. Meade Browder, Jr., Esq.
Chelsey B. Noble, Esq.

E-2024-00047

COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION

PETITION OF

APPALACHIAN POWER COMPANY

CASE NO. PUR-2024-00161

for approval to revise its net metering program pursuant to § 56-594 of the Code of Virginia

PETITION OF APPALACHIAN POWER COMPANY PURSUANT TO § 56-594 OF THE CODE OF VIRGINIA FOR REVISIONS TO ITS NET METERING PROGRAM

Pursuant to § 56-594 E of the Code of Virginia ("Code"), and the State Corporation Commission of Virginia's ("Commission") Order Establishing Proceeding ("Order") issued on May 6, 2024 in Case No. PUR-2024-00047, Appalachian Power Company ("Appalachian" or the "Company") petitions the Commission for approval of its proposed revisions to its net energy metering ("net metering") program.[1] In support of this Petition, the Company respectfully states as follows.

I. INTRODUCTION AND BACKGROUND

Appalachian is a Virginia public service corporation serving approximately 542,000 customers in Virginia and maintaining an office at 1051 East Cary Street, Suite 1100, Richmond, Virginia 23219. The Company is also an incumbent electric utility as defined in the Virginia Electric Utility Regulation Act. The contact information for Appalachian's attorneys is stated at the end of the Petition.

[1] Although the Order was filed in Case No. PUR-2024-00047, the Commission indicated that Appalachian's Petition will be assigned a separate case number and docket. Order at 3.

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The Virginia Net Energy Metering Provisions (the "Net Metering Law") passed in 1999, established, in relevant part, the rules for net metering in the Commonwealth.[2] Code § 56-594 E provides, in relevant part, that:

> On and after the earlier of (i) 2024 for a Phase I Utility or 2025 for a Phase II Utility or (ii) when the aggregate rated generating capacity owned and operated by eligible customer-generators, eligible agricultural customer-generators, and small agricultural generators in the Commonwealth reaches three percent of a Phase I or Phase II Utility's adjusted Virginia peak-load forecast for the previous year, the Commission shall conduct a net energy metering proceeding.

The purpose of this proceeding is to, among other things, assist in the evaluation of the current net metering program and assess whether establishing a new net metering program would be beneficial for the Commonwealth.

On May 6, 2024, the Commission issued the Order docketing this proceeding and requiring Appalachian to file its proposed net metering program petitions by September 2, 2024.[3] As part of this Order the Commission directed Appalachian to address the following:

- A proposed amount for customers to pay on their utility bills each month for the costs of using the utility's infrastructure;
- A proposed amount the utility shall pay to appropriately compensate the customer for the total benefits such facilities provide;
- Identify, quantify, and present the direct and indirect economic impact of net metering to the Commonwealth and particularly within the utility's service territory;
- A proposed rate structure related to net energy metering to govern compensation related to all eligible customer-generators, eligible agricultural customer-generators, and small agricultural generators, except low-income utility customers, that interconnect after the effective date established in the Commission's final order in the net energy metering proceeding;

[2] Va. Code § 56-594.

[3] The Order also directed Virginia Electric and Power Company to file its net metering program petition by May 1, 2025.

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- The utility's position on whether the six percent aggregate net metering cap should be raised or removed, and if an increase is proposed, the level of such increase;
- Identify, quantify, and present the costs and benefits of the current net energy metering program;
- The proposed netting measurement interval for a successor tariff that is just and reasonable in light of the costs and benefits of the net metering program in aggregate, and applicable to new requests for net energy metering service;
- Identify, quantify, and present the specific avoided cost for customer-generators, by the different type of customer-generator technologies if appropriate, and a proposed methodology for determining the compensation rate for any net excess generation determined according to the applicable net measurement interval for any new tariff;
- Identify, quantify, and present the utility's efforts to ensure that the net energy metering program does not result in unreasonable cost-shifting to nonparticipating electric utility customers;
- In the context of the cost and benefits of the utility's net energy metering programs, evaluate and provide the following:
    - the aggregate impact of customer-generators on the electric utility's long-run marginal costs of generation, distribution, and transmission;
    - the cost of service implications of customer-generators on other customers within the same class, including an evaluation of whether customer-generators provide an adequate rate of return to the electrical utility compared to the otherwise applicable rate class when, for analytical purposes only, examined as a separate class within a cost of service study;
    - the direct and indirect economic impact, qualitative and quantitative, of the net energy metering program to the Commonwealth;
    - and any other information deemed relevant, including environmental and resilience benefits of customer-generator facilities; and
- Any additional relevant information the utility requests the Commission to consider.

As discussed in more detail below, the Petition and supporting testimony address each of these issues, collectively the "Required Net Metering Considerations."

2020-00174

II. WITNESSES IN SUPPORT OF PETITION

The following witnesses submit testimony in support of the Petition:

- ***William K. Castle***, Director of Regulatory Services-VA/TN for Appalachian Power Company ("APCo"). Mr. Castle testifies that the need for policy support for behind the meter distributed generation has diminished over time with increasing retail costs for electricity and decreased costs for installed solar systems. Additionally, he discusses whether continued policy support for net metering in light of a mandatory RPS is the best use of customer resources. He further supports the Company's position on whether to raise or remove the existing six percent net metering cap with the imposition of cost-based compensation for electricity placed on the grid, and discusses the Company's position on the timing of an avoided cost rate update.
- ***Nicole M. Coon***, Regulatory Consultant Principal for American Electric Power Service Corporation ("AEPSC"). Ms. Coon supports the Company's request for approval of the proposed revisions to its net metering program, including the Company's proposed new net metering credit compensation structure called Rider N.M.S. II, which the Company believes will appropriately compensate customer-generators relative to non-participating customers.
- ***Trenton E. Feasel***, Manager of Economic Forecasting for American Electric Power Service Corporation ("AEPSC"). Mr. Feasel supports the identification and quantification of the direct and indirect economic impacts of the current net metering program. He also discusses certain costs and benefits associated with the Company's net metering program.

III. REQUIRED NET METERING CONSIDERATIONS

As discussed in more detail below, the Company addresses each of the Required Net Metering Considerations in this Petition and supporting direct testimony.

A. Proposed Net Metering Rate Structure and Costs and Benefits of Net Metering: Customer-Generator Payment for Infrastructure Usage and Compensation for Utility Benefits

Witness Coon describes Appalachian's proposal to close its current Rider N.M.S. to all new customer-generators as of the rate effective date set in this case and introduce a new net metering credit compensation structure, named Rider N.M.S. II. The proposed Rider N.M.S. II aligns with Code § 56-594, which authorizes the Commission to approve appropriate net metering credit provisions in a net metering proceeding.

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Under proposed Rider N.M.S. II, the Company will charge customer-generators for all metered energy the Company provides during each monthly billing period at standard tariff rates and will credit customer-generators for all the metered energy the Company receives at an avoided cost approved by the Commission. Only customer-generators whose electric generating facility receives a Certificate of Completion after Rider N.M.S. II becomes effective will be subject to this proposed rate structure. Existing Rider N.M.S. customer-generators and those who submit applications and receive a Certificate of Completion before Rider N.M.S. II takes effect will be grandfathered under the current Rider N.M.S. This protects customer-generators who made investment decisions based on the current Rider N.M.S. by preserving the existing rate structure for 25 years, after which they will transition to the new Rider N.M.S. II or its successor.

The proposed Rider N.M.S. II will ensure appropriate crediting to customer-generators for the energy delivered to the grid while minimizing cost-shifting to non-participating electric utility customers. Under the proposed Rider N.M.S. II, the Company proposes to bill customer-generators for the costs associated with distribution, transmission, and capacity facilities and other services that they rely on when they are not self-generating. Monthly charges will be calculated using an identical rate structure to the structure that would apply if the customer were not a customer-generator.

Regarding customer-generator compensation, when a customer-generator's system produces electricity, the generated kilowatt-hours are initially used to meet the customer-generator's own electric needs. Any surplus energy generated by the system is then fed onto the Company's electric grid and used by other customers. Consequently, the customer-generator receives a full retail offset for the kilowatt-hours generated during periods when their system

production matches or is less than the customer-generator's consumption. Under the proposed Rider N.M.S. II tariff, all metered energy delivered to the Company's distribution system via the meter installed at the customer-generator's premise will be credited to the customer-generator's monthly bill at the Company's avoided cost rate, which is summarized below:

Rider NMS II Avoided Cost Component Rates ($/kWh)						
Customer	**Voltage Level**	**Energy**	**Capacity**	**Transmission**	**Ancillary Service**	**Total Energy Credit**
Residential	Secondary	$0.0372	$0.0037	$0.0068	$0.00150	$0.0492
Commercial, Industrial	Secondary	$0.0372	$0.0038	$0.0074	$0.00150	$0.0501
Commercial, Industrial	Primary	$0.0357	$0.0038	$0.0071	$0.00144	$0.0480
Commercial, Industrial	Sub-Transmission	$0.0353	$0.0038	$0.0071	$0.00142	$0.0476
Commercial, Industrial	Transmission	$0.0348	$0.0037	$0.0070	$0.00140	$0.0469

Ms. Coon explains that the Company's methodology for determining avoided cost rate and compensation for excess net metering customer generation includes avoided PJM energy costs at the Company's marginal cost of energy (including marginal losses and congestion), distribution losses, avoided ancillary service costs, avoided generation, and shifted PJM zonal transmission costs. However, the societal cost of carbon, the value of customer-generators' Renewable Energy Certificates, and other externalities are not included in the Company's avoided cost rate nor are they utility cost-of-service items. To determine this rate, the Company only considers cost-of-service items that would result in an actual cost reduction for the Company and its other non-net metering customers due to an N.M.S. II customer-generator's excess generation. Accordingly, the avoided cost rate, also called the "total energy credit," varies based on customer type and voltage level as seen in the table above.

The Company proposes to credit a customer-generator's account for the full billing period energy credit even if it exceeds the total customer-generator's bill for that billing period.

B. Economic Impact of Net Metering

Appalachian used IMPLAN, a leading economic modeling and analytics software, as described in Witness Feasel's testimony, to measure the direct and indirect economic impacts of net metering to the Commonwealth and within the Company's service area. The economic impacts within the Company's service area vary. Primarily, net metering has benefitted the local economies through the installation of solar panels on residential and commercial properties. This includes the creation of jobs, material sales, and tax revenues. From 2017 to 2023, the cumulative expenditures related to solar installations, including hardware and soft costs such as installation, permitting, inspection, profit, overhead, and interconnection costs, amounted to $57.3 million. This investment supported an average of 78 jobs per year, with 55 being direct jobs, generating $26.9 million in labor income and contributing $50 million to the gross regional product ("GRP") of APCo's service territory. Additionally, it resulted in $11.1 million in tax revenues, with $3.8 million benefiting state and local governments.

Beyond the Company's Virginia service territory, net metering also impacted the Commonwealth's economy. This includes effects stemming from the broader supply chain and employee expenditures, supported an additional 14 jobs, or two jobs per year on average, generated $1.1 million in labor income, and added $1.8 million to the GRP of the Commonwealth. Tax receipts increased by $416,000, with $155,000 accruing to state and local governments. However, the relative impact of this additional economic activity is modest. The total impact, including 80

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jobs per year and $51.8 million added to the GRP, represents only approximately 0.002% of the Commonwealth's economy.[4]

Mr. Feasel further explains that an economic analysis would not be complete if it did not consider the economic impact net metering has offset and the available alternatives. For example, one offset is Appalachian's lost revenue that could have supported jobs. Regarding alternatives, utility-scale solar would provide many of the same benefits above, but on a larger scale because there are more economic benefits associated with land-leases and operations and maintenance that are not present with small rooftop solar installations.

C. Net Metering Cap Adjustment

The Company proposes a cost-based compensation structure which, if approved by the Commission, would render the need for a net metering cap unnecessary. As described in Witness Castle's testimony, if the full retail rate compensation is maintained, the Commission should be cognizant of perpetuating inequitable cross-subsidization under the current net metering program. Accordingly, if full retail rate compensation is maintained, the Commission should not raise the current six percent cap, and should consider reducing it.

D. Costs And Benefits of Current Net Metering Program: Cost-of-Service Implications; Impact on Long-Run Marginal Costs; Netting Measurement Interval, Economic Impacts, Mitigation of Unreasonable Cost-Shifting, and Additional Relevant Information

In addition to the broader economic impacts discussed above and by Witness Feasel, Witness Coon performed a cost-of-service study to determine whether customer-generators provide an adequate rate of return by isolating current residential customer-generators into their own class within the class cost-of-service and removed them from the residential class. As

[4] *See* Ex. 2 to the Direct Testimony of Trenton E. Feasel.

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discussed further in Ms. Coon's testimony, the net metering class produces lower rates of return compared to their standard tariff non-participating counterparts. In other words, the revenue received from customer-generators is inadequate to cover the costs to serve them, meaning those customer-generators are receiving rate subsidies from other non-participating customers. Ms. Coon calculated that the current annual subsidy for residential net metering customer-generators is approximately $3.3 million, which translates into approximately $938 per year per system.

The Company's witnesses also discuss the following topics:

i. *Aggregate Impact of Customer-Generators on Long-Run Marginal Costs*

Witness Coon testifies that the items included in the Company's proposed avoided cost rate (N.M.S. II) account for the marginal cost of energy, marginal cost of generation through the capacity cost, and marginal cost of transmission through the shifted PJM zonal transmission costs. Ms. Coon's was advised by APCo's distribution team that there are no impacts to long-run marginal distribution costs associated with customer-generators.

ii. *Netting Measurement Interval*

Witness Coon explains that the Company proposes to use an integrated hourly interval for billing purposes. She further explains that the Company's proposal is just and reasonable because it permits customer-generators to net their usage at full retail rates when their generating system produces electricity equal to or less than the customer generator's usage. Importantly, it also ensures that customer-generators pay their fair share to use the Company's system, which minimizes inequitable cross-subsidization by non-participating customers.

iii. *Economic Impact to the Commonwealth*

As described above and as captured in Witness Feasel's testimony, while the net metering program has stirred some economic activity within the Commonwealth, this has also been offset by the ongoing revenue loss at the Company which may have impacted job growth at the

Company. Additionally, utility-scale solar also presents similar benefits to net metering, with more ongoing benefits.

iv. *Efforts to Mitigate Unreasonable Cost-Shifting to Non-Participating Customers*

Several features of the proposed Rider N.M.S. II rate structure are designed to lower overcompensation and decrease unreasonable cost-shifting to non-participating customers. This includes, as discussed above and detailed in Witness Coon's testimony, a change to the compensation structure and rate credited by the Company to the customer-generator for excess generation received by the Company, and a change in the cost recovery of payments made for N.M.S. II customer-generators' excess generation.

v. *Additional Relevant Information*

As described in Witness Feasel's testimony and discussed above, while there are environmental benefits to net metering, these benefits would be better captured and maximized with utility-scale solar. In addition to economic considerations, equity considerations as discussed in Witness Castle's testimony should be considered by the Commission. Generally, more affluent customers benefit from the policies that support net metering. Due to the inherent cross-subsidization in the current net metering program, non-participating customers, including low-income customers and/or customers that are members of environmental justice communities, bear a disproportionate share of the costs necessary to facilitate net metering as it exists today.

IV. APPROVAL OF REVISED TARIFF AND TERMS AND CONDITIONS OF SERVICE

Consistent with the Order, the Company proposes to revise the net metering program by introducing Rider N.M.S. II. Schedules 1 and 2 to Ms. Coon's testimony include the Company's proposed edits to Rider N.M.S. and the proposed Rider N.M.S. II tariff reflecting the proposed terms as described above and in Ms. Coon's testimony.

WHEREFORE, Appalachian respectfully requests that the Commission approve its proposed revisions to its net metering program and Rider N.M.S. and the Company's proposed Rider N.M.S. II.

Respectfully submitted,

APPALACHIAN POWER COMPANY

August 30, 2024

By _____

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Counsel for Appalachian Power Company

E240827000

CERTIFICATE OF SERVICE

I hereby certify that on this 30th day of August, 2024, a true copy of the foregoing Petition of Appalachian Power Company was emailed to the following:

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APCo Exhibit No. ____
Witness: WKC

2024-00069

DIRECT TESTIMONY OF
WILLIAM K. CASTLE
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2024-00___

APCo Exhibit No. ____
Witness: WKC

2009-00060

SUMMARY OF DIRECT TESTIMONY OF WILLIAM K. CASTLE

In my testimony, I

- Demonstrate that the need for policy support for behind the meter solar generation has diminished over time with increasing retail costs for electricity and decreased costs for installed solar systems;
- Discuss whether continued policy support for net metering in light of a mandatory RPS is the best use of customer resources;
- Raise equity issues associated with customer-owned systems being owned, predominately by wealthier customers.
- Support the Company's position to remove the existing 6% net metering cap with the imposition of cost-based compensation for electricity placed on the grid;
- Support the Company's position for the timing of an avoided cost rate update.

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DIRECT TESTIMONY OF
WILLIAM K. CASTLE
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2024-00___

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND POSITION.

A. My name is William K. Castle. I am the Director of Regulatory Services-VA/TN for APCo, and my business address is 1051 East Cary St., Suite 1100, Richmond, Va. 23219.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I provide the Commission with context concerning the policy support level that net metering has provided historically, who has participated in net metering and whether that is congruent with the Commonwealth's policy on environmental justice, and finally, whether rooftop solar should be prioritized over utility scale renewable facilities.

Q. WHEN VIRGINIA PASSED ITS NET METERING LAW IN 1999, WHAT WAS THE LEVEL OF POLICY SUPPORT FOR A TYPICAL RESIDENTIAL INSTALLATION?

A. In 2000, the median installed residential solar system cost \$8.10/Watt ("W_{DC}").[1] In 2022, the median cost of a more efficient system[2] was \$4.25/W_{DC}. Thus, a system of 9.89 kilowatts ("kW_{DC}") cost \$80,109 in 2000 and \$42,032 in 2022. Additionally, a customer installing a solar system in 2024 is eligible for a 30% investment tax credit ("ITC") that was not available in 2000.[3] The ITC further reduces the installed cost of that typical system to \$29,423. Using APCo's residential electric rate in 2000, a customer at that

[1] https://emp.lbl.gov/tracking-the-sun; (\$13.77/W in \$2022).

[2] Efficiencies have improved from 13.5% in 2002 to 20.8% in 2022.

[3] https://www.seia.org/sites/default/files/resources/History%20of%20ITC%20Slides.pdf.

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time could expect $571 in annual savings from their system, while that amount is $2,029 in 2024.[4]

Q. IS THIS CURRENT LEVEL OF POLICY SUPPORT NECESSARY TO ENCOURAGE ROOFTOP SOLAR?

A. No. Rooftop solar installations grew exponentially when installed costs were considerably higher and retail electric rates were lower. Reducing policy support to sustainable levels will not eliminate customer motivation to install rooftop solar systems.

Q. PLEASE DESCRIBE THE CUSTOMERS INSTALLING SOLAR SYSTEMS AND PARTICIPATING IN THE COMPANY'S NET METERING PROGRAM.

A. Company witness Feasel demonstrates in his direct testimony that customers who participate in net metering reside predominantly in zip codes with higher median incomes. Thus, it is reasonable to extrapolate that the customers installing rooftop solar systems tend to have higher incomes.

Q. ARE THERE EQUITY CONSIDERATIONS FOR THE COMMISSION TO CONSIDER IN THIS REGARD?

A. Yes. While it is the policy of the Commonwealth generally to encourage or enhance the investment in distributed energy resources, the Commission should consider that it is predominantly more affluent customers that financially benefit from the policy support at the expense of non-participating customers, many of which are considered low-income and/or environmental justice communities.

Q. IS THE ANSWER TO PROMOTE LOW-INCOME SOLAR PROGRAMS?

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[4] Using a 17.55% capacity factor and retail rates of $0.045/kWh and $0.16/kWh and inverter efficiency of 83.4%.

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A. Low-income solar programs address the equity issue in a limited way. As a practical matter, and given overall net metering participation as a guide, only a small minority of low-income customers will ever take advantage of such a program, which would, necessarily require additional policy support to be successful. Thus, a relative handful of low-income customers may be advantaged at the expense of others, while affluent customers continue receiving support unabated.

Q. IS THERE A LOWER COST PATH TO DECARBONIZATION?

A. Yes. The Company is required to meet an annual Renewable Portfolio Standards ("RPS"). The least expensive way to do this is through utility-scale renewable facilities, whether owned by the utility or third-parties. Paying for residential solar at $122-$284/MWh is much more expensive than purchasing utility scale renewable energy for $27-$92/MWh.[5]

Q. DOES NET METERING GET THE COMMONWEALTH TO 100% CARBON-FREE GENERATION FASTER?

A. No. The schedule to achieve 100% carbon-free generation is contained in Code § 56-585.5. Increased behind-the-meter generation will only result in a minor and temporary increase in renewable generation above what is achieved by the RPS alone.

Q. WHY IS THE INCREASE ONLY MINOR AND TEMPORARY?

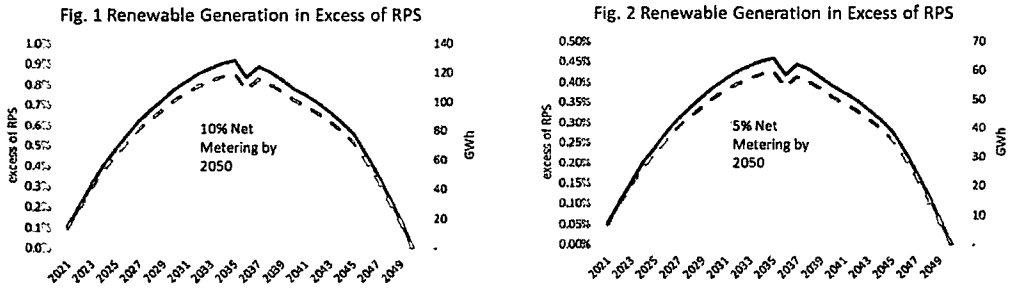
A. Net metering displaces the number of renewable energy certificates ("RECs") the Company must retire, reducing the necessary investment in utility-scale renewables. The utility RPS requirement, in absolute terms, is displaced by behind-the-meter generation.

[5] https://www.lazard.com/media/xemfey0k/lazards-lcoeplus-june-2024-_vf.pdf.

2020-00160

The ultimate composition of the generating portfolio will be a mix of utility and behind-the-meter carbon-free generation - the only question is whether it will have more or less of one or the other. If net metering (ratably) reaches 10% of utility peak load by 2050 (measured by nameplate capacity), this will create renewable generation (utility + customer) that exceeds the amount that would be achieved by the RPS alone (utility only) by an amount shown in Figure 1. For APCo, this cumulative amount of renewable generation in excess of the RPS is approximately 2,300 GWh over the years 2020-2050, but zero after 2050. This is roughly equivalent to a 40 MW utility solar generator (or 25 MW of wind) operating for 30 years. A utility-owned generation facility does not create the same cross-subsidization or equity issues as net metering customer-generators. If the amount of net metering achieved is a more modest 5%, the impacts are linear (Fig. 2).

Figure 1



Q. IF THE COMMISSION ADOPTS A MORE COST-BASED APPROACH TO COMPENSATION FOR ENERGY PLACED ONTO THE GRID, WILL THAT DISCOURAGE THE ADOPTION OF CUSTOMER-SITED GENERATION?

A. No. Since the policy was originally adopted in the Commonwealth, falling real prices for solar systems, the addition of the ITC, and rising utility costs (and rates) have improved the economics of customer-sited generation dramatically. Regardless of the

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compensation for generation exported to the grid, customer-generators receive the full retail rate benefit for generation that directly offsets energy consumption. Thus, any migration to cost-based compensation will largely mitigate cross-subsidization and equity concerns while not appreciably dampening the adoption of residential solar systems.

Q. SHOULD THE 6% AGGREGATE CAP ON NET METERING BE CHANGED?

A. If the compensation structure is cost-based, a cap is unnecessary. If full retail rate compensation is maintained, the Commission should consider that the carbon reductions made by net metering customer-generators merely cannibalize the ones required by the RPS, and there is, therefore, no compelling reason to keep policy support in place, above what is already being provided by the federal government via the ITC. Further, the Commission should consider that keeping the current compensation method in place provides a subsidy that likely increases (with retail rates) for the life of those solar generators. Those current and prospective customers will be able to avoid paying for various initiatives or liabilities that are unknown at this point, for which they will (or did) equally benefit.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

APCo Exhibit No. ____
Witness: TEF

DIRECT TESTIMONY OF
TRENTON E. FEASEL
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2024-00___

6007847

APCo Exhibit No. ____
Witness: TEF

SUMMARY OF DIRECT TESTIMONY OF TRENTON E. FEASEL

In my testimony, I

- Assess the direct and indirect economic impact of net metering to the Commonwealth and the utility's service territory.
- Quantify the direct and indirect economic impacts.
- Discuss some of the costs and benefits of the Company's net metering program.

APCo Exhibit No. ____
Witness: TEF

2024000069

DIRECT TESTIMONY OF
TRENTON E. FEASEL
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2024-00___

Q. PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS.

A. My name is Trenton Feasel. I am the Manager of Economic Forecasting for American Electric Power Service Corporation ("AEPSC"), the service company affiliate of Appalachian Power Company ("APCo" or the "Company"). My business address is 1 Riverside Plaza, Columbus, Ohio 43215.

Q. WOULD YOU PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND BUSINESS EXPERIENCE?

A. I earned a Bachelor of Science degree from Indiana State University in 2011 with a major in Economics. In 2015, I earned a Master of Science degree in Economics as well as a Master's of Public Policy and Management from The Ohio State University.

I began working at AEPSC in May 2015 as an Economic Forecast Analyst. In February 2019, I left AEPSC to work at Encova Insurance as a Consultant in their Actuarial and Analytics department. I rejoined AEPSC in August 2021 as an Economic Forecast Analyst Principal. In January 2024 I was promoted to my current role of Manager, Economic Forecasting.

In my current role, I prepare customer, sales, peak demand, and revenue forecasts for each of the American Electric Power, Inc. ("AEP") operating companies in the eleven jurisdictions and three regional transmission organizations that cover the AEP service territory. In addition, I produce weather normalization calculations and sales and revenue variance reports for each of the AEP operating companies including APCo.

2020-00060

Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY AS A WITNESS BEFORE ANY REGULATORY COMMISSION?

A. Yes. I have submitted testimony to the Public Utility Commission of Texas in Docket No. 56165.

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes. I am sponsoring the following exhibits:

- APCo Exhibit No. 1 (TEF) Schedule 1 – IMPLAN Inputs
- APCo Exhibit No. 2 (TEF) Schedule 2 – IMPLAN Direct and Indirect Economic Impact Analysis
- APCo Exhibit No. 3 (TEF) Schedule 3 – IMPLAN Lost Revenue Analysis Summary

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. The purpose of my direct testimony is to assess the direct and indirect economic impacts of net metering to the Commonwealth of Virginia ("Commonwealth") and to APCo's Virginia service territory. In addition, I identify, quantify, and present certain costs and benefits related to the Company's current net energy metering programs.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. My testimony shows that the evidence does not support the premise that NM has incented the best use of resources in the Commonwealth. My testimony shows 31.5 megawatts ("MW") of customer-sited solar installations across APCo's Virginia service territory from 2017 to 2023 added approximately $50 million in Gross Regional Product ("GRP") to the Commonwealth. However, more could have been accomplished with utility-scale solar, benefitting more Virginians in a more cost-effective manner. For clarity, my

testimony primarily focuses on the solar portion of net metering because solar represented 99.8% of all net metering in APCo's service territory in 2023.

CURRENT STATE OF NET METERING IN APCO'S VIRGINIA SERVICE TERRITORY

Q. WHAT IS THE CURRENT STATE OF NET METERING PARTICIPATION IN APCO'S VIRGINIA SERVICE TERRITORY?

A. At the end of 2023, 3,868 of APCo's Virginia retail customers participated in net metering. The total nameplate capacity of all installations was 36.9 MW. Of the net metering customer-generators, 3,852 utilized solar, representing 36.8 MW of installed capacity. Of the remaining customers-generators, 16 utilized hydro or wind as their generation source, with a combined nameplate capacity of 0.08 MW.

Q. HAS THE COMPANY EXPERIENCED GROWTH IN THE NUMBER OF CUSTOMER-GENERATORS?

A. Yes. The Company has seen total customer-generators increase from 1,310 in 2018 to 3,868 in 2023, which puts the five-year compound annual growth rate at 31.6%. The nameplate capacity has grown from 8.9 MW to 36.9 MW over the same period. Nearly all of the growth is occurring with solar as the generation source, with only one non-solar customer coming online since 2018 with a 0.026 MW wind generation system.

Q. HOW DOES THIS COMPARE TO THE SIZE OF APCO?

A. Despite the growth over the last five years, overall penetration remains low. APCo had approximately 542,000 Virginia retail customers at the end of 2023, meaning approximately 0.7% of customers participated in net energy metering. Assuming all

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nameplate capacity can be utilized, the 36.9 MW of installed capacity would represent 1% of APCo's 3,225 MW Virginia peak load recorded in 2023.

Q. HOW DOES THIS COMPARE TO THE COMMONWEALTH?

A. According to 2023 EIA-861 data,[1] 1.3% of electric customers in the Commonwealth net meter. This includes the approximately 1.7% penetration of Virginia Electric and Power Company's ("Dominion") Virginia customers, which account for approximately 84% of all net metering customer-generators in the Commonwealth.

Q. WHY DOES APCO HAVE A SMALLER PORTION OF CUSTOMERS PARTICIPATING IN NET METERING?

APCo's Virginia service territory is less affluent compared to the rest of the Commonwealth, with median household incomes 47% lower in 2023, according to Moody's Analytics estimates ($62,211 versus $91,228). Consistent with the theory of demand for a normal good, one should expect greater demand in areas with higher incomes. This is supported by the Company's data, as illustrated in Figure 1 below, which summarizes APCo's solar net metering installations by median household income across zip codes. Because 56% of APCo's solar net metering occurs in areas with median household incomes of more than $73,637, it is not surprising that Dominion has more than double the share of customers that net meter. More densely populated counties such as Fairfax and Loudoun, both of which are in Dominion's service territory, have 2023

[1] 2023 EIA-861M Net Metering Data: https://www.eia.gov/electricity/data/eia861m/archive/xls/net_metering2023.xlsx.

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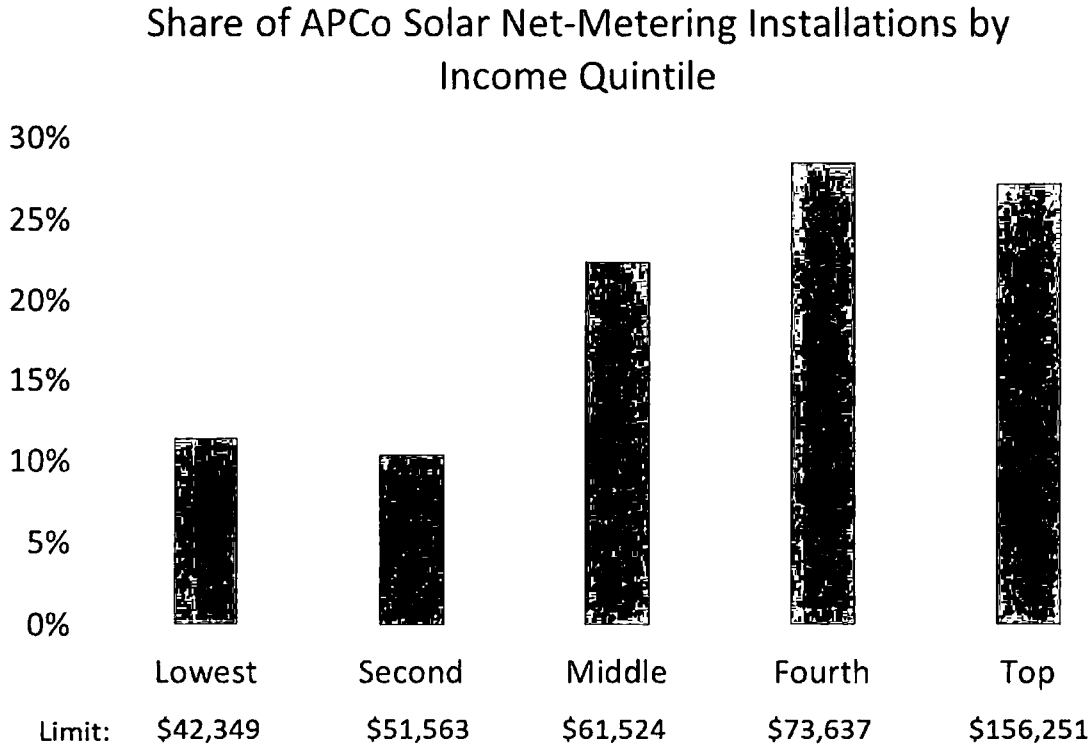
median household incomes of at least $170,000, according to Moody's Analytics estimates.

Figure 1

Share of APCo Customers with Solar Net energy Metering by Income



ECONOMIC IMPACTS

Q. WHAT ANALYIS WAS CONDUCTED TO ASSESS THE ECONOMIC IMPACTS?

A. The Company utilized IMPLAN to measure the direct and indirect economic impacts of net energy metering. IMPLAN is a leading input-output software used to estimate the

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impacts of economic activity. IMPLAN's report toolkit explains its methodology as follows:

> "IMPLAN utilizes an economic modeling technique called Input-Output analysis and a Social Accounting Matrix, which is a type of applied economic analysis that tracks the interdependence among various producing and consuming industries of an economy and the spending of households. It measures the relationship between a given set of demands for final goods and services and the inputs required to satisfy those demands."[2]

Q. HOW DOES AN IMPLAN STUDY SATISFY THE COMMISSION'S FINDING TO ASSESS THE DIRECT AND INDIRECT IMPACTS OF NET METERING?

A. IMPLAN is well suited to answer these questions. Because it tracks the flows and impacts of production and consumption, analysis can be broken down into three primary categories. It measures the initial effects to local industry due to economic activity, which is the direct effect. Further, it measures the impact of business-to-business activity in the supply chain from economic activity, known as the indirect effect. Finally, it can also assess the regional impacts stemming from the activity (induced effect), along with quantifying impacts to employment, labor and proprietor income, and taxes, among other items.

Q. WHAT ASSUMPTIONS WERE MADE IN THE ANALYSIS?

A. Because most installations occurred since 2017, the Company analyzed net metering installations from 2017 to 2023. Additionally, the Company focused the economic analysis on solar net metering installations because only one non-solar installation occurred during this time period and cost estimates for such a small wind unit were not

[2] IMPLAN Report Toolkit by Candi Clouse, PhD; March 13, 2020.

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readily available. Regarding cost estimates, the Company used cost estimates from NREL's U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark reports. Additionally, as implied above, only the soft cost spend and spend on hardware were included. Spending associated with modules and inverters generally flows to the manufacturers, which would largely qualify as a leakage outside of the Commonwealth in input-output modeling.

Q. WHAT IS THE IMPACT TO THE APCO SERVICE TERRITORY'S ECONOMY FROM NET METERING?

A. The economic impact of net metering is apparent in many forms. The positive impacts to the territory's economy are primarily related to the installation of solar panels at residential homes and businesses. This would include wages and jobs for those who install the panels, sales of materials necessary to complete an installation, and additional taxes, among others. From 2017 to 2023, the period when the majority of net metering solar was installed in APCo's Virginia service territory, estimated cumulative expenditures of the installs related to hardware and soft costs (e.g., installation, permitting, inspection, profit, overhead, and interconnections costs) were $57.3 million. This spend created and supported 78 jobs per year, on average, with 55 of them being direct jobs. In total, this produced labor income of $26.9 million and added $50 million to the gross regional product ("GRP") of APCo's service territory. Further, it contributed $11.1 million in taxes, with $3.8 million of that accruing to state and local governments.

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Q. ARE THERE ADDITIONAL IMPACTS TO THE COMMONWEALTH'S ECONOMY?

A. Yes, although the above estimates are the impact to APCo's territory, there are spillover, or induced, effects into the remainder of the Commonwealth. This is a result of the expenditures affecting the broader supply chain and induced effects from employee expenditures. These spillover effects created and supported 14 jobs, or 2 jobs per year on average, $1.1 million in labor income, and $1.8 million to the GRP of the Commonwealth. Tax receipts increased by $416,000, with $155,000 accruing to state and local governments.

Q. WHAT IS THE RELATIVE IMPACT OF THIS ADDITIONAL ECONOMIC ACTIVITY?

A. The relative impact of the economic activity associated with net metering is very small. The total impact, 80 jobs per year and $51.8 million of GRP, represents about 0.002% of the Commonwealth's more than 4 million jobs and more than $700 billion of output in 2023, per Moody's Analytics data.

<u>OTHER ECONOMIC IMPACTS & EFFICACY OF NET METERING</u>

Q. ARE THERE ANY OTHER ECONOMIC IMPACTS OR FACTORS FROM NET METERING THAT SHOULD BE TAKEN INTO ACCOUNT?

A. Yes, there are many. Any analysis would be incomplete if it did not consider what economic activity net metering has offset and the alternatives. The latter calls into question the efficacy of net metering, along with additional economic activity that would have been generated under alternative approaches.

Q. WHAT ECONOMIC ACTIVITY HAS BEEN OFFSET FROM NET METERING?

A. Despite the additional economic activity that has occurred with net metering, one must also account for what it has offset. This includes, but is not limited to, APCo's lost revenue that would otherwise be used to support jobs. In 2023, net energy metering is estimated to have reduced APCo revenue by approximately $3.8 million, which would have translated to $3 million is lost GRP, including associated value-added activity, throughout the Commonwealth. This causes a reduction of seven jobs in total, with two being direct. It is important to note these impacts would be expected to occur annually in the future, offsetting the previously discussed benefits.

Q. WHY SHOULD THE EFFICACY OF NET METERING BE QUESTIONED?

A. In short, the cost of energy, namely rooftop solar, associated with net metering is a relatively expensive form of energy. Other alternatives are available that are cheaper, as environmentally friendly, and produce similar, if not greater, economic benefits. From a pure economic perspective, when such a scenario arises, incentives that promote the more expensive option leads to a less-than-optimal allocation of resources.

Q. WHAT IS A MORE COST-EFFECTIVE ALTERNATIVE TO CAPTURE THESE BENEFITS?

A. Utility-scale solar would be the primary alternative.

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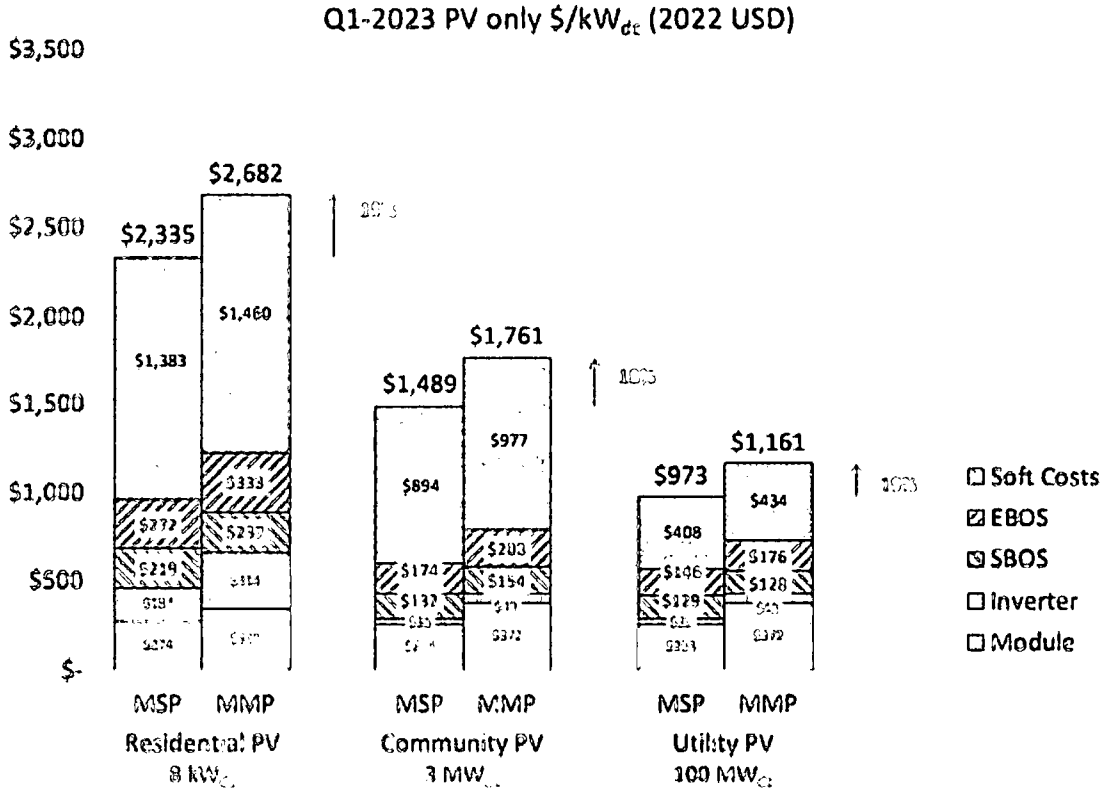
Q. WHY IS UTILITY-SCALE SOLAR A MORE COST-EFFECTIVE ALTERNATIVE THAN ROOFTOP SOLAR?

A. Lower costs deriving from economies of scale is the primary reason. As shown below in Figure 2, data from NREL[3] shows that market prices for utility-scale solar is over $1,500 per kW cheaper than residential solar.

Figure 2
Solar Cost by Type



Source: Q1 2023 NREL U.S. Photovoltaic System and Energy Storage Cost Benchmarks

What this effectively means is that for the $57.3 million in total expenditures throughout APCo's Virginia service territory for net metering, approximately 49 MW of

[3] https://www.nrel.gov/docs/fy23osti/87303.pdf.

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utility-scale solar was possible, rather than 36.8 MW of net metering. Not only would more be installed for the same cost, but utility-scale solar is a more efficient way to harness energy than rooftop solar. According to NREL,[4] rooftop solar in most of Virginia has a mean capacity factor of 15.3% compared to 24.6% for utility-scale solar. This means that a utility-scale installation has greater efficiency in harnessing solar energy, and it would be expected to produce 59% more energy per year.

Finally, there is at least one additional benefit worth mentioning. That is, all APCo customers would be able to reap the benefits of solar if it was utility-scale, rather than the smaller, yet relatively wealthier, population of net metering customer-generators.

Q. PLEASE DISCUSS THE ECONOMIC IMPACTS OF UTILITY-SCALE SOLAR.

A. Utility-scale solar would largely resemble the direct impacts discussed earlier, both to the APCo service territory and to the rest of the Commonwealth. Because the process to install utility-scale solar would not differ much, there is no reason to believe a higher or lower economic multiplier would result, thus leading to similar direct and indirect economic benefits. The one difference is that utility-scale would produce greater on-going benefits. Most net metering installations produce one-time injections into the economy that do not produce many recuring, direct economic benefits. However, when it occurs at utility-scale, there are more ongoing benefits in the form of ongoing land-leases, operations and maintenance of the plant, etc.

[4] https://atb.nrel.gov/electricity/2023/utility-scale_pv and https://atb.nrel.gov/electricity/2023/residential_pv.

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Q. PLEASE PROVIDE A SUMMARY OF YOUR DIRECT TESTIMONY.

Net metering in APCo's service territory has led to small, nearly inconsequential direct and indirect economic impacts relative to the size of the Commonwealth's economy. Because more capacity could have been installed with a similar level of total expenditures using utility-scale solar, it is not clear that net metering has incented an optimal allocation of resources within the Commonwealth.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

Component	Class	2017	2018	2019	2020	2021	2022	2023	Sum (if applicable)	
Module	Residential	$ 0.38	$ 0.49	$ 0.39	$ 0.38	$ 0.33	$ 0.61	$ 0.55		
Inverter	Residential	$ 0.21	$ 0.22	$ 0.23	$ 0.22	$ 0.27	$ 0.44	$ 0.40		
Hardware BOS - Structural and Electrical Components	Residential	$ 0.39	$ 0.32	$ 0.29	$ 0.27	$ 0.32	$ 0.46	$ 0.42		
Soft Costs - Install Labor	Residential	$ 0.33	$ 0.28	$ 0.25	$ 0.24	$ 0.18	$ 0.16	$ 0.15		
Soft Costs - Others (PII, Land Acquisition, Sales Tax, Overhead, and Net Profit)	Residential	$ 1.74	$ 1.52	$ 1.40	$ 1.36	$ 1.55	$ 1.28	$ 1.16		
Additional Costs from Model Updates	Residential	$ -	$ -	$ 0.21	$ 0.24	$ -	$ -	$ -		
Total	Residential	$ 2.95	$ 2.76	$ 2.77	$ 2.74	$ 2.65	$ 2.95	$ 2.68		
PV Count Increment	Residential	107	237	306	375	537	714	869	3,145	
PV Capacity Increment KWh	Residential	0.736	1.507	1.937	2.625	4.525	7.086	9.180	27.6	
Incremental Watt/Cust	Residential	6.877	6.360	6.330	6.999	8.427	9.924	10.564		
Module Total $	Residential	$ 281,343	$ 741,972	$ 763,653	$ 987,395	$ 1,512,081	$ 4,324,100	$ 5,094,514		
Inverter Total $	Residential	$ 155,520	$ 331,519	$ 444,929	$ 570,148	$ 1,216,530	$ 3,116,295	$ 3,671,518		
Hardware BOS Total $	Residential	$ 287,349	$ 489,386	$ 556,972	$ 720,374	$ 1,452,944	$ 3,242,683	$ 3,820,424		
Soft Costs Install Labor Total $	Residential	$ 244,341	$ 426,239	$ 478,410	$ 636,398	$ 827,087	$ 1,133,688	$ 1,335,675		
Soft Costs Others Total $	Residential	$ 1,280,088	$ 2,289,063	$ 2,715,130	$ 3,578,757	$ 7,005,617	$ 9,065,368	$ 10,680,524		
Total $	Residential	$ 2,171,574	$ 4,154,697	$ 5,371,800	$ 7,202,254	$ 12,014,258	$ 20,882,134	$ 24,602,655		
Module	Com/Ind	$ 0.38	$ 0.49	$ 0.39	$ 0.38	$ 0.33	$ 0.45	$ 0.43		
Inverter	Com/Ind	$ 0.11	$ 0.08	$ 0.05	$ 0.04	$ 0.09	$ 0.06	$ 0.05		
Hardware BOS - Structural and Electrical Components	Com/Ind	$ 0.33	$ 0.26	$ 0.26	$ 0.24	$ 0.25	$ 0.34	$ 0.33		
Soft Costs - Install Labor	Com/Ind	$ 0.18	$ 0.13	$ 0.16	$ 0.16	$ 0.15	$ 0.15	$ 0.15		
Soft Costs - Others (PII, Land Acquisition, Sales Tax, Overhead, and Net Profit)	Com/Ind	$ 1.01	$ 0.84	$ 0.84	$ 0.82	$ 0.73	$ 0.84	$ 0.82		
Additional Costs from Model Updates	Com/Ind	$ -	$ -	$ 0.05	$ 0.08	$ -	$ -	$ -		
Total	Com/Ind	$ 1.95	$ 1.86	$ 1.76	$ 1.72	$ 1.56	$ 1.84	$ 1.78		
PV Count Increment	Com/Ind	9	9	12	9	11	19	24	93	
PV Capacity Increment	Com/Ind	0.584	0.626	0.287	0.261	0.099	0.462	1.548	3.9	
Incremental Watt/Cust	Com/Ind	64.851	69.544	23.916	28.953	9.012	24.314	64.518		
Module Total $	Com/Ind	$ 223,156	$ 308,106	$ 113,148	$ 98,025	$ 33,122	$ 206,541	$ 670,369		
Inverter Total $	Com/Ind	$ 66,531	$ 52,444	$ 15,682	$ 11,620	$ 8,833	$ 76,105	$ 84,729		
Hardware BOS Total $	Com/Ind	$ 191,213	$ 163,886	$ 73,462	$ 63,686	$ 24,879	$ 157,308	$ 510,574		
Soft Costs Install Labor Total $	Com/Ind	$ 107,486	$ 78,665	$ 46,799	$ 41,369	$ 14,722	$ 69,341	$ 225,060		
Soft Costs Others Total $	Com/Ind	$ 591,248	$ 524,436	$ 242,035	$ 213,173	$ 72,627	$ 389,895	$ 1,265,482		
Total $	Com/Ind	$ 1,139,205	$ 1,166,928	$ 506,087	$ 448,314	$ 154,183	$ 849,190	$ 2,756,214		
[redacted]										$ 15,357,524
[redacted]										$ 9,772,404
[redacted]										$ 11,755,140
[redacted]										$ 5,665,280
[redacted]										$ 39,913,503
[redacted]										$ 83,419,492
[redacted]										$ 57,333,924

Sources:
PV Count data = Internal company data
Cost data = NREL

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AMERICAN ELECTRIC POWER
BOUNDLESS ENERGY

Project Name	Economic Impact Analysis - Net-Metering Solar Installations
Project Location	Appalachian Power Company Virginia Service Area
Study Region	Appalachian Power Company Virginia Service Area
Capital Investment	Impacts of $57.3 million spend for solar panel installations over 2017 through 2023 period.
Source	Implan Version 6.3. The IMPLAN Construction of New Power and Communication Structures (IIMPLAN ndustry 52) was used fore analysis. Multi-Region Input-Output (MRIO) analysis used to estimate impacts on the remainder of the State.
Date of Analysis	August 2024

Disclaimer: Economic modeling provides general impact estimates for economic development projects. However, future results will be affected by political, social, and economic conditions. Economic modeling is most informative when used in conjunction with other forms of analysis, such as cost-benefit analysis and fiscal impact analysis, to estimate the overall impact of a project. The completion of this analysis by AEP is neither an endorsement for or against this project. Additionally, the analysis is based on information provided externally. If that information were to change for any reason, it would change the results of the analysis.

Solar Panel Installation Appalachian Power Virginia Service Area

Installation expenditure impacts were based off of estimated expenditures of $57.3 M over 2017 through 2023. That estimated spend created or supported an average of 55 direct jobs per year of the seven year project, and 78 jobs per year overall in the economy during the spend period (including the 55 direct jobs). It represents a jobs multiplier of 1.43 and total labor income of $26.9 M (2024$). It adds $50.0 M (2024$) to the gross regional product (value added).

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	382.47	$18,592,491.28	$33,159,325.29	$57,684,678.80
Indirect Effect	70.35	$4,147,054.34	$8,099,181.23	$15,773,657.69
Induced Effect	95.89	$4,206,850.77	$8,764,926.79	$15,563,736.06
Totals	548.71	$26,946,396.38	$50,023,433.31	$89,022,072.55
Type SAM Multiplier	*1.43*	*1.45*	*1.51*	*1.54*

Annual Average Employment

Direct Effect	55
Indirect Effect	10
Induced Effect	14
Total	78

Solar Panel Installation Expenditures Economic Effects on the Remainder of Virginia

Solar panel installation expenditures in the study area will have spill over effects into the remainder of the Commonwealth of Virginia. These expenditures will affect the supply chain (indirect effects) and employee expenditures (induced effects). A multi-regional input-out model was used to estimate these impacts. The spill over effects will create or support 2 jobs per year over the seven year period. These activities add an additional $1.1 M (2024$) and an additional $1.8 M (2024$) to the gross regional product (value added).

Impact Type	Employment	Labor Income	Value Added	Output
Indirect Effect	8.64	$755,893.00	$1,150,303.40	$2,149,012.40
Induced Effect	5.73	$333,184.48	$659,716.49	$1,079,670.35
Total Effect	14.36	$1,089,077.48	$1,810,019.89	$3,228,682.75

Solar Panel Installation Expenditures for APCo Virginia - Total Effects for Commonwealth of Virginia

Capital expenditures in study area have impacts in the study area and the remainder of the Commonwealth of Virginia. The activities associated with the capital spend created or supported 55 jobs per year of the seven year period, and 80 jobs overall for the Commonwealth over the spend period including 55 direct jobs. It represents a jobs multiplier of 1.47 and total labor income of $28.0 M (2024$). It adds $51.8 M (2024$) to the gross regional product (value added).

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	382.47	$18,592,491.28	$33,159,325.29	$57,684,678.80
Indirect Effect	78.99	$4,902,947.34	$9,249,484.63	$17,922,670.09
Induced Effect	101.62	$4,540,035.25	$9,424,643.28	$16,643,406.41
Totals	563.07	$28,035,473.86	$51,833,453.20	$92,250,755.31
Type SAM Multiplier	*1.47*	*1.51*	*1.56*	*1.60*

Annual Average Employment

Direct Effect	55
Indirect Effect	11
Induced Effect	15
Total	80

Taxes as a Result of Pole Management Expenditures - Appalachian Power Service Area

Activities associated with the proposed capital expenditures in the study area will result in an estimated $1,384.8 thousand local taxes, $2,400.9 thousand state taxes and $7,347.2 thousand Federal taxes. The estimated total tax impact is $11.132.9 thousand.

Impact Type	Sub County General	Sub County Special	County	State	Federal	Total		State and Local
Direct Effect	$114,692.15	$1,053.72	$210,932.07	$1,033,675.77	$5,003,627.28	$6,363,980.99		$ 1,360,353.71
Indirect Effect	$204,249.68	$1,912.29	$368,998.54	$725,130.68	$1,152,165.27	$2,452,456.46		$ 1,300,291.18
Induced Effect	$171,463.46	$1,604.46	$309,925.74	$642,073.30	$1,191,431.85	$2,316,498.81		$ 1,125,066.96
Total Effect	$490,405.29	$4,570.47	$889,856.34	$2,400,879.75	$7,347,224.41	$11,132,936.26		$ 3,785,711.85

Taxes as a Result of Solar Panel Installation Expenditures Activities - Virginia

The Commonwealth of Virginia will have additional taxes as a result of activities in the study area. It is estimate there will be an additional $72.0 thousand local taxes, an additional $82.6 thousand state taxes and additional $261.0 thousand federal taxes. The estimated additional total tax impact is $415.6 thousand.

Impact Type	Sub County General	Sub County Special	County	State	Federal	Total		State and Local
Indirect Effect	$12,535.57	$9.59	$23,206.36	$47,293.03	$176,771.54	$259,816.09		$83,044.55
Induced Effect	$12,741.85	$9.87	$23,448.53	$35,333.47	$84,219.05	$155,752.76		$71,533.71
Total Effect	$25,277.42	$19.46	$46,654.89	$82,626.50	$260,990.59	$415,568.85		$154,578.26

Taxes as a Result of Solar Panel Installation Expenditures Activities - Commonwealth of Virginia

The Commonwealth of Virginia will have taxes as a result of activities in the study area. It is estimate there will be $1,456.8 thousand local taxes, $2,483.5 thousand state taxes and $7,608.2 thousand federal taxes. The estimated total tax impact is $11,548.5 thousand.

Impact Type	Sub County General	Sub County Special	County	State	Federal	Total		State and Local
Direct Effect	$114,692.15	$1,053.72	$210,932.07	$1,033,675.77	$5,003,627.28	$6,363,980.99		$ 1,360,353.71
Indirect Effect	$216,785.25	$1,921.87	$392,204.90	$772,423.71	$1,328,936.82	$2,712,272.55		$ 1,383,335.73
Induced Effect	$184,205.31	$1,614.33	$333,374.26	$677,406.77	$1,275,650.90	$2,472,251.58		$ 1,196,600.67
Total Effect	$515,682.71	$4,589.93	$936,511.23	$2,483,506.25	$7,608,215.00	$11,548,505.12		$ 3,940,290.12

AMERICAN ELECTRIC POWER
BOUNDLESS ENERGY

Project Name	Economic Impact Analysis - Lost Sales Due to Net Metering Solar Installations
Project Location	Appalachian Power Company Virginia Service Area
Study Region	Appalachian Power Company Virginia Service Area
Capital Investment	Impacts of $3.8 million lost sales due solar panel installations in 2023.
Source	Implan Version 6.3. The IMPLAN Electric Power Transmission and Distribution (IIMPLAN ndustry 47) was used fore analysis. Multi-Region Input-Output (MRIO) analysis used to estimate impacts on the remainder of the State.
Date of Analysis	August 2024

Disclaimer: Economic modeling provides general impact estimates for economic development projects. However, future results will be affected by political, social, and economic conditions. Economic modeling is most informative when used in conjunction with other forms of analysis, such as cost-benefit analysis and fiscal impact analysis, to estimate the overall impact of a project. The completion of this analysis by AEP is neither an endorsement for or against this project. Additionally, the analysis is based on information provided externally. If that information were to change for any reason, it would change the results of the analysis.

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Lost Sales Appalachian Power Virginia Service Area

Lost sales resulted in lost revenue of $3.8 M in 2023. That estimated lost revenue resulted in 2 less jobs being supported, and 7 jobs overall in the economy (including the 2 direct jobs). It represents a jobs multiplier of 3.13 and lost labor income of $0.8 M (2024$). It reduced $3.0 M (2024$) to the gross regional product (value added).

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	2.26	$389,035.13	$1,862,901.91	$3,800,265.73
Indirect Effect	2.18	$246,795.46	$870,551.31	$1,726,692.73
Induced Effect	2.64	$115,609.95	$240,880.01	$427,722.68
Totals	7.07	$751,440.55	$2,974,333.23	$5,954,681.13
Type SAM Multiplier	*3.13*	*1.93*	*1.60*	*1.57*

Lost Sales Economic Effects on the Remainder of Virginia

Lost sales in the study area will have spill over effects into the remainder of the Commonwealth of Virginia. These lost sales will affect the supply chain (indirect effects) and employee expenditures (induced effects). A multi-regional input-out model was used to estimate these impacts. The spill over effects will minimal for jobs. These loss of these activities further reduce $0.04 M (2024$) and an additional $0.1 M (2024$) to the gross regional product (value added).

Impact Type	Employment	Labor Income	Value Added	Output
Indirect Effect	0.23	$28,435.16	$76,298.52	$140,593.72
Induced Effect	0.18	$10,715.46	$21,215.40	$34,720.55
Total Effect	0.42	$39,150.61	$97,513.92	$175,314.27

Lost Sales for APCo Virginia - Total Effects for Commonwealth of Virginia

Lost sales in study area have impacts in the study area and the remainder of the Commonwealth of Virginia. The lost activities associated with the lost sales resulted in 2 less jobs, and 7 jobs overall for the Commonwealth including 2 direct jobs. It represents a jobs multiplier of 3.31 and lost labor income of $0.8 M (2024$). It reduces $3.1 M (2024$) to the gross regional product (value added).

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	2.26	$389,035.13	$1,862,901.91	$3,800,265.73
Indirect Effect	2.41	$275,230.62	$946,849.84	$1,867,286.45
Induced Effect	2.82	$126,325.41	$262,095.41	$462,443.23
Totals	7.49	$790,591.16	$3,071,847.16	$6,129,995.41
Type SAM Multiplier	*3.31*	*2.03*	*1.65*	*1.61*

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Taxes as a Result of Lost Sales - Appalachian Power Service Area

Activities associated with the lost sales in the study area will result in an estimated $311.0 thousand local taxes, $352.1 thousand state taxes and $276.6 thousand Federal taxes. The estimated total tax impact is $888.7 thousand.

Impact Type	Sub County General	Sub County Special	County	State	Federal	Total		State and Local
Direct Effect	$68,486.84	$642.39	$123,510.39	$216,972.14	$157,622.89	$567,234.65		$ 409,611.76
Indirect Effect	$37,355.00	$350.34	$67,374.47	$117,475.50	$86,272.54	$308,827.84		$ 222,555.30
Induced Effect	$4,711.82	$44.09	$8,516.77	$17,644.49	$32,742.45	$63,659.61		$ 30,917.17
Total Effect	$110,553.66	$1,036.82	$199,401.62	$352,092.13	$276,637.88	$939,722.10		$ 663,084.22

Lost Taxes as a Result of Lost Sales and Associated Activities - Virginia

The Commonwealth of Virginia will have less taxes as a result of lost activities in the study area. It is estimate there will be $9.9 thousand less local taxes, $7.9 thousand less state taxes and $10.7 thousand less federal taxes. The estimated total tax impact is $28.5 thousand lost taxes.

Impact Type	Sub County General	Sub County Special	County	State	Federal	Total		State and Local
Indirect Effect	$3,067.63	$2.39	$5,628.75	$6,765.18	$7,982.08	$23,446.03		$15,463.94
Induced Effect	$409.73	$0.32	$754.01	$1,136.22	$2,708.47	$5,008.74		$2,300.28
Total Effect	$3,477.35	$2.71	$6,382.76	$7,901.40	$10,690.55	$28,454.77		$17,764.22

Lost Taxes as a Result of Lost Sales Activities - Commonwealth of Virginia

The Commonwealth of Virginia will have less taxes as a result of lost sales activities in the study area. It is estimate there will be $320.9 thousand less local taxes, $360.0 thousand less state taxes and $287.3 thousand less federal taxes. The estimated total tax impact is $968.2 thousand less.

Impact Type	Sub County General	Sub County Special	County	State	Federal	Total		State and Local
Direct Effect	$68,486.84	$642.39	$123,510.39	$216,972.14	$157,622.89	$567,234.65		$ 409,611.76
Indirect Effect	$40,422.62	$352.73	$73,003.21	$124,240.68	$94,254.63	$332,273.87		$ 238,019.24
Induced Effect	$5,121.54	$44.41	$9,270.77	$18,780.72	$35,450.91	$68,668.36		$ 33,217.44
Total Effect	$114,031.01	$1,039.53	$205,784.38	$359,993.53	$287,328.43	$968,176.87		$ 680,848.44

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APCo Exhibit No. ____
Witness: NMC

DIRECT TESTIMONY OF
NICOLE M. COON
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2024-00___

APCo Exhibit No. ____
Witness: NMC

SUMMARY OF DIRECT TESTIMONY OF NICOLE M. COON

In my testimony, I

- Propose an amount for the net metering customer to pay on his electricity bills each month for the costs of using the utility's infrastructure;
- Propose an amount the utility shall pay to appropriately compensate the customer-generator for the total benefits the generator provide;
- Propose a rate structure related to net energy metering to govern compensation related to all eligible customer-generators;
- Identify, quantify, and present the costs of the current net energy metering program;
- Support the proposed netting measurement interval for a successor tariff that is just and reasonable in light of the costs and benefits of the net metering program in aggregate, and applicable to new requests for net energy metering service;
- Identify, quantify, and present the specific avoided cost for customer-generators, and a propose a methodology for determining the compensation rate for any net excess generation determined according to the applicable net measurement interval;
- Identify, quantify, and present the utility's efforts to ensure that the net energy metering program does not result in unreasonable cost-shifting to nonparticipating electric utility customers;
- Evaluate and provide the aggregate impact of customer-generators on the electric utility's long-run marginal costs of generation, distribution, and transmission; and
- Evaluate and provide the cost-of-service implications of customer-generators on other customers within the same class, including an evaluation of whether customer-generators provide an adequate rate of return to the electrical utility compared to the otherwise applicable rate class when, for analytical purposes only, examined as a separate class within a cost of service study.

APCo Exhibit No. ____
Witness: NMC

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DIRECT TESTIMONY OF
NICOLE M. COON
FOR APPALACHIAN POWER COMPANY
IN VIRGINIA S.C.C. CASE NO. PUR-2024-00___

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND PRESENT POSITION.

A. My name is Nicole M. Coon. I am employed by American Electric Power Service Corporation ("AEPSC") as a Regulatory Consultant Principal. My business address is 1 Riverside Plaza, Columbus, Ohio 43215. AEPSC is a wholly-owned subsidiary of AEP, the parent company of APCo.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I graduated from Ohio State University with a Bachelor of Science degree in Business Administration majoring in Accounting and minoring in Communications in 2018. I obtained my Certified Public Accountant license in 2018 and am licensed in the state of Ohio. Prior to joining AEPSC I worked for a regional public accounting firm where I performed various financial audits of companies and prepared tax returns for individuals and businesses. In 2019, I joined AEPSC as a Strategic Initiatives Associate in the Strategy and Transformation Operations Group. I later became a Strategic Initiatives Associate Senior, where I was responsible for internal and external business valuation, preparing pro forma business and financial plans, performing strategic studies and analyses, and preparing executive council and board-level presentations. In 2022, I transferred to Regulatory Services to my current position as a Regulatory Consultant Principal.

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Q. PLEASE BRIEFLY DESCRIBE YOUR DUTIES AND RESPONSIBILITIES AS REGULATORY CONSULTANT PRINCIPAL.

A. My responsibilities include the preparation of cost-of-service analyses, rate design, special contracts, and renewable analysis for the AEP System operating company. I assist APCo and other AEP electric utility operating companies in the preparation of filings before the Commission and other public service commissions under whose jurisdiction the Company provides electric service.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE ANY REGULATORY AGENCIES?

A. Yes. I have sponsored testimony on behalf of APCo before this Commission in Case No. PUR-2023-00212 and before the Kentucky Public Service Commission in Case No. 2024-00243.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to:

- Describe the proposed amount for net energy metering customers, or customer-generators, to pay on their power bills each month for the costs of using APCo's infrastructure (pages 20-21);
- Describe the proposed amount APCo shall pay to appropriately compensate the customer-generators for the total benefits such facilities provide (pages 13-15 testimony);
- Describe the proposed rate structure related to net energy metering to govern compensation related to all eligible customer-generators (pages 13-15);
- Identify, quantify, and present the costs of the current net energy metering program (pages 7-10);
- Discuss the proposed netting measurement interval for a successor tariff that is just and reasonable in light of the costs and benefits of the net metering program in aggregate, and applicable to new requests for net energy metering service (pages 15-16);

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- Identify, quantify and present the specific avoided cost for customer-generators, and a proposed methodology for determining the compensation rate for any net excess generation determined according to the applicable net measurement interval for any new tariff (pages 13, 16-19);
- Identify, quantify, and present APCo's efforts to ensure that the net energy metering program does not result in unreasonable cost-shifting to nonparticipating electric utility customers (pages 10-12, 20-22);
- Evaluate and provide the aggregate impact of customer-generators on APCo's long-run marginal costs of generation, distribution, and transmission (page 14);
- Evaluate and provide the cost-of-service implications of customer-generators on other customers within the same class, including an evaluation of whether customer-generators provide an adequate rate of return to APCo compared to the otherwise applicable rate class when, for analytical purposes only, examined as a separate class within a cost-of-service study (pages 7-10).

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes. I am sponsoring the following exhibits:

- APCo Exhibit No. ___ (NMC) Schedule 1 – Optional Rider N.M.S. (clean and redlined versions)
- APCo Exhibit No. ___ (NMC) Schedule 2 – Optional Rider N.M.S. II

BACKGROUND AND CURRENT STATE

Q. PLEASE PROVIDE A BRIEF OVERVIEW OF THE COMPANY'S NET METERING PROGRAM.

A. As of yearend 2023, the vast majority of customer-generators in the Company's Virginia service territory (99.8%) have installed solar facilities. The remaining 0.2% is comprised of one hydro customer and 15 wind customers. The current compensation structure in optional Rider N.M.S. for excess generation produced by customer-generators is such that they receive a credit that is equal to the "full retail rate," which can allow customer-generators to pay only the basic service charge on their bill and carry any excess credits to offset future bills. For purposes of calculating average avoided cost rates for

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customer-generators in this proceeding, the Company utilizes a solar generator's attributes because solar comprises materially all of the Company's net metering customer-generator systems. This is consistent with the principle of using class averages for the purpose of utility rate setting.

Q. DOES THE COMPANY'S CURRENT NET METERING RATE STRUCTURE RESULT IN A CROSS-SUBSIDY BETWEEN CUSTOMER-GENERATORS AND NON-PARTICIPATING CUSTOMERS?

A. Yes. The current net metering rate structure credits customer-generators with "full retail rate" netting, which compensates them for energy delivered to the grid at a rate that exceeds the value provided to the grid by their renewable energy systems. This one-to-one net metering provision shifts cost responsibility for the non-energy related facilities and services that all customers use onto non-participating customers. For example, customer-generators rely on the Company's transmission and distribution lines to deliver and receive energy but avoid contributing their fair share to the fixed cost recovery of the utility system or its maintenance. As demonstrated in my Figure 7 below, the typical net metering customer contributes effectively no revenues towards the generation, transmission or distribution infrastructure that they utilize daily.

Q. HOW HAS THE NET METERING LANDSCAPE CHANGED OVER THE YEARS IN THE COMPANY'S JURISDICTION?

A. In the early days of net metering, only a handful of customers took advantage of the program for a variety of reasons. Solar costs were relatively high and self-generation did not appeal to most residential or commercial customers. For years, the number of customers utilizing the Company's distribution network to augment their self-generation

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through the net metering program was so small that there was little impact to other customers. As discussed in company witness Castle's testimony, solar costs have declined due to technological improvements, economies of scale, improved production efficiencies, and various incentive programs. As solar has become more affordable, more customers have shown interest in net metering and self-generation. As shown in Figure 1 below, net metering has grown exponentially to approximately 3,868 customer-generators and approximately 37 MW of installed capacity in the Company's Virginia jurisdictional service territory as of December 31, 2023 (the "Test Year"). Due to the recent growth in net metering coupled with Code § 56-594 requiring the Commission to conduct a net metering proceeding for the Company, it is an appropriate time to comprehensively evaluate APCo's net metering compensation structure and make revisions that ensure net metering practices are not unjustly and unreasonably shifting costs to non-participating customers.

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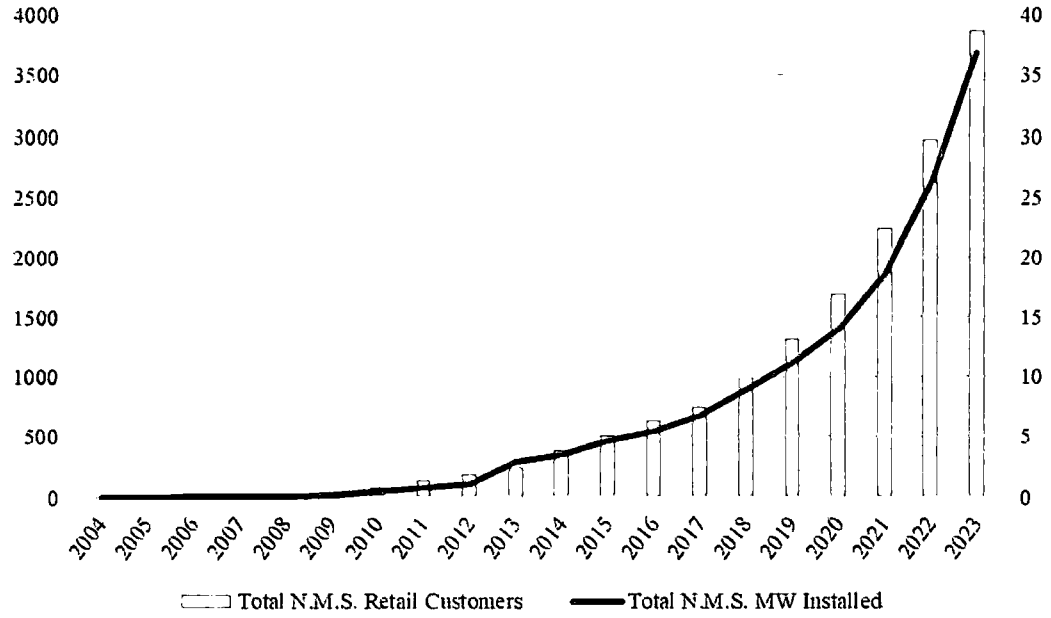
Figure 1

Rider N.M.S. Profile



Residential customers account for the largest contingent of retail customers taking service on Rider N.M.S., accounting for 83% (30.6 MW) of the installed customer-generator capacity on the Rider N.M.S., while commercial and industrial customers account for 13% (4.8 MW) and 4% (1.5 MW), respectively. See Figure 2 for a breakdown of Rider N.M.S. customer-generators by class.

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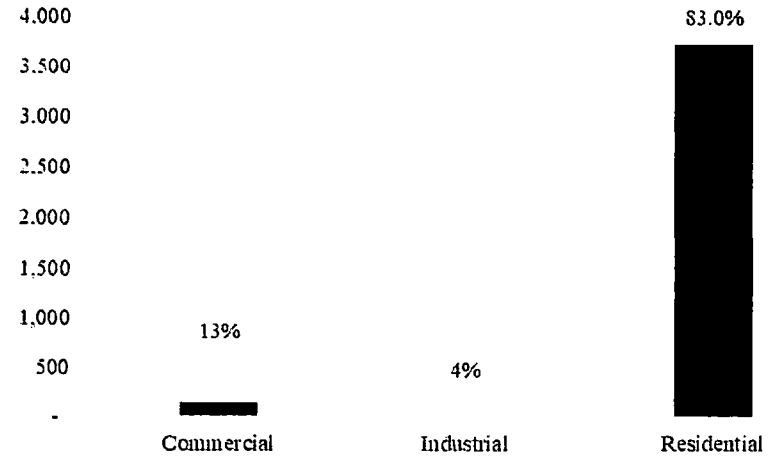
Figure 2



CLASS COST-OF-SERVICE ANALYSIS

Q. PLEASE DESCRIBE THE CLASS COST-OF-SERVICE ANALYSIS THAT WAS PERFORMED FOR THIS PROCEEDING.

A. In order to evaluate whether customer-generators provide an adequate rate of return, the Company broke out the current residential customer-generators into their own class within the class cost-of-service[1] ("CCOS") and removed them from the residential class. This was done by compiling the energy usage and billing revenues from the residential customer-generators during the Test Year. Cost-of-service allocators were derived for these customers based on their specific load profile and then subsequently removed from

[1] Class cost-of-service from PUR-2024-00024 provided in response to Interrogatory Staff 3-66.

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the non-participating residential customer class.

Q. WHAT WERE THE RESULTS OF THE UPDATED CCOS?

A. The results of the updated CCOS are summarized in the following figures.

Figure 3

Generation Going-Level and Relative Rates of Return

CLASS	Going Level ROR	Relative ROR
Residential Service without N.M.S.	4.62%	0.76
Residential N.M.S.	4.20%	0.69
Total VA Retail	6.06%	1.00

Figure 4

Distribution Going-Level and Relative Rates of Return

CLASS	Going Level ROR	Relative ROR
Residential Service without N.M.S.	4.63%	0.79
Residential N.M.S.	2.29%	0.39
Total VA Retail	5.87%	1.00

The net metering class has lower class rates of return compared to the standard tariff counterparts and to the total population of retail customers. That is, the revenue from customer-generators is inadequate to cover the costs to serve them based on their

unique characteristics and, as such, those customer-generators are receiving rate subsidies from other non-participating standard tariff customers.

Q. WHAT DOES THE CCOS DEMONSTRATE REGARDING THE RATES BEING CHARGED TO CUSTOMER-GENERATORS?

A. During the test year, customer-generators' rates were too low to cover the Company's cost to serve them, and they are being subsidized by all other customers, including non-participating residential customers. Customer-generators' rates would need to be increased to bring their class to parity with their standard tariff counterparts. The CCOS result is consistent with what one would expect for a subset of customers that, like net metering customer-generators, contribute to the Company's cost allocation peaks, produced less revenues due to a reduction in billing units, and utilize the Company's infrastructure for service every day.

Q. WHAT IS THE QUANTIFIED SUBSIDY IN RATES THAT CUSTOMER-GENERATORS ARE CURRENTLY RECEIVING?

A. The Company looked at both base rate CCOS results, as described above, and riders that are not included in base rates, such as transmission costs. When looking at all of the services and programs that represent a bill, the current subsidy for net metering residential customer-generators is $3,384,419. During the Test Year, the Company had 3,607 residential customers on Rider N.M.S., which means that other customers are paying roughly $938 per year per system in subsidies under Rider N.M.S.'s existing one-to-one net metering provisions.

Additionally, net metering is at 1% penetration, as described by Company witness Feasel. The Company prepared a sensitivity of how additional growth in net metering

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would impact this subsidy. Figure 5 shows the result of that sensitivity and how, if full retail rate netting were kept in place, the burden on non-participating customers will only continue to grow. This sensitivity does not take into account growth in load.

Figure 5

	% of Net Metering Penetration					
	1%	2%	3%	4%	5%	6%
Approximate Subsidy	$3,384,419	$6,768,838	$10,153,257	$13,537,676	$16,922,095	$20,306,514

RIDER N.M.S. REVISIONS

Q. PLEASE DESCRIBE THE COMPANY'S PROPOSED CHANGES TO THE RIDER N.M.S. AND THE FEATURES OF THE PROPOSED RIDER N.M.S. II.

A. In response to the Commission's Order in this proceeding, the Company has analyzed and supports a proposed amount for customer-generators to pay for the costs of using APCo's infrastructure, as well as an amount the Company should pay to appropriately compensate customer-generators. The Company is proposing to close its current Rider N.M.S. to all new customers concomitantly with the rate effective date set in this case, and institute a new net metering credit compensation structure called Rider N.M.S. II. The proposed N.M.S. II aligns with Code § 56-594, which provides the Commission with the ability to approve appropriate net metering credit provisions in a net energy metering proceeding. The Company's N.M.S. II is designed to limit the intra-class subsidies that the "full retail rate" net metering construct produces. The changes proposed in N.M.S. II will appropriately credit net metering customer-generators for the energy they deliver to the grid at the avoided cost to non-participating customers, while ensuring they are paying for the distribution, transmission, and capacity facilities and other services that they rely on when they are not self-generating in full or using the Company's

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infrastructure to export excess energy. The Company is proposing to bill customer-generators for all metered energy the Company supplies during each billing period at the standard tariff rates and to credit customer-generators for all the metered energy the Company receives at an avoided cost rate approved by the Commission. The following features of N.M.S. II were designed to limit the overcompensation and cost shifting that exists in the current N.M.S. compensation structure:

1. A change to the compensation structure and rate credited by the Company to the customer-generator for excess generation the Company receives.
2. A change in the cost recovery of payments made for N.M.S. II customer – generators' excess generation.

Q. HOW WILL THE PROPOSED N.M.S. II CHANGES IMPACT CURRENT CUSTOMER-GENERATORS AND CUSTOMERS THAT SUBMIT A NEW N.M.S. APPLICATION TO THE COMPANY PRIOR TO A COMMISSION ORDER?

A. New customer-generators will have until a date certain to submit a materially complete net energy metering application online for service under the existing tariff rate structure. The Company's new rate structure under the proposed Rider N.M.S. II will only apply to customers whose eligible electric generating facility receives a Certificate of Completion after the new rates go into effect. Existing customer-generators and customers that submit net energy metering applications and receive a Certificate of Completion before Rider N.M.S. II becomes effective will be grandfathered under the current Rider N.M.S.. The proposed Grandfathering Provision protects existing customer-generators that might have made their investment decisions based on the current Rider N.M.S. one-to-one ("full retail rate") net metering policy and the underlying economics. Current customer-

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generators will be grandfathered under a provision that preserves the current Rider N.M.S. rate structure for 25 years (the "Grandfathering Provision"), after which they will be moved onto the new N.M.S. II rate structure, or its successor. During the pendency of the Grandfathering Provision, customer-generators may replace or add additional solar panels or related equipment to their electric generating facility that cumulatively results in no more than a 10% or one kilowatt increase in system output, whichever is greater and does not result in a system that is larger than their consumption. The Grandfathering Provision will not apply to customer-generators if the addition of solar panels or related equipment exceed the aforementioned criteria. Customer-generators will also be allowed to add storage systems without violating the Grandfathering Provision. So long as the Grandfathering Provision remains in effect, net metering credits shall remain with the service location regardless of the name on the Company account. This filing serves as notice to customers that Rider N.M.S. is changing and that a new compensation system will be in place for customers who choose to net meter in the future.

Q. WHAT RATES WILL BE CHARGED TO THE CUSTOMER-GENERATOR BY THE COMPANY FOR ENERGY APCO SUPPLIES DURING THE BILLING PERIOD UNDER THE PROPOSED RIDER N.M.S. II?

A. All metered energy supplied to the customer-generator by the Company will be charged at the rates applicable under the standard service tariff that the customer would otherwise be served absent the customer's generating facility. The standard rate schedules are designed to recover the fixed costs of the utility system which customer-generators use every day when their systems are not producing energy.

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Q. HOW WILL THE CUSTOMER-GENERATOR BE CREDITED FOR THE EXCESS GENERATION IT SUPPLIES TO THE COMPANY DURING THE BILLING PERIOD UNDER THE PROPOSED RIDER N.M.S. II?

A. All metered energy delivered ("Metered Output"), as recorded by the input channel of the Company's meter, into the Company's distribution system by the customer-generator will be credited to the customer's monthly bill at the Company's avoided cost rate listed below, in Figure 6, by voltage level:

Figure 6

N.M.S. II Avoided Cost Component Rates ($/kWh)						
Customer	Voltage Level	Energy	Capacity	Transmission	Ancillary Service	Total Energy Credit
Residential	Secondary	$0.0372	$0.0037	$0.0068	$0.00150	$0.0492
Commercial, Industrial	Secondary	$0.0372	$0.0040	$0.0074	$0.0015	$0.0501
Commercial, Industrial	Primary	$0.0357	$0.0038	$0.0071	$0.00144	$0.0480
Commercial, Industrial	Sub-Transmission	$0.0353	$0.0038	$0.0071	$0.00142	$0.0476
Commercial, Industrial	Transmission	$0.0348	$0.0037	$0.0070	$0.00140	$0.0469

The Company is proposing to credit a customer-generator's account for the full billing period energy credit even if it exceeds the total customer-generator's bill for the billing period.

Q. PLEASE DESCRIBE WHAT IS AND WHAT IS NOT INCLUDED IN THE COMPANY'S AVOIDED COST COMPONENTS?

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A. The following items are included in the Company's avoided cost rate because they are cost of service related.:

- Avoided PJM energy costs at the Company's marginal cost of energy, including marginal losses and congestion;
- A gross up to avoided energy costs to account for distribution losses;
- Avoided load based ancillary service costs;
- Avoided generation capacity costs; and
- Shifted PJM zonal transmission costs.

This above approach is also how the Company analyzes and presents the economics of utility scale, distribution interconnected solar and has been approved by the Commission for purposes of analyzing the prudency of the Company's projects proposed to comply with the Renewable Portfolio Standard. The items included in the avoided cost rate account for the marginal cost of energy, marginal cost of generation through the capacity cost and marginal cost of transmission through the shifted PJM zonal transmission costs. I have been advised by APCo's distribution team that net metering does not impact long-run marginal distribution costs.

The following items are not included in the Company's avoided cost rate nor are they utility cost of service items:

- The societal cost of carbon
- The value of customer-generators' renewable energy certificates ("RECs")
- Other externalities

For purposes of determining the Company's avoided cost rate for excess net metering customer generation, the Company is only considering electric utility cost of service

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items for which the Company and its non-participating customers would see an actual cost reduction. The items discussed above that are not included are appropriately excluded because they do not pertain to the Company's cost of service, upon which is what its retail jurisdictional rates are based. The REC value is specifically excluded because customer-generators either retain the REC, which are the legal entitlement to one MWh of renewable generation and all associated environmental attributes, or sell them to other entities to lower the cost of their renewable generation systems. It would be inappropriate for the avoided cost rate to compensate customer-generators a second time for their RECs. Furthermore, customer-generators' REC benefits are not realized by other customers.

Q. HOW WILL THE COMPANY NET THE ENERGY PRODUCED BY THE CUSTOMER-GENERATOR'S DISTRIBUTED GENERATION SYSTEM?

A. The meter installed at a customer-generator's premise is bi-directional, meaning it measures how much energy is served by the Company ("kWh delivered" or "Metered Input") and the difference between the customer-generator's production and their load demand ("kWh received" or "Metered Output"). Bi-directional meters do not measure the customer-generator's total solar or other distributed generation systems electricity production. Thus, customer-generators can instantaneously offset their electric energy usage with the electricity produced by their distributed generation systems. As the customer-generator's system produces electricity, the kilowatt-hours produced are first netted against and used to meet the customer's electric requirements. Any excess generation is then exported to the utility's electric system and utilized by other customers. Thus, the customer receives a full retail offset for the kwh it generates during

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the hours that the customer generation is equal to or less than the customer's usage. Any excess customer generation that exceeds a customer-generator's usage will be credited at the proposed avoided cost rate, all of which will be measured for billing purposes on an integrated hourly interval.

Q. WHY IS THIS METERING PROPOSAL JUST AND REASONABLE?

A. The proposed metering of energy delivered by the Company and the energy delivered to the Company is just and reasonable as it more accurately represents the partial requirements usage of the customer-generator. The proposal still allows for customer-generators to net their usage at full retail rates when their generator produces energy equal to or less than the customer-generator's usage. Additionally, it will ensure that customer-generators pay their fair share for using the Company's system, which minimizes inequitable cross-subsidization by non-participating customers.

Q. HOW DID THE COMPANY CALCULATE THE AVERAGE RESIDENTIAL CUSTOMER-GENERATOR'S NET EXCESS GENERATION FOR THEIR N.M.S. II ANALYSIS?

A. The Company took the average hourly monthly load profile of a typical 1,014 kWh per month residential customer and reduced it by the average hourly generation profile of an 8.25 kWac solar array using the PVWatts® model. All hourly excess energy (energy produced by the solar array that exceeded the customer-generator's electric usage) was considered excess generation or metered output delivered to the Company.

Q. WHAT IS THE BASIS FOR THE COMPANY'S PROPOSED N.M.S. II AVOIDED ENERGY COST COMPONENT RATE?

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A. The avoided energy cost credit is based on the average loss-adjusted PJM day-ahead market price for the AEP APCo Residual Aggregate during the on-peak hours from the hour-ending 0700 though the hour-ending 2300 for the period from January 1, 2023, through December 31, 2023. This reflects the wholesale price of energy delivered to the Company by the customer-generator.

Q. HOW DID THE COMPANY CALCULATE THE AVERAGE GENERATION PROFILE OF THEIR RESIDENTIAL CUSTOMER-GENERATORS?

A. Because the Company's meters are bi-directional and do not measure the total generation produced by the customer-generator's distributed resource, the Company used the PVWatts® model developed by the National Renewable Energy Laboratory to reasonably estimate the typical customer-generator's solar production profile for an 8.25 kWac/9.89kWdc solar array (the average size residential system installed at year-end 2023), located in Roanoke, Virginia. This model provides an estimate of annual, monthly, and hourly solar energy output based on 30 years of weather-normalized data.

Q. DID THE COMPANY COMPARE THE OUTPUT FROM THE PVWATTS® MODEL TO THE ACTUAL GENERATION OF DISTRIBUTION LEVEL SOLAR PROJECTS IT CONTRACTS WITHIN VIRGINIA?

A. Yes. The Company compared the modeled PVWatts® generation with the actual generation profiles the 20 MW Wytheville, 20 MW Leatherwood and 15 MW Depot solar facilities. The Company found that the outputs were similar and chose to use the generation from the PVWatts® model because it more precisely models the size of a residential, rooftop solar array rather than scaling a much larger solar array, such as the Company's contracted arrays, to residential size. The Company's contracted solar

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facilities possess features that rooftop solar installations do not, meaning they generate more electricity per installed kW. Such features include tracking ability and optimal siting in open spaces rather than on rooftops.

Q. WHAT IS THE BASIS FOR THE COMPANY'S PROPOSED N.M.S. II AVOIDED CAPACITY COST COMPONENT RATE?

A. The Company took the average of the hourly excess generation delivered to the Company by the typical customer-generator's solar array that coincide with the times of PJM's 5 Coincident Peaks ("5CP") over the past three years. The customer-generator's average net excess generation coincident with the PJM's 5CP for 2021, 2022 and 2023 resulted in an average 0.65 KW reduction in the Company's peak load beyond the reduction of the customer generator's own usage. The Company used the 2023 Fundamental Forecast capacity value for AEP GEN HUB, which represents its avoided long-term cost for capacity, to determine an annual avoided capacity cost credit. The annual avoided capacity cost credit was divided by the typical customer-generator's net excess generation to produce the annual avoided capacity cost credit rate.

Q. WHAT IS THE BASIS FOR THE COMPANY'S PROPOSED N.M.S. II TRANSMISSION COST COMPONENT RATE?

A. A customer-generator provides an avoided transmission cost benefit to APCo when it generates electricity, reducing the Company's load, during the 12 coincident monthly peaks used to allocated PJM zonal transmission costs to APCo under the FERC-approved AEP Transmission Agreement. The same is true for the single highest peak that allocates PJM zonal transmission costs to the AEP load serving entities within the AEP transmission zone. Similar to the calculation of the capacity component, this historical

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customer-generator hourly output coincident with the Company's 2021, 2022 and 2023 NSPL resulted in an average 0.35 KW reduction in the Company's peak load. The Company used PJM's transmission-related costs during the twelve-month period from July 2023 through June 2024 to develop an average avoided transmission credit component. The Company used the Annual Network Integration Transmission ("NITS") Rates for the AEP Transmission Zone, which represents its avoided cost for transmission, to determine an annual avoided transmission cost credit. The annual avoided transmission cost credit was divided by the typical customer-generator's net excess generation to produce the annual avoided transmission cost credit rate. Importantly, I am referring to these transmission costs as "avoided" when they are in fact shifted costs. They are being avoided by APCo and recovered from other load serving entities within the AEP transmission zone. They are the fixed infrastructure costs associated with zonal transmission service and are not reduced from a total revenue requirement standpoint when peaks are reduced.

Q. WHAT IS THE BASIS FOR THE COMPANY'S PROPOSED N.M.S. II ANCILLARY SERVICE COST COMPONENT RATE?

A. Ancillary services are required to help balance and maintain reliability on the transmission system as electricity moves from generating sources to ultimate consumers. When a customer-generator exports electricity to the distribution system, it reduces certain load-based PJM ancillary service charges assessed to the Company. The Company used its actual 2023 PJM Ancillary Services charges as the basis for the ancillary service cost component rate.

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Q. WHAT WOULD THE TYPICAL RESIDENTIAL MONTHLY BILL BE FOR A N.M.S. II CUSTOMER USING THE INFORMATION FROM THE 2023 TEST PERIOD?

A. Figure 7 shows a typical customer bill with a 8.25 kWac/9.89kWdc solar array billed on Rider N.M.S., Rider N.M.S. II and standard tariff rates. Under the new instantaneous netting methodology, N.M.S. II customers net 483 kWh monthly with their load, a 574 kWh reduction compared to the 1,057 kWh netted and banked monthly under the N.M.S. construct. N.M.S. II customers pay for 531 kWh of energy from the Company compared to 0 kWh received by N.M.S. customers. The instantaneous netting results in 574 kWh of excess energy produced and delivered to the Company by the customer-generator but not offset by their load. The new avoided cost credits generate a monthly bill offset that can be applied to the customer's bill of $28.26. N.M.S. II customers will pay on average $66.95 for their monthly utility bills. This is an increase of $58.99 from the current N.M.S. rate structure and $107.63 less than the average non-participating Schedule R.S. customer for their monthly utility bills. Considering the Company's proposal to collect the avoided cost payments to customer-generators that I will discuss later in my testimony, monthly billing revenues increase a total of $87.25 per month.

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Figure 7

			Non-Participating RES Customer (kWh)		N.M.S. RES Customer (kWh)		N.M.S. II RES Customer (kWh)	
Average Monthly Energy Usage (kWh):			1,014		1,014		1,014	
Solar Production					1,057		1,057	
Energy Netting					1,057		483	
Net Energy Received from Utility					(44)		531	
NEM II Net Excess Generation Delivered to Grid							574	
Bill Calculation								
	Effective Date:	Rates		Billing		Billing		Billing
Customer Charge		$ 7.96		$ 7.96	(44)	$ 7.96		$ 7.96
Energy Charges (G)		$ 0.0388	1,014	$ 39.35		$ -	531	$ 20.60
Energy Charges (T)		$ -	1,014	$ -	(44)	$ -	531	$ -
Energy Charges (D)		$ 0.0360	1,014	$ 36.50	(44)	$ -	531	$ 19.11
Base Charges Total				$ 83.80		$ 7.96		$ 47.67
Riders								
Sales & Use Tax*	1/1/2024	$ 0.0003	1,014	0.26	(44)	$ -	531	$ 0.14
Fuel Adjustment	11/1/2023	$ 0.0414	1,014	41.95	(44)	$ -	531	$ 21.97
T-R.A.C.	9/1/2023	$ 0.0386	1,014	39.10	(44)	$ -	531	$ 20.48
E-R.A.C.	12/1/2022	$ 0.0028	1,014	2.88	(44)	$ -	531	$ 1.51
G-R.A.C.	10/3/2023	$ 0.0032	1,014	3.25	(44)	$ -	531	$ 1.70
E.E.-R.A.C.	9/1/2022	$ 0.0014	1,014	1.45	(44)	$ -	531	$ 0.76
BC-RAC	3/1/2024	$ 0.0006	1,014	0.60	(44)	$ -	531	$ 0.31
RPS A5 DE	10/1/2023	$ 0.0001	1,014	0.08	(44)	$ -	531	$ 0.04
RPS A5 F	10/1/2023	$ 0.0010	1,014	0.98	(44)	$ -	531	$ 0.51
PCAP	10/1/2023	$ 0.0002	1,014	0.15	(44)	$ -	531	$ 0.08
RPS A6	10/1/2023	$ 0.0000	1,014	0.02	(44)	$ -	531	$ 0.01
P.I.P.P.	9/7/2021	$ 0.0000	1,014	0.04	(44)	$ -	531	$ 0.02
Riders Total				$ 90.77		$ -		$ 47.53
NEM II Avoided Cost Credit								
Energy (Residential)		$ (0.04)					574	$ (21.36)
Capacity		$ (0.00)					574	$ (2.13)
Transmission		$ (0.01)					574	$ (3.91)
Ancillary Service		$ (0.00)					574	$ (0.86)
								$ (28.26)
Monthly Base + Rider Total				$ 174.58		$ 7.96		$ 66.95
Annual Base + Rider Total				$ 2,094.94		$ 95.52		$ 803.42

Figure 7 also helps to showcase how a typical customer-generator under the current rider N.M.S. is not contributing to the fixed, transmission costs that is collected through the T-R.A.C.

Q. THERE ARE 8,760 HOURS IN A YEAR. HOW MANY HOURS DOES THE TYPICAL RESIDENTIAL CUSTOMER-GENERATOR USE THE COMPANY'S ELECTRICAL SYSTEM?

A. The Company took the load profile of the population of residential customer-generators and found that out of 8,760 hours per year, these customers use the electrical system 7,030 hours, or 80% of the time. But as shown above in Figure 7, in the typical bill

comparison under the current net metering compensation, the customer is only paying the customer charge even though they use the system 80% of the time.

Q. WAS A SIMILAR PROCESS PERFORMED TO DETERMINE THE AVOIDED COST RATE FOR COMMERCIAL AND INDUSTRIAL CUSTOMERS ?

A. Yes. The Company performed the same exact analysis as described for a residential net metering customer above but used the typical profile of commercial customers that participate on Rider N.M.S. and increased the system size installed to 43.77 kWac / 52.53 kWdc.

Q. WILL THE N.M.S. II RATES PERIODICALLY BE REVIEWED AND ADJUSTED?

A. Yes. The Company proposes that the avoided energy, capacity, transmission, and ancillary service cost components of the credit rates applicable to customer-generators' net excess generation delivered to the Company will be reviewed and adjusted as an element in the Company's Biennial Review filing, with any revision becoming effective coincident with the rate change ordered in that review.

Q. HOW DOES THE COMPANY PROPOSE TO COLLECT THE AVOIDED COST PAYMENTS MADE TO CUSTOMER-GENERATORS UNDER RIDER N.M.S. II?

A. The Company proposes to collect from all customers the cost of these avoided cost component credits through the fuel factor because the payments are no different than other purchased power expenses.

Q. IS PROPOSED RIDER N.M.S. II FAIR, REASONABLE AND COST BASED?

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A. Yes, it is. As I have discussed, the proposed changes will ensure that customer-generators participating on Rider N.M.S. II contribute more appropriately towards the Company's cost of retail electric service which customer-generators use every day when they are not generating enough energy to meet their load requirements. The new rate also compensates customer generators at the avoided cost rate the Company will realize without unreasonable cost-shifting to non-participating customers. Proposed Rider N.M.S. II is fully supported by an actual cost of service analysis and is fair, reasonable and cost-based.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

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OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)

AVAILABILITY OF SERVICE

Available for ~~new or~~ existing customers who take Standard Service from the Company, own and operate, or contract with other persons to own or operate, or both; an eligible renewable fuel generator or agricultural renewable fuel generator as further defined below designed to operate in parallel with the Company's system and request Net Metering Service (NMS) from the Company. Those Customers who utilize time-of-day provisions must have service that has two or more time-of-use tiers for energy-based charges and an electricity supply demand charge. Customers that do not take Standard Service shall make net metering arrangements with their Competitive Service Provider. The total capacity of all NMS Customers shall be limited pursuant to subsection E of § 56-594 of the Code of Virginia, and shall be available to customers with eligible Generators on a first come, first serve basis. In the event a prospective net metering customer has submitted a notification form required by Rule 20 VAC5-315-30 ("Interconnection Form") and that customer's interconnection would cause the Company to exceed the "Renewable Generator Limit", the Company will provide the proper notification to the customer and the Commission's Division of Energy Regulation.

Customers who applied for service after [effective date of the order in this case], must take service under Optional Rider N.M.S.II. Existing customers on this tariff before [effective date of the order in this case] will be subject to the Grandfathering Provision. The Grandfathering Provision preserves the rate structure within Optional Rider N.M.S. for 25 years, after which Customers will be moved onto Optional Rider N.M.S. I.I. During the pendency of the Grandfathering Provision, Customers may replace or add additional panels or related equipment to their electric generating facility that cumulatively results in no more than a 10% or one kilowatt increase in system output, whichever is greater and does not result in a system that is larger than the Customer's consumption. The Grandfathering Provision will not apply to Customers if the addition of solar panels or related equipment exceed the aforementioned criteria.

DEFINITIONS

The following terms: "Agricultural Net Metering Customer," "Agricultural Renewable Fuel Generator," "Billing Period Credit," "Customer," "Excess Generation," "Net Metering Customer," "Net Metering Period," "Net Metering Service," "Person," "Renewable Energy Certificate (REC)," "Renewable Fuel Generator," "Small agricultural generating facility," and "Small agricultural generator" shall solely be used to define the applicability of Rider N.M.S in conjunction with additional terms defined in accordance with Rule 20 VAC 5-315-20. These terms can be found at the following location: https://law.lis.virginia.gov/admincode/title20/agency5/chapter315/section20/

A. Notification

1. A prospective net metering customer shall notify and receive approval to interconnect prior to starting any construction, installation or addition of capacity to an electrical generating facility via the commission-approved Interconnection Form (Form NMIN) which can be found at the Company's website at https://www.appalachianpower.com/global/utilities/lib/docs/builders/VA/NMINforVA.pdf. The prospective net metering customer may submit the Interconnection Form either directly to the Company or by mail. Alternatively, the customer may complete the online form at https://aep.powerclerk.com/MvcAccount/Login. All sections that require the Company's review, including appropriate signatures, of the Interconnection Form must be completed for the notification to be valid. Both the Company and the prospective net metering customer must comply with

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OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)
(continued)

notification requirements contained in 20VAC5 315 30 (https://law.lis.virginia.gov/admincode/title20/agency5/chapter315/section30/).

2. Thirty-one (31) days after the date of final notification for a residential customer, and sixty-one (61) days after the date of final notification for a nonresidential customer, the prospective customer may interconnect and begin operation of the generating facility unless the Company requests a waiver of this requirement under the provisions of 20VAC5-315-80 prior to the 31st or 61st day, respectively. Within this period, the Company shall also make a determination whether there is cause to file a request for waiver with the VA. S.C.C.
3. The Customer shall immediately notify the Company of any changes in the ownership of, operational responsibility for, or contact information for the Generator.

CONDITIONS OF SERVICE

B. Conditions of Interconnection

Prospective net metering customers must interconnect in accordance with 20VAC5-315-40. Small agricultural generators or agricultural renewable fuel generators may elect to interconnect as a net metering customer or as small agricultural generators pursuant to 20VAC5-315-75, but not both. Existing eligible agricultural renewable fuel generators may elect to become small agricultural generators, but may not revert to being an agricultural renewable fuel generator after such election.

Customer

1. A Generating system shall meet all applicable safety and performance standards established by the National Electrical Code, the Institute of Electrical and Electronics Engineers, and accredited testing laboratories such as Underwriters Laboratories. The vendor certifies, by signing the commission-approved Interconnection Form that the Generation equipment is being installed in compliance with the requirements established by Underwriters Laboratories or other national testing laboratories in accordance with IEEE Standard 1547, Standard for Interconnecting Distributed Resources with Electric Power Systems, July 2003.

   In addition, non-static inverter-connected Generator equipment and installations shall comply with the Company's Interconnection Guidelines. The Company shall provide a copy of its Interconnection Guidelines to the Customer upon request.

2. The following requirements shall be met before interconnection may occur:

   a. Electric Distribution Facilities and Customer Impact Limitations. A Generator shall not be permitted to interconnect to the Company's distribution facilities if the interconnection would reasonably lead to damage of any of the Company's facilities or would reasonably lead to voltage regulation or power quality problems at other customer revenue meters due to the incremental effect of the Company's electric distribution system, unless the customer reimburses the Company for its cost to accommodate the interconnection, including the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.

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OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)
(continued)

b. Secondary, Service and Service Entrance Limitations. The capacity of the Generator shall be less than the capacity of the Company-owned secondary, service, and service entrance cable connected to the point of interconnection, unless the Customer reimburses the Company for the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.

c. Transformer Loading Limitations. The Generator shall not have the ability to overload the Company's transformer, or any transformer winding, beyond manufacturer or nameplate ratings, unless the customer reimburses the Company for the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.

d. Integration With Company Facilities Grounding. The grounding scheme of each Generator shall comply with IEEE 1547, Standard for Interconnecting Distributed Resources With Electric Power Systems, July 2003, and shall be consistent with the grounding scheme used by the Company. If requested by a prospective customer, the Company shall assist the customer in selecting a grounding scheme the coordinates with the Company's distribution system.

Customer (Cont'd)

e. Balance Limitation. The Generator shall not create a voltage imbalance of more than 3.0% at any other customer's revenue meter if the Company's transformer, with the secondary connected to the point of interconnection, is a three-phase transformer, unless the Customer reimburses the Company for the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.

3. The Customer is required to maintain liability insurance with the requirements contained in 20VAC5 315 60 (https://law.lis.virginia.gov/admincode/title20/agency5/chapter315/section60/). The Company's receipt of evidence of liability insurance does not imply an endorsement of the terms and conditions of the coverage.
4. Following Notification by the Customer, the Company shall have the right to inspect and test the Generator equipment and installation prior to interconnection. The nature and extent of these tests shall be determined solely by the Company. The Company reserves the right to conduct additional tests and inspections and to install additional equipment or meters at any time following interconnection of the Generator.
5. The Generator installation must have a visibly open, lockable, manual disconnect switch at each of the facility's generators which is accessible by the Company and clearly labeled. A licensed electrician must certify via the Interconnection Form that the disconnection switch has been installed properly. Alternatively, if the Customer or licensed Virginia Class A or B general contractor installs the customer's generator or generators, the signed final electrical inspection can be used in lieu of the licensed electrician's certification. The Company reserves the right to install any additional equipment, including controls and meters, at the facility.
6. The Customer shall periodically maintain and test the Generator in accordance with the manufacturer's specifications and all applicable safety and performance standards. The Customer shall notify the Company at least fourteen (14) days prior to making any material changes to the Generator facility or installation, including, but not necessarily limited to, any modification to the equipment or protective equipment settings or disconnection of the Generator from the Company's system, excluding temporary disconnects for routine maintenance.

OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)
(continued)

Following a notification of disconnection of the Generator, the customer must again complete the notification process specified above prior to any subsequent reconnection.

In addition, the Customer shall notify the Company immediately regarding either any damage to the Generator facility or safety-related emergency disconnections.

7. Interconnection authorization is not transferable or assignable to other persons or service locations.

Small Agricultural Generators

Small agricultural generators shall abide by the small generator interconnection process described in 20VAC5-314. Such customer shall be responsible for all costs associated with any interconnection or engineering studies that may be required prior to interconnection.

Small agricultural generators electing to interconnect pursuant to this section shall enter into a power purchase agreement with the Company to sell all of the electricity generated from its small agricultural generating facility. The Company shall be obligated by the power purchase agreement to purchase the electricity generated at a price equal to a rate agreed upon by the parties that is not less than the Company's Schedule Cogen/SPP approved as the Company's avoided cost tariff for energy and capacity.

Small agricultural generators with renewable energy certificates or other environmental attributes generated by the small agricultural generating facility shall have the rights described in 20VAC5-315-50 as detailed in this Rider under "Renewable Energy Credits".

FACILITIES CHARGES

The Customer is responsible for all equipment and installation costs of the Generator facility.

The Company shall inspect the inverter settings of a static inverter-connected generator with capacity in excess of 10 kW prior to interconnection. The Customer shall pay $50 to the Company for each generator that requires inspection.

The Company shall inspect the protective equipment settings of a non-static inverter-connected generator prior to interconnection. The Customer shall pay $50 to the Company for each generator that requires inspection.

The Customer shall pay to the Company any additional charges, as determined by the Company, for equipment, labor, metering, testing or inspections requested by the customer. To ensure public safety, power quality, and reliability of the Company's system, a Customer shall bear all reasonable costs of equipment required for the interconnection to the Company's system, including costs, if any, to (i) install additional controls and (ii) perform additional tests. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such additional charges.

METERING- Customer

Net metered energy shall be measured in accordance with standard metering practices by metering equipment capable of measuring (but not necessarily displaying) power flow in both directions.

OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)
(continued)

In instances where a Customer has requested, and where the Company would not have otherwise installed, metering equipment that is intended to be read off-site, the Company may charge the Customer its actual cost of installing any additional equipment necessary to implement net metering service.

A time-of-use Customer shall bear the incremental metering costs associated with Net Metering.

Agricultural Net Metering Customers shall be responsible for the cost of additional metering equipment necessary to accomplish account aggregation.

Any incremental metering costs associated with measuring the total output of the Generator for the purposes of receiving Renewable Energy Certificates shall be installed at the Customer's expense.

METER AGGREGATION

Only Agricultural Net Metering Customers are eligible for meter aggregation. An Agricultural Net Metering Customer may, but need not, apply to the Company to aggregate into one account the load of multiple meters located at separate but contiguous sites the customer uses for its agricultural business. The applicant must provide to the Company deeds, plats, leases, or other evidence satisfactory to Company to show that the meters the customer desires to aggregate are (1) on the same or contiguous sites and (2) that the customer uses the affected sites for its Agricultural business. After the applicant has demonstrated to Company's reasonable satisfaction that it qualifies for meter aggregation, the Company will determine the applicable Standard Schedule for the aggregated meters. To do so, Company will determine the coincident peak demand recorded or estimated over the most recent 12 months on the meters to be aggregated and assign the aggregated meters to the applicable Standard Schedule for the aggregated coincident peak demand. If any of the existing meters to be aggregated is not capable of recording demand data, Company will work in good faith with the customer to estimate a peak demand for the facilities on the customer's side of each such meter. To the extent the customer's requested meter aggregation requires Company to replace or enhance an existing meter with a meter with increased capabilities, e.g., replacing a non-demand recording meter with a meter capable of recording demand data, the Company will charge customer for the entire cost of the meter replacement or enhancement, for which payment in full will be due to Company on the due date of the bill on which the charge first appears. This condition applies only to meter replacements or enhancements required to achieve a customer's requested meter aggregation; it does not apply to the cost of any meter replacements or enhancements necessary solely to implement net metering. If the actual demand and consumption warrant a revision after the installation of demand recording meters the Company will reassess the applicable Standard Schedule for the aggregated meters.

Upon aggregating meters according to the applying customer's request as described above, the Company will bill the Customer for monthly coincident demand and total energy consumption across the aggregated meters as though the aggregated meters were a single meter under the appropriate Standard Schedule and this Rider NMS. The highest-voltage service supplied to any of the aggregated meters will be the voltage used to determine the appropriate Standard Schedule for all the aggregated meters and the applicable charges under that rate schedule. For example, a Customer aggregating two secondary-level services and one primary-level service will be billed for primary-level basic service, demand, and energy charges for all three aggregated meters under the appropriate rate schedule. After Company aggregates meters according to the customer's request, a Customer may not remove a meter from a requested aggregation unless the Customer ceases to take service at that location or ceases to qualify as an Agricultural Net Metering Customer.

OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)
(continued)

A Customer may add qualifying meters to an existing aggregation upon application to Company showing sufficient evidence to qualify for aggregation as described above. An Agricultural Net Metering Customer who aggregates meters must notify Company within 90 days of any outage of the Customer's generating facility and provide reasonable evidence of the Customer's efforts to restore the generating facility to service in a timely manner.

Company will use good faith to determine if the Customer's efforts are reasonably likely to restore the facility to service in a timely manner. If Company determines in its sole discretion that the Customer is not making reasonable efforts to restore the facility to service in a timely manner, Company will discontinue the Customer's meter aggregation and Net Metering Service effective immediately, and will bill the customer at the standard rate schedules individually applicable to the meters.

MONTHLY CHARGES

All monthly charges shall be in accordance with the Standard Schedule under which the Customer takes service. Such charges shall be based on the Customer's net energy for the billing period, to the extent that the net energy exceeds zero. To the extent that a non-time of use Customer's net energy is zero or negative during the billing period, the Customer shall pay only the non-usage sensitive charges, including any applicable standby charges, of the standard Schedule. To the extent that a time-of-use Customer's net energy is zero or negative during the billing period, the Customer shall pay only the demand charge or charges, non-usage sensitive charges, and any applicable standby charges of the Standard Schedule. The Customer shall receive no compensation from the Company for Excess Generation during the billing period. The Excess Generation during the billing period shall be carried forward and credited against positive energy usage (by tiers, in the case of time-of-use customers) in subsequent billing periods

The Net Metering Period shall be defined as each successive 12 month period beginning with the first meter reading date following the date of interconnection of the renewable fuel generator with the Company's facilities. Any Excess Generation at the end of a Net Metering Period shall be carried forward to the next Net Metering Period only to the extent that the Excess Generation does not exceed the Customer's billed consumption for the current Net Metering Period, adjusted to exclude accumulated Billing Period Credits carried forward and applied from the previous Net Metering Period (recognizing tiers for time-of-use customers).

Upon written request of the Customer, the Company and the Customer shall enter into a power purchase agreement for the Customer's Excess Generation for one or more Net Metering Periods. For Net Metering Periods beginning on or after January 1, 2009, the written request of the customer must be submitted prior to the beginning of the Net Metering Period. The power purchase agreement shall be consistent with the Commission's Rules Governing Net Energy Metering (20 VAC 5-315-50 et seq.) and will obligate the Company to purchase the Customer's negative net energy for requested Net Metering Periods at a price equal to the PJM Interconnection, L.L.C. (PJM) day-ahead annual, simple average LMP (locational marginal price) or in the case of time-of-use Customers, the simple average of hourly LMPs by tiers, for the AEP Zone, as published by the PJM Market Monitoring Unit, for the most recent calendar year ending on or before the end of each Net Metering Period. The Company shall make full payment annually to the Customer within 30 days following the latter of the end of the Net Metering Period or the date of the PJM Market Monitoring Unit's publication of the previous calendar year's AEP Zone day-ahead annual, simple average LMP, or hourly LMP as appropriate.

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OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)
(continued)

Excess Generation is not transferable, and the Customer, absent a signed power purchase agreement as outlined above, shall receive no compensation from the Company for any Excess Generation upon termination of service from the Company, or upon the customer's choice of a qualified ESP.

RENEWABLE ENERGY CREDITS

A Customer owns any Renewable Energy Certificates associated with the total output of its Generator.

The Company is only obligated to purchase a Customer's RECs if the Customer has exercised its one-time option at the time of signing a power purchase agreement with the Company to include a provision requiring the purchase by the Company of all generated RECs over the duration of the power purchase agreement.

Payment for all whole RECs purchased by the Company during a Net Metering Period in accordance with the purchase power agreement shall be made at the same time as the payment for any Excess generation.

The Company will post a credit to the Customer's account or the Customer may elect a direct payment.

RENEWABLE ENERGY CREDITS (Cont'd)

Any fractional REC remaining shall not receive immediate payment, but may be carried forward to subsequent Net Metering Periods for the duration of the power purchase agreement.

The rate of the payment by the Company for a Customer's RECs shall be the daily unweighted average of the "CR" component of Virginia Electric and Power Company's Virginia jurisdiction Rider G tariff in effect over the period for which the rate of payment for the excess generation is determined.

SPECIAL TERMS AND CONDITIONS

This Schedule is subject to the Company's Terms and Conditions of Standard Service. The terms, conditions, fees and eligibility requirements for net metering are subject to revision, as specified in 20VAC5-315 of the Virginia Administrative Code and approved by the Virginia State Corporation Commission.

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OPTIONAL RIDER N.M.S.
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AVAILABILITY OF SERVICE

Available for existing customers who take Standard Service from the Company, own and operate, or contract with other persons to own or operate, or both; an eligible renewable fuel generator or agricultural renewable fuel generator as further defined below designed to operate in parallel with the Company's system and request Net Metering Service (NMS) from the Company. Those Customers who utilize time-of-day provisions must have service that has two or more time-of-use tiers for energy-based charges and an electricity supply demand charge. Customers that do not take Standard Service shall make net metering arrangements with their Competitive Service Provider. The total capacity of all NMS Customers shall be limited pursuant to subsection E of § 56-594 of the Code of Virginia, and shall be available to customers with eligible Generators on a first come, first serve basis. In the event a prospective net metering customer has submitted a notification form required by Rule 20 VAC5-315-30 ("Interconnection Form") and that customer's interconnection would cause the Company to exceed the "Renewable Generator Limit", the Company will provide the proper notification to the customer and the Commission's Division of Energy Regulation.

Customers who applied for service after [effective date of the order in this case], must take service under Optional Rider N.M.S.II. Existing customers on this tariff before [effective date of the order in this case] will be subject to the Grandfathering Provision. The Grandfathering Provision preserves the rate structure within Optional Rider N.M.S. for 25 years, after which Customers will be moved onto Optional Rider N.M.S. I.I. During the pendency of the Grandfathering Provision, Customers may replace or add additional panels or related equipment to their electric generating facility that cumulatively results in no more than a 10% or one kilowatt increase in system output, whichever is greater and does not result in a system that is larger than the Customer's consumption. The Grandfathering Provision will not apply to Customers if the addition of solar panels or related equipment exceed the aforementioned criteria.

DEFINITIONS

The following terms: "Agricultural Net Metering Customer," "Agricultural Renewable Fuel Generator," "Billing Period Credit," "Customer," "Excess Generation," "Net Metering Customer," "Net Metering Period," "Net Metering Service," "Person," "Renewable Energy Certificate (REC)," "Renewable Fuel Generator," "Small agricultural generating facility," and "Small agricultural generator" shall solely be used to define the applicability of Rider N.M.S in conjunction with additional terms defined in accordance with Rule 20 VAC 5-315-20. These terms can be found at the following location: https://law.lis.virginia.gov/admincode/title20/agency5/chapter315/section20/

A. Notification

1. A prospective net metering customer shall notify and receive approval to interconnect prior to starting any construction, installation or addition of capacity to an electrical generating facility via the commission-approved Interconnection Form (Form NMIN) which can be found at the Company's website at https://www.appalachianpower.com/global/utilities/lib/docs/builders/VA/NMINforVA.pdf. The prospective net metering customer may submit the Interconnection Form either directly to the Company or by mail. Alternatively, the customer may complete the online form at https://aep.powerclerk.com/MvcAccount/Login. All sections that require the Company's review, including appropriate signatures, of the Interconnection Form must be completed for the notification to be valid. Both the Company and the prospective net metering customer must comply with

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(Net Metering Service Rider)
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notification requirements contained in 20VAC5 315 30 (https://law.lis.virginia.gov/admincode/title20/agency5/chapter315/section30/).

2. Thirty-one (31) days after the date of final notification for a residential customer, and sixty-one (61) days after the date of final notification for a nonresidential customer, the prospective customer may interconnect and begin operation of the generating facility unless the Company requests a waiver of this requirement under the provisions of 20VAC5-315-80 prior to the 31st or 61st day, respectively. Within this period, the Company shall also make a determination whether there is cause to file a request for waiver with the VA. S.C.C.
3. The Customer shall immediately notify the Company of any changes in the ownership of, operational responsibility for, or contact information for the Generator.

CONDITIONS OF SERVICE

B. Conditions of Interconnection

Prospective net metering customers must interconnect in accordance with 20VAC5-315-40. Small agricultural generators or agricultural renewable fuel generators may elect to interconnect as a net metering customer or as small agricultural generators pursuant to 20VAC5-315-75, but not both. Existing eligible agricultural renewable fuel generators may elect to become small agricultural generators, but may not revert to being an agricultural renewable fuel generator after such election.

Customer

1. A Generating system shall meet all applicable safety and performance standards established by the National Electrical Code, the Institute of Electrical and Electronics Engineers, and accredited testing laboratories such as Underwriters Laboratories. The vendor certifies, by signing the commission-approved Interconnection Form that the Generation equipment is being installed in compliance with the requirements established by Underwriters Laboratories or other national testing laboratories in accordance with IEEE Standard 1547, Standard for Interconnecting Distributed Resources with Electric Power Systems, July 2003.

   In addition, non-static inverter-connected Generator equipment and installations shall comply with the Company's Interconnection Guidelines. The Company shall provide a copy of its Interconnection Guidelines to the Customer upon request.

2. The following requirements shall be met before interconnection may occur:

   a. Electric Distribution Facilities and Customer Impact Limitations. A Generator shall not be permitted to interconnect to the Company's distribution facilities if the interconnection would reasonably lead to damage of any of the Company's facilities or would reasonably lead to voltage regulation or power quality problems at other customer revenue meters due to the incremental effect of the Company's electric distribution system, unless the customer reimburses the Company for its cost to accommodate the interconnection, including the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.

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OPTIONAL RIDER N.M.S.
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b. Secondary, Service and Service Entrance Limitations. The capacity of the Generator shall be less than the capacity of the Company-owned secondary, service, and service entrance cable connected to the point of interconnection, unless the Customer reimburses the Company for the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.

c. Transformer Loading Limitations. The Generator shall not have the ability to overload the Company's transformer, or any transformer winding, beyond manufacturer or nameplate ratings, unless the customer reimburses the Company for the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.

d. Integration With Company Facilities Grounding. The grounding scheme of each Generator shall comply with IEEE 1547, Standard for Interconnecting Distributed Resources With Electric Power Systems, July 2003, and shall be consistent with the grounding scheme used by the Company. If requested by a prospective customer, the Company shall assist the customer in selecting a grounding scheme the coordinates with the Company's distribution system.

Customer (Cont'd)

e. Balance Limitation. The Generator shall not create a voltage imbalance of more than 3.0% at any other customer's revenue meter if the Company's transformer, with the secondary connected to the point of interconnection, is a three-phase transformer, unless the Customer reimburses the Company for the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.

3. The Customer is required to maintain liability insurance with the requirements contained in 20VAC5 315 60 (https://law.lis.virginia.gov/admincode/title20/agency5/chapter315/section60/). The Company's receipt of evidence of liability insurance does not imply an endorsement of the terms and conditions of the coverage.
4. Following Notification by the Customer, the Company shall have the right to inspect and test the Generator equipment and installation prior to interconnection. The nature and extent of these tests shall be determined solely by the Company. The Company reserves the right to conduct additional tests and inspections and to install additional equipment or meters at any time following interconnection of the Generator.
5. The Generator installation must have a visibly open, lockable, manual disconnect switch at each of the facility's generators which is accessible by the Company and clearly labeled. A licensed electrician must certify via the Interconnection Form that the disconnection switch has been installed properly. Alternatively, if the Customer or licensed Virginia Class A or B general contractor installs the customer's generator or generators, the signed final electrical inspection can be used in lieu of the licensed electrician's certification. The Company reserves the right to install any additional equipment, including controls and meters, at the facility.
6. The Customer shall periodically maintain and test the Generator in accordance with the manufacturer's specifications and all applicable safety and performance standards. The Customer shall notify the Company at least fourteen (14) days prior to making any material changes to the Generator facility or installation, including, but not necessarily limited to, any modification to the equipment or protective equipment settings or disconnection of the Generator from the Company's system, excluding temporary disconnects for routine maintenance.

OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)
(continued)

Following a notification of disconnection of the Generator, the customer must again complete the notification process specified above prior to any subsequent reconnection.

In addition, the Customer shall notify the Company immediately regarding either any damage to the Generator facility or safety-related emergency disconnections.

7. Interconnection authorization is not transferable or assignable to other persons or service locations.

Small Agricultural Generators

Small agricultural generators shall abide by the small generator interconnection process described in 20VAC5-314. Such customer shall be responsible for all costs associated with any interconnection or engineering studies that may be required prior to interconnection.

Small agricultural generators electing to interconnect pursuant to this section shall enter into a power purchase agreement with the Company to sell all of the electricity generated from its small agricultural generating facility. The Company shall be obligated by the power purchase agreement to purchase the electricity generated at a price equal to a rate agreed upon by the parties that is not less than the Company's Schedule Cogen/SPP approved as the Company's avoided cost tariff for energy and capacity.

Small agricultural generators with renewable energy certificates or other environmental attributes generated by the small agricultural generating facility shall have the rights described in 20VAC5-315-50 as detailed in this Rider under "Renewable Energy Credits".

FACILITIES CHARGES

The Customer is responsible for all equipment and installation costs of the Generator facility.

The Company shall inspect the inverter settings of a static inverter-connected generator with capacity in excess of 10 kW prior to interconnection. The Customer shall pay $50 to the Company for each generator that requires inspection.

The Company shall inspect the protective equipment settings of a non-static inverter-connected generator prior to interconnection. The Customer shall pay $50 to the Company for each generator that requires inspection.

The Customer shall pay to the Company any additional charges, as determined by the Company, for equipment, labor, metering, testing or inspections requested by the customer. To ensure public safety, power quality, and reliability of the Company's system, a Customer shall bear all reasonable costs of equipment required for the interconnection to the Company's system, including costs, if any, to (i) install additional controls and (ii) perform additional tests. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such additional charges.

METERING- Customer

Net metered energy shall be measured in accordance with standard metering practices by metering equipment capable of measuring (but not necessarily displaying) power flow in both directions.

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OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)
(continued)

In instances where a Customer has requested, and where the Company would not have otherwise installed, metering equipment that is intended to be read off-site, the Company may charge the Customer its actual cost of installing any additional equipment necessary to implement net metering service.

A time-of-use Customer shall bear the incremental metering costs associated with Net Metering.

Agricultural Net Metering Customers shall be responsible for the cost of additional metering equipment necessary to accomplish account aggregation.

Any incremental metering costs associated with measuring the total output of the Generator for the purposes of receiving Renewable Energy Certificates shall be installed at the Customer's expense.

METER AGGREGATION

Only Agricultural Net Metering Customers are eligible for meter aggregation. An Agricultural Net Metering Customer may, but need not, apply to the Company to aggregate into one account the load of multiple meters located at separate but contiguous sites the customer uses for its agricultural business. The applicant must provide to the Company deeds, plats, leases, or other evidence satisfactory to Company to show that the meters the customer desires to aggregate are (1) on the same or contiguous sites and (2) that the customer uses the affected sites for its Agricultural business. After the applicant has demonstrated to Company's reasonable satisfaction that it qualifies for meter aggregation, the Company will determine the applicable Standard Schedule for the aggregated meters. To do so, Company will determine the coincident peak demand recorded or estimated over the most recent 12 months on the meters to be aggregated and assign the aggregated meters to the applicable Standard Schedule for the aggregated coincident peak demand. If any of the existing meters to be aggregated is not capable of recording demand data, Company will work in good faith with the customer to estimate a peak demand for the facilities on the customer's side of each such meter. To the extent the customer's requested meter aggregation requires Company to replace or enhance an existing meter with a meter with increased capabilities, e.g., replacing a non-demand recording meter with a meter capable of recording demand data, the Company will charge customer for the entire cost of the meter replacement or enhancement, for which payment in full will be due to Company on the due date of the bill on which the charge first appears. This condition applies only to meter replacements or enhancements required to achieve a customer's requested meter aggregation; it does not apply to the cost of any meter replacements or enhancements necessary solely to implement net metering. If the actual demand and consumption warrant a revision after the installation of demand recording meters the Company will reassess the applicable Standard Schedule for the aggregated meters.

Upon aggregating meters according to the applying customer's request as described above, the Company will bill the Customer for monthly coincident demand and total energy consumption across the aggregated meters as though the aggregated meters were a single meter under the appropriate Standard Schedule and this Rider NMS. The highest-voltage service supplied to any of the aggregated meters will be the voltage used to determine the appropriate Standard Schedule for all the aggregated meters and the applicable charges under that rate schedule. For example, a Customer aggregating two secondary-level services and one primary-level service will be billed for primary-level basic service, demand, and energy charges for all three aggregated meters under the appropriate rate schedule. After Company aggregates meters according to the customer's request, a Customer may not remove a meter from a requested aggregation unless the Customer ceases to take service at that location or ceases to qualify as an Agricultural Net Metering Customer.

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OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)
(continued)

A Customer may add qualifying meters to an existing aggregation upon application to Company showing sufficient evidence to qualify for aggregation as described above. An Agricultural Net Metering Customer who aggregates meters must notify Company within 90 days of any outage of the Customer's generating facility and provide reasonable evidence of the Customer's efforts to restore the generating facility to service in a timely manner.

Company will use good faith to determine if the Customer's efforts are reasonably likely to restore the facility to service in a timely manner. If Company determines in its sole discretion that the Customer is not making reasonable efforts to restore the facility to service in a timely manner, Company will discontinue the Customer's meter aggregation and Net Metering Service effective immediately, and will bill the customer at the standard rate schedules individually applicable to the meters.

MONTHLY CHARGES

All monthly charges shall be in accordance with the Standard Schedule under which the Customer takes service. Such charges shall be based on the Customer's net energy for the billing period, to the extent that the net energy exceeds zero. To the extent that a non-time of use Customer's net energy is zero or negative during the billing period, the Customer shall pay only the non-usage sensitive charges, including any applicable standby charges, of the standard Schedule. To the extent that a time-of-use Customer's net energy is zero or negative during the billing period, the Customer shall pay only the demand charge or charges, non-usage sensitive charges, and any applicable standby charges of the Standard Schedule. The Customer shall receive no compensation from the Company for Excess Generation during the billing period. The Excess Generation during the billing period shall be carried forward and credited against positive energy usage (by tiers, in the case of time-of-use customers) in subsequent billing periods

The Net Metering Period shall be defined as each successive 12 month period beginning with the first meter reading date following the date of interconnection of the renewable fuel generator with the Company's facilities. Any Excess Generation at the end of a Net Metering Period shall be carried forward to the next Net Metering Period only to the extent that the Excess Generation does not exceed the Customer's billed consumption for the current Net Metering Period, adjusted to exclude accumulated Billing Period Credits carried forward and applied from the previous Net Metering Period (recognizing tiers for time-of-use customers).

Upon written request of the Customer, the Company and the Customer shall enter into a power purchase agreement for the Customer's Excess Generation for one or more Net Metering Periods. For Net Metering Periods beginning on or after January 1, 2009, the written request of the customer must be submitted prior to the beginning of the Net Metering Period. The power purchase agreement shall be consistent with the Commission's Rules Governing Net Energy Metering (20 VAC 5-315-50 et seq.) and will obligate the Company to purchase the Customer's negative net energy for requested Net Metering Periods at a price equal to the PJM Interconnection, L.L.C. (PJM) day-ahead annual, simple average LMP (locational marginal price) or in the case of time-of-use Customers, the simple average of hourly LMPs by tiers, for the AEP Zone, as published by the PJM Market Monitoring Unit, for the most recent calendar year ending on or before the end of each Net Metering Period. The Company shall make full payment annually to the Customer within 30 days following the latter of the end of the Net Metering Period or the date of the PJM Market Monitoring Unit's publication of the previous calendar year's AEP Zone day-ahead annual, simple average LMP, or hourly LMP as appropriate.

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OPTIONAL RIDER N.M.S.
(Net Metering Service Rider)
(continued)

Excess Generation is not transferable, and the Customer, absent a signed power purchase agreement as outlined above, shall receive no compensation from the Company for any Excess Generation upon termination of service from the Company, or upon the customer's choice of a qualified ESP.

RENEWABLE ENERGY CREDITS

A Customer owns any Renewable Energy Certificates associated with the total output of its Generator.

The Company is only obligated to purchase a Customer's RECs if the Customer has exercised its one-time option at the time of signing a power purchase agreement with the Company to include a provision requiring the purchase by the Company of all generated RECs over the duration of the power purchase agreement.

Payment for all whole RECs purchased by the Company during a Net Metering Period in accordance with the purchase power agreement shall be made at the same time as the payment for any Excess generation.

The Company will post a credit to the Customer's account or the Customer may elect a direct payment.

RENEWABLE ENERGY CREDITS (Cont'd)

Any fractional REC remaining shall not receive immediate payment, but may be carried forward to subsequent Net Metering Periods for the duration of the power purchase agreement.

The rate of the payment by the Company for a Customer's RECs shall be the daily unweighted average of the "CR" component of Virginia Electric and Power Company's Virginia jurisdiction Rider G tariff in effect over the period for which the rate of payment for the excess generation is determined.

SPECIAL TERMS AND CONDITIONS

This Schedule is subject to the Company's Terms and Conditions of Standard Service. The terms, conditions, fees and eligibility requirements for net metering are subject to revision, as specified in 20VAC5-315 of the Virginia Administrative Code and approved by the Virginia State Corporation Commission.

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OPTIONAL RIDER N.M.S. II
(Net Metering Service Rider)

AVAILABILITY OF SERVICE

Available for new or existing customers who take Standard Service from the Company, own and operate, or contract with other persons to own or operate, or both; an eligible renewable fuel generator or agricultural renewable fuel generator as further defined below designed to operate in parallel with the Company's system and request Net Metering Service (NMS) from the Company after [the effective date of the Order in this proceeding] or for customers who took service under Optional Rider N.M.S but who no longer meet eligibility requirements for that Rider. Those Customers who utilize time-of-day provisions must have service that has two or more time-of-use tiers for energy-based charges and an electricity supply demand charge. Customers that do not take Standard Service shall make net metering arrangements with their Competitive Service Provider. The total capacity of all NMS Customers shall be limited pursuant to subsection E of § 56-594 of the Code of Virginia, and shall be available to customers with eligible Generators on a first come, first serve basis. In the event a prospective net metering customer has submitted a notification form required by Rule 20 VAC5-315-30 ("Interconnection Form") and that customer's interconnection would cause the Company to exceed the "Renewable Generator Limit," the Company will provide the proper notification to the customer and the Commission's Division of Energy Regulation

DEFINITIONS

The following terms: "Agricultural Net Metering Customer," "Agricultural Renewable Fuel Generator," "Billing Period Credit," "Customer," "Excess Generation," "Net Metering Customer," "Net Metering Period," "Net Metering Service," "Person," "Renewable Energy Certificate (REC)," "Renewable Fuel Generator," "Small agricultural generating facility," and "Small agricultural generator" shall solely be used to define the applicability of Rider N.M.S II in conjunction with additional terms defined in accordance with Rule 20 VAC 5-315-20. These terms can be found at the following location: https://law.lis.virginia.gov/admincode/title20/agency5/chapter315/section20/.

A. Notification

1. A prospective net metering customer shall notify and receive approval to interconnect prior to starting any construction, installation or addition of capacity to an electrical generating facility via the commission-approved Interconnection Form (Form NMIN) which can be found at the Company's website at https://www.appalachianpower.com/global/utilities/lib/docs/builders/VA/NMINforVA.pdf. The prospective net metering customer may submit the Interconnection Form either directly to the Company or by mail. Alternatively, the customer may complete the online form at https://aep.powerclerk.com/MvcAccount/Login. All sections that require the Company's review, including appropriate signatures, of the Interconnection Form must be completed for the notification to be valid. Both the Company and the prospective net metering customer must comply with notification requirements contained in 20VAC5 315 30 (https://law.lis.virginia.gov/admincode/title20/agency5/chapter315/section30/).
2. Thirty-one (31) days after the date of final notification for a residential customer, and sixty-one (61) days after the date of final notification for a nonresidential customer, the prospective customer may interconnect and begin operation of the generating facility unless the Company requests a waiver of this requirement under the provisions of 20VAC5-315-80 prior to the 31st or 61st day, respectively. Within this period, the Company shall also make a determination whether there is cause to file a request for waiver with the VA. S.C.C.
3. The Customer shall immediately notify the Company of any changes in the ownership of, operational responsibility for, or contact information for the Generator.

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OPTIONAL RIDER N.M.S. II
(Net Metering Service Rider)
(continued)

CONDITIONS OF SERVICE

B. Conditions of Interconnection

Prospective net metering customers must interconnect in accordance with 20VAC5-315-40. Small agricultural generators or agricultural renewable fuel generators may elect to interconnect as a net metering customer or as small agricultural generators pursuant to 20VAC5-315-75, but not both. Existing eligible agricultural renewable fuel generators may elect to become small agricultural generators, but may not revert to being an agricultural renewable fuel generator after such election.

Customer

1. A Generating system shall meet all applicable safety and performance standards established by the National Electrical Code, the Institute of Electrical and Electronics Engineers, and accredited testing laboratories such as Underwriters Laboratories. The vendor certifies, by signing the commission-approved Interconnection Form that the Generation equipment is being installed in compliance with the requirements established by Underwriters Laboratories or other national testing laboratories in accordance with IEEE Standard 1547, Standard for Interconnecting Distributed Resources with Electric Power Systems, July 2003.

   In addition, non-static inverter-connected Generator equipment and installations shall comply with the Company's Interconnection Guidelines. The Company shall provide a copy of its Interconnection Guidelines to the Customer upon request.

2. The following requirements shall be met before interconnection may occur:

   a. Electric Distribution Facilities and Customer Impact Limitations. A Generator shall not be permitted to interconnect to the Company's distribution facilities if the interconnection would reasonably lead to damage of any of the Company's facilities or would reasonably lead to voltage regulation or power quality problems at other customer revenue meters due to the incremental effect of the Company's electric distribution system, unless the customer reimburses the Company for its cost to accommodate the interconnection, including the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.
   b. Secondary, Service and Service Entrance Limitations. The capacity of the Generator shall be less than the capacity of the Company-owned secondary, service, and service entrance cable connected to the point of interconnection, unless the Customer reimburses the Company for the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.
   c. Transformer Loading Limitations. The Generator shall not have the ability to overload the Company's transformer, or any transformer winding, beyond manufacturer or nameplate ratings, unless the customer reimburses the Company for the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.

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OPTIONAL RIDER N.M.S. II
(Net Metering Service Rider)
(continued)

d. Integration With Company Facilities Grounding. The grounding scheme of each Generator shall comply with IEEE 1547, Standard for Interconnecting Distributed Resources With Electric Power Systems, July 2003, and shall be consistent with the grounding scheme used by the Company. If requested by a prospective customer, the Company shall assist the customer in selecting a grounding scheme the coordinates with the Company's distribution system.

Customer (Cont'd)

e. Balance Limitation. The Generator shall not create a voltage imbalance of more than 3.0% at any other customer's revenue meter if the Company's transformer, with the secondary connected to the point of interconnection, is a three-phase transformer, unless the Customer reimburses the Company for the reasonable cost of equipment required for the interconnection. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such reimbursement.

3. The Customer is required to maintain liability insurance with the requirements contained in 20VAC5 315 60 (https://law.lis.virginia.gov/admincode/title20/agency5/chapter315/section60/). The Company's receipt of evidence of liability insurance does not imply an endorsement of the terms and conditions of the coverage.
4. Following Notification by the Customer, the Company shall have the right to inspect and test the Generator equipment and installation prior to interconnection. The nature and extent of these tests shall be determined solely by the Company. The Company reserves the right to conduct additional tests and inspections and to install additional equipment or meters at any time following interconnection of the Generator.
5. The Generator installation must have a visibly open, lockable, manual disconnect switch at each of the facility's generators which is accessible by the Company and clearly labeled. A licensed electrician must certify via the Interconnection Form that the disconnection switch has been installed properly. Alternatively, if the Customer or licensed Virginia Class A or B general contractor installs the customer's generator or generators, the signed final electrical inspection can be used in lieu of the licensed electrician's certification. The Company reserves the right to install any additional equipment, including controls and meters, at the facility.
6. The Customer shall periodically maintain and test the Generator in accordance with the manufacturer's specifications and all applicable safety and performance standards. The Customer shall notify the Company at least fourteen (14) days prior to making any material changes to the Generator facility or installation, including, but not necessarily limited to, any modification to the equipment or protective equipment settings or disconnection of the Generator from the Company's system, excluding temporary disconnects for routine maintenance. Following a notification of disconnection of the Generator, the customer must again complete the notification process specified above prior to any subsequent reconnection.

   In addition, the Customer shall notify the Company immediately regarding either any damage to the Generator facility or safety-related emergency disconnections.

7. Interconnection authorization is not transferable or assignable to other persons or service locations.

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OPTIONAL RIDER N.M.S. II
(Net Metering Service Rider)
(continued)

Small Agricultural Generators

Small agricultural generators shall abide by the small generator interconnection process described in 20VAC5-314. Such customer shall be responsible for all costs associated with any interconnection or engineering studies that may be required prior to interconnection.

Small agricultural generators electing to interconnect pursuant to this section shall enter into a power purchase agreement with the Company to sell all of the electricity generated from its small agricultural generating facility. The Company shall be obligated by the power purchase agreement to purchase the electricity generated at a price equal to a rate agreed upon by the parties that is not less than the Company's Schedule Cogen/SPP approved as the Company's avoided cost tariff for energy and capacity.

Small agricultural generators with renewable energy certificates or other environmental attributes generated by the small agricultural generating facility shall have the rights described in 20VAC5-315-50 as detailed in this Rider under "Renewable Energy Credits".

FACILITIES CHARGES

The Customer is responsible for all equipment and installation costs of the Generator facility.

The Company shall inspect the inverter settings of a static inverter-connected generator with capacity in excess of 10 kW prior to interconnection. The Customer shall pay $50 to the Company for each generator that requires inspection.

The Company shall inspect the protective equipment settings of a non-static inverter-connected generator prior to interconnection. The Customer shall pay $50 to the Company for each generator that requires inspection.

The Customer shall pay to the Company any additional charges, as determined by the Company, for equipment, labor, metering, testing or inspections requested by the customer. To ensure public safety, power quality, and reliability of the Company's system, a Customer shall bear all reasonable costs of equipment required for the interconnection to the Company's system, including costs, if any, to (i) install additional controls and (ii) perform additional tests. In addition, the Customer shall reimburse the Company for all state and federal income taxes associated with such additional charges.

METERING- Customer

Net metered energy shall be measured in accordance with standard metering practices by metering equipment capable of measuring (but not necessarily displaying) power flow in both directions.

In instances where a Customer has requested, and where the Company would not have otherwise installed, metering equipment that is intended to be read off-site, the Company may charge the Customer its actual cost of installing any additional equipment necessary to implement net metering service.

A time-of-use Customer shall bear the incremental metering costs associated with Net Metering.

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OPTIONAL RIDER N.M.S. II
(Net Metering Service Rider)
(continued)

Agricultural Net Metering Customers shall be responsible for the cost of additional metering equipment necessary to accomplish account aggregation.

Any incremental metering costs associated with measuring the total output of the Generator for the purposes of receiving Renewable Energy Certificates shall be installed at the Customer's expense.

METER AGGREGATION

Only Agricultural Net Metering Customers are eligible for meter aggregation. An Agricultural Net Metering Customer may, but need not, apply to the Company to aggregate into one account the load of multiple meters located at separate but contiguous sites the customer uses for its agricultural business. The applicant must provide to the Company deeds, plats, leases, or other evidence satisfactory to Company to show that the meters the customer desires to aggregate are (1) on the same or contiguous sites and (2) that the customer uses the affected sites for its Agricultural business. After the applicant has demonstrated to Company's reasonable satisfaction that it qualifies for meter aggregation, the Company will determine the applicable Standard Schedule for the aggregated meters. To do so, Company will determine the coincident peak demand recorded or estimated over the most recent 12 months on the meters to be aggregated and assign the aggregated meters to the applicable Standard Schedule for the aggregated coincident peak demand. If any of the existing meters to be aggregated is not capable of recording demand data, Company will work in good faith with the customer to estimate a peak demand for the facilities on the customer's side of each such meter. To the extent the customer's requested meter aggregation requires Company to replace or enhance an existing meter with a meter with increased capabilities, e.g., replacing a non-demand recording meter with a meter capable of recording demand data, the Company will charge customer for the entire cost of the meter replacement or enhancement, for which payment in full will be due to Company on the due date of the bill on which the charge first appears. This condition applies only to meter replacements or enhancements required to achieve a customer's requested meter aggregation; it does not apply to the cost of any meter replacements or enhancements necessary solely to implement net metering. If the actual demand and consumption warrant a revision after the installation of demand recording meters the Company will reassess the applicable Standard Schedule for the aggregated meters.

Upon aggregating meters according to the applying customer's request as described above, the Company will bill the Customer for monthly coincident demand and total energy consumption across the aggregated meters as though the aggregated meters were a single meter under the appropriate Standard Schedule and this Rider NMS II. The highest-voltage service supplied to any of the aggregated meters will be the voltage used to determine the appropriate Standard Schedule for all the aggregated meters and the applicable charges under that rate schedule. For example, a Customer aggregating two secondary-level services and one primary-level service will be billed for primary-level basic service, demand, and energy charges for all three aggregated meters under the appropriate rate schedule. After Company aggregates meters according to the customer's request, a Customer may not remove a meter from a requested aggregation unless the Customer ceases to take service at that location or ceases to qualify as an Agricultural Net Metering Customer.

A Customer may add qualifying meters to an existing aggregation upon application to Company showing sufficient evidence to qualify for aggregation as described above. An Agricultural Net Metering Customer who aggregates meters must notify Company within 90 days of any outage of the Customer's generating facility and provide reasonable evidence of the Customer's efforts to restore the generating facility to service in a timely manner.

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(Net Metering Service Rider)
(continued)

Company will use good faith to determine if the Customer's efforts are reasonably likely to restore the facility to service in a timely manner. If Company determines in its sole discretion that the Customer is not making reasonable efforts to restore the facility to service in a timely manner, Company will discontinue the Customer's meter aggregation and Net Metering Service effective immediately, and will bill the customer at the standard rate schedules individually applicable to the meters.

MONTHLY CHARGES

All monthly charges shall be in accordance with the Standard Schedule under which the Customer takes service.

Fixed monthly charges may include: customer charges, other monthly charges not related to energy consumption, charges for incremental cost of interconnection, and the net difference in the cost of a traditional meter and the bi-directional meter requirement for net metering directly incurred by the electric utility in accommodating a net metering system that would not be required for electric retail customers who are not Customers.

The electrical energy supplied by the Company to the Customers ("Metered Input") and the electrical energy generated by the Customers and supplied to the Company ("Metered Output" or "Excess Generation") will be separately measured and charged as follows:

1. Monthly charges shall be calculated using an identical rate structure to the structure that would apply to the Customer if it did not have a Renewable Fuel Generator.
2. The Net Metering Period shall be defined and aligned with the billing period.
3. The net electrical energy produced or consumed during the billing period shall be measured in accordance with normal metering practices.
4. The Company shall credit a Customer for Metered Output produced by a Renewable Fuel Generator installed on the Customer side of the electric meter and supplied to the Company.
5. The Company shall credit a Customer for each kWh of Metered Output at the following rates:

NMS II Avoided Cost Component Rates ($/kWh)						
Customer	Voltage Level	Energy	Capacity	Transmission	Ancillary Service	Total Energy Credit
Residential	Secondary	$0.0372	$0.0037	$0.0068	$0.00150	$0.0492
Commercial, Industrial	Secondary	$0.0372	$0.0038	$0.0074	$0.00150	$0.0501
Commercial, Industrial	Primary	$0.0357	$0.0038	$0.0071	$0.00144	$0.0480
Commercial, Industrial	Sub-Transmission	$0.0353	$0.0038	$0.0071	$0.00142	$0.0476
Commercial, Industrial	Transmission	$0.0348	$0.0037	$0.0070	$0.00140	$0.0469

6. Future changes to the credit rates for Metered Output are subject to Commission approval.

Effective: [Date]

Issued: [Date]

Issued: [Date]
Pursuant to Final Order
Dated: Case PUR-2024-000___

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OPTIONAL RIDER N.M.S. II
(Net Metering Service Rider)
(continued)

7. The Company shall credit a Customer's account for the full billing period energy credit even if it exceeds the total Customer's bill for the billing period.

RENEWABLE ENERGY CERTIFICATES

A Customer owns any Renewable Energy Certificates associated with the total output of its Generator.

Renewable Energy Certificates

The Company is only obligated to purchase a Customer's RECs if the Customer has exercised its one-time option at the time of signing the interconnection agreement. The Company and the Customer will enter into a REC purchase agreement requiring the purchase by the Company of all generated RECs over the duration of the REC purchase agreement.

The Company shall make full payment for all whole RECS annually to the Customer within 30 days following the end of the REC Period. The REC Period shall be defined as each successive 12 month period beginning with the first meter reading date following the date of interconnection of the renewable fuel generator with the Company's facilities.

The Company will post a credit to the Customer's account or the Customer may elect a direct payment.

Any fractional REC remaining shall not receive immediate payment, but may be carried forward to subsequent REC Periods for the duration of the REC purchase agreement.

The rate of payment by the Company for a Customer's RECs shall be the Renewable Energy Premium component of the Company's Optional Rider W.W.S in effect over the period for which the rate of payment for the REC generation is determined.

SPECIAL TERMS AND CONDITIONS

This Schedule is subject to the Company's Terms and Conditions of Standard Service. The terms, conditions, fees and eligibility requirements for net metering are subject to revision, as specified in 20VAC5-315 of the Virginia Administrative Code and approved by the Virginia State Corporation Commission.