BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Ohio Power Company for an Increase in Electric Distribution Rates.	**)** **)** **)**	**Case No. 20-585-EL-AIR**
In the Matter of the Application of Ohio Power Company for Tariff Approval.	**)** **)**	**Case No. 20-586-EL-ATA**
In the Matter of the Application of Ohio Power Company for Approval to Change Accounting Methods.	**)** **)** **)**	**Case No. 20-587-EL-AAM**

NOTICE OF WITNESS SUBSTITUTION OF
NATIONWIDE ENERGY PARTNERS, LLC

Nationwide Energy Partners, LLC ("NEP") hereby provides notice of the substitution of one of its witnesses at the upcoming hearing in these proceedings. NEP prefiled the testimony of Susanne Buckley in these proceedings on April 20, 2021. Due to a conflict, Ms. Buckley is not able to testify at the adjudicatory hearing scheduled to resume on Tuesday, May 12, 2021. In her stead, Eric Rehberg with Armada Power, LLC adopts Ms. Buckley's pre-filed testimony and substitutes as one of the witnesses on behalf of the NEP.

Attached to this notice is a new version of the testimony that will be presented at the hearing. Mr. Rehberg's personal information and background have been substituted at the

beginning of the testimony, his resume added, and slight revisions are reflected in Answers 10 and 11 and in Exhibit A.

Respectfully Submitted,

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CERTIFICATE OF SERVICE

The Public Utilities Commission of Ohio's e-filing system will electronically serve notice of the filing of this document on the parties referenced on the service list of the docket card who have electronically subscribed to the case. In addition, the undersigned certifies that a courtesy copy of the foregoing document is also being served (via electronic mail) on the 5th day of May 2021 upon all persons/entities listed below:

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/s/ Michael J. Settineri
Michael J. Settineri

BEFORE
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DIRECT TESTIMONY OF ERIC REHBERG

ON BEHALF OF

NATIONWIDE ENERGY PARTNERS, LLC

May 5, 2021

Q1. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND ON WHOSE BEHALF YOU ARE TESTIFYING?

A1. My name is Eric Rehberg. I am the Chief Engineer with Armada Power, LLC ("Armada Power"). My business address is 230 West Street, Suite 200, Columbus, Ohio 43215. I am presenting testimony in this proceeding on behalf of Nationwide Energy Partners, LLC ("NEP").

Q2. WHAT ARE YOUR JOB RESPONSIBILITIES?

A2. I lead the development of Armada Power's technology roadmap and provide support to our business development team. I also consult on energy, technology, and engineering topics specific to NEP.

Q3. WHAT IS YOUR EDUCATIONAL BACKGROUND AND YOUR PROFESSIONAL EXPERIENCE?

A3. I have a bachelor of science degree in Electrical and Computer Engineering from The Ohio State University. I am a licensed Professional Engineer in the State of Ohio. PE.73543. I previously worked for American Electric Power at its Dolan Technology Center where I helped develop new technologies for use across the AEP system and evaluated emerging smart grid technologies. I lead projects in energy technology and research at the Battelle Memorial Institute where I was also awarded Emerging Scientist of the Year in 2013. It was at Battelle that we developed the core technology components that were eventually spun out into Armada Power. At Battelle, I also consulted on a wide range of energy analysis projects for US and Global customers, including electric rate impacts and macroeconomic trends in utility investments. I am currently the Chief Engineer for Armada Power and am an inventor with 14 patents in the

field of energy technology. As part of my work experience at AEP, Battelle, and Armada Power, I have been involved with projects that span a wide range of analysis including, energy management, electric rates, efficiency, and load management for single family residential, multifamily commercial, office building commercial, and industrial facilities including large scale refrigeration and wastewater treatment. A copy of my resume is attached as Exhibit B.

Q4. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A4. The purpose of my testimony is to highlight for the Commission the impact to GS-2 and GS-3 customers in AEP Ohio's service territory that will result from the changes proposed in the Joint Stipulation and Recommendation filed on March 12, 2021 in these proceedings (the "Stipulation"). One significant change proposed in the Stipulation is that the current General Service ("GS") rate classes (GS-2 and GS-3) are being combined into a single GS class (see tariff changes starting on Sheet 220-4 of Stipulation Attachment C). While the GS-2 and GS-3 base distribution rates are currently designed as demand only, the increase under the proposed rate structure exasperates the increase experienced by these customers under demand only tariffs. Certain GS customers will experience a more significant impact from the rate increase due to the demand-only structure. I will also propose an alternative rate structure that can be utilized for low-load factor customers and an alternative pilot program that can be adopted by the Commission to allow for investigation of the alternative rate structure.

Q5. HAVE YOU REVIEWED THE STIPULATION?

A5. I have reviewed the Stipulation in addition to AEP Ohio's application and the Staff report filed in these proceedings.

Q6. WHAT IS A LOW-LOAD FACTOR CUSTOMER?

A6. A low-load factor customer is a customer that regularly uses a significantly lower amount of electricity versus its possible consumption based on the customer's peak demand. Load factor is a ratio of how much energy a customer used over a period of time versus how much energy that customer could have used if it constantly consumed electricity at its peak use over that same period. On a monthly bill, load factor can be calculated by taking the monthly kilowatt-hour ("kWh") divided by the product of the monthly peak demand in kilowatts ("kWs") multiplied by the total clock hours in the month. I am not aware of any specific guidance from AEP Ohio as to what constitutes a low-load factor customer. Based on my experience, I would consider any customer with a load factor below 40% to be a low-load factor customer.

Q7. CAN YOU PROVIDE EXAMPLES OF CUSTOMERS THAT YOU BELIEVE CAN HAVE LOW-LOAD FACTORS?

A7. Low-load factor customers can consist of multi-family housing, restaurants, and in some cases warehouses. Other examples can be single shift manufacturers, churches, schools, and small medical and commercial offices.

Q8. WHY WOULD THESE TYPES OF CUSTOMERS HAVE A LOW-LOAD FACTOR?

A8. For these customers, managing demand can be difficult and dependent on the circumstances not easily controlled. Therefore, these customers tend to have to poor load factors. For example, residential customer usage is generally reflected in HVAC, water heating and general lifestyle impacts such as laundry, dishwashers, and other residential electric use that the residential customer directly controls. Restaurants, like residential customers, are also subject to lifestyle impacts usage. A restaurant's consumption of electricity is higher during a few hours a day as HVAC systems work to provide comfort to meet customers demand during peak mealtime hours. However, over the course of a month, a restaurant's energy (kWh) usage is significantly diminished when it is closed. Once a peak is established during the month the reduced consumption, while not operating, drives load factors lower. Unlike a manufacturer which can control shifts or manage operations to minimize its monthly peak demand, a restaurant is not going to turn away customers or make them uncomfortable to manage its peak demand. Multi-family units also are subject to fluctuating usage as general tenant lifestyle impacts apply depending on whether the tenant is home or away and the nature of the tenant's use of common areas.

Q9. HAVE YOU DONE AN ANALYSIS OF HOW THE PROPOSED RATE SCHEDULES IN THE STIPULATION WILL IMPACT LOW-LOAD FACTOR CUSTOMERS IN THE PROPOSED GS CLASS?

A9. Yes. I applied the proposed rate schedules in the Stipulation to certain representative monthly demands and usages. The representative monthly demands and usages include

information from actual AEP Ohio multi-family unit development accounts which are customers of NEP. The accounts were selected because they contained both high and low-load factors with varying monthly consumptions. I used that same information to develop monthly impacts applying rate schedules in effect as of December 2019 (AEP Ohio's date certain for its application was December 31, 2019) and as of March 2021 (to account for current rates). In conducting my analysis, I made certain assumptions which were: 1) setting the initial Stipulation Distribution Investment Rider ("DIR") percentage to 5% and 2) keeping the Economic Development Cost Recovery Rider and Enhanced Service Reliability Rider consistent in both the current and Stipulation scenarios.

My analysis was designed to allow for a comparison of the impact of the Stipulation on both what I consider to be low-load factor and high-load factor customers, show the actual distribution of the increase of the proposed rate schedules by excluding generation, and to allow for adjustments in the DIR rider that will increase over the coming year(s) to show how the distribution charges will increase as a result of adjustments.

Q10. WHY DID YOU EXCLUDE GENERATION COSTS FROM YOUR ANALYSIS?

A10. Generation is a component that is unrelated to distribution. As a competitive option in Ohio, that piece will vary based on the customer's decisions and in my opinion should not be part of an analysis of impacts of tariffed distribution charges which cannot be shopped or avoided. Also, when GS-2 and GS-3 customers utilize dual billing (which means that the AEP Ohio invoice will not include generation charges), the distribution rate increase on AEP Ohio's bill will not be diluted by generation charges.

Q11. WHAT WERE THE RESULTS OF YOUR ANALYSIS?

A11. The results of my analysis are attached to my testimony as Tables 1 – 7 in Exhibit A.

Table 1 indicates that when using December 2019 rate schedules as the baseline, the increase in distribution rates as a result of the Stipulation is approximately 33% to 40% of what customers are paying now for the same service. The amount of annual proposed increase in our sample of medium-consuming customers is $1,652 per year. The amount of the proposed annual increase in larger consuming customers averaged $11,348 per year. Table 3 indicates that these costs increase to $2,007 and $13,505, respectively as the DIR percentage increases to 11% to meet with the proposed caps in 2023. Table 5 shows how the 11 % assumption was derived as a function of the increasing revenue caps for the rider.

Table 2 indicates that when using March 2021 tariffs as the baseline, the increase in distribution rates as a result of the Stipulation is approximately 26% to 32% of what customers are paying now for the same service. The amount of annual proposed increase in our sample of medium-consuming customers is $1,363 per year. The amount of proposed annual increase in larger-consuming customers averaged $9,670 per year. Table 4 shows these costs increase to $1,718 and $11,828, respectively, as the DIR percentage increases to meet the proposed caps in 2023.

As indicated in Table 6, low-load factor customers currently pay approximately twice as much when unitized per kWh for the same distribution service as high-load factor customers due to the rate design of demand-only charges. In my experience, a high-load

factor customer can be described as one above 60%. Since the Stipulation does not contemplate any change to rate design for the GS-2 and GS-3 customers, this disparity in costs per kWh are more exaggerated as the monthly peak demand charges increase. The increase for a low-load factor medium-sized customer is $0.007 per kWh while the increase for a high-load factor medium sized customer is $0.003 per kwh. For larger-consuming customers, the increases are $0.009 per kWh for low-load factor customers and $0.004 per kWh for high-load factor customers.

Q12. DO THE RESULTS OF YOUR ANALYSIS INFORM YOUR OPINION OF THE STIPULATION ON THE GS RATE SCHEDULES?

A12. Yes. My analysis highlights how GS customers will see a sizable increase in distribution rates with no additional benefits or services than what they receive today. These facts show that the GS rate schedule proposed by the Stipulation will have a particularly significant and long-term rate impact on low-load factor customers by locking in increases to demand charges.

Q13. WHY DO YOU BELIEVE THE RATE IMPACT WILL BE LONG-TERM?

A13. The GS rate schedule is a distribution rate schedule and historically it has been years since AEP has gone through a distribution rate case. Customers will see an increase on their bills and that increase will grow in magnitude as AEP's adjustable charges like the DIR increase. For example, I would expect school accounts to become much more aware of the distribution rate increase in the summer months as buildings are not used and the accounts remain subject to the demand ratchet charge which requires a customer to pay no less than 60% of the highest peak in the past eleven (11) months.

Q14. DO YOU BELIEVE THE GS RATE SCHEDULE SHOULD BE ADOPTED AS PROPOSED IN THE STIPULATION?

A14. No. The proposed GS rate schedule does not account for gradual rate increases for low-load factor customers due to the impact that the demand based rate schedule will have on those customers. As I noted above, low-load factor customers in my experience cannot manage monthly peak demand effectively. To allow these low-load factor customers the opportunity to lower monthly costs, I recommend that an additional GS rate schedule be put in place specifically for low-load factor customers that provides for a combination of energy based and demand based charges.

Q15. WHY WOULD A COMBINATION ENERGY/DEMAND CHARGE INCREASE BE BETTER FOR LOW-LOAD FACTOR CUSTOMERS THAN THE DEMAND CHARGE INCREASE THAT THE STIPULATION RECOMMENDS?

A15. As I noted earlier, demand for most low-load factor commercial customers is not easy to control. Unlike reductions in energy through the use of efficient equipment or reductions in other usage through behavior changes (i.e., turning off computer monitors when not in use, etc.) over the course of the month, reducing demand charges introduces the challenge of controlling coincident usage over a short period of time (i.e., the HVAC fans running at the same time the industrial dishwasher is drying). Additionally, seasonal customers such as schools, certain manufacturers and colleges can be subject to a demand ratchet which requires a customer to pay no less than 60% of the highest peak in the past eleven (11) months. Increasing demand charges will have an increased impact on those customers during those months when they are subject to the demand ratchet.

For many customers, reducing peak demand is typically done through load curtailment or shifting operations. Due to the nature of how low-load factor customers use electricity, these methods cannot be easily implemented. A low-load factor commercial tariff that is structured to include demand and energy charges for distribution will give the customer the ability to manage its overall monthly usage and in turn a portion of their distribution charges through energy efficiency measures and behavior-based changes. If those customers are left under the Stipulation's GS rate proposal, they will not have the ability to effectively manage costs as their demand will drive all their GS distribution rate schedule charges.

Creating a rate design that includes kWh for low-load factor commercial customers will also incentivize energy efficiency projects. Energy efficiency project benefits are typically measured in usage (kWh) reduction. With the elimination of the energy efficiency rebate program managed by AEP Ohio, customers will be looking for ways to improve the payback on future energy efficiency projects. Moving a portion of distribution charges to energy (kWh) will improve the payback calculations for deploying capital which should incentivize further energy efficiency without the need for a utility-managed rebate program.

Q16. DO YOU HAVE A RECOMMENDATION ON HOW A LOW-LOAD FACTOR CUSTOMER RATE SCHEDULE CAN BE DESIGNED?

A16. Yes. A rate schedule that I believe would accomplish the goal of allowing some cost control for low-load factor customers while allowing some guaranteed increase for AEP Ohio would be:

- For GS secondary low-load factor customers, a demand charge of $5.04 per kW and an energy charge of $0.0067 per kWh.
- For GS primary low-load factor customers, a demand charge of $3.98 per kW and an energy charge of $0.0064 per kWh.
- A low-load factor customer would be defined as a customer with a load factor of 40% or below based on the prior year's 12-month load factor average.

Q17. HOW DID YOU DEVELOP YOUR PROPOSED RATE SCHEDULE FOR THESE GS CUSTOMERS?

A17. The demand charges in the proposed rate design limits the increase in current demand charges to no more than 25%. The remaining proposed cost increase would be collected through energy charges (kWh) at a level that will achieve the same costs collected by the Stipulation assuming no usage reduction. Splitting the cost increase between demand and energy provides a balance between a cost increase guarantee for AEP Ohio and some amount of cost control for customers.

The energy rate was determined by finding the rate that would equate to the same costs proposed by the Stipulation should a customer not engage in lowering monthly

consumption. Table 7 illustrates that the demand costs provided by the Stipulation and the combined demand and energy costs of the new low-load factor tariff are consistent.

Q18. DOES YOUR PROPOSED RATE SCHEDULE CREATE A RISK OF UNDER COLLECTION FOR AEP OHIO VERSUS THE STIPULATION'S PROPOSED GS RATE SCHEDULE?

A18. Any risk of over- or under-collection for the low-load factor customer rate schedule I propose would be similar to the risk that AEP Ohio faces with any class of customer which can either control demand or reduce kWh. Under the current settlement, the kWh efficiency reduction risk exists for residential and GS1 customers. That is, if customer usage decreases due to weather, energy efficiency measures or other factors, then AEP Ohio would see a decrease in its collected revenues. Likewise, if customer usage increases for reasons such as weather or expanded operations, then AEP Ohio would receive the benefit of an over-collection. This under-collection is partially de-risked for AEP Ohio with the 25% increase in demand charges.

Q19. WHAT DO YOU RECOMMEND THE COMMISSION DO REGARDING YOUR LOW-LOAD FACTOR CUSTOMER PROPOSAL?

A19. I recommend that the Commission adopt my proposal and require AEP Ohio to create and submit revised rate schedules that would implement the low-load factor rate schedule proposed in my testimony. If the Commission elects to not adopt my proposal, I recommend at a minimum that the Commission allow for a pilot to investigate the benefits of a low-load factor rate schedule. The pilot would be capped at 1,000 customers on a first-come, first-serve basis. At a maximum capacity participation and assuming those customers whose average consumption is 100,000 kWh per month will

achieve a high level of 20% energy efficiency, I estimate the maximum potential impact to AEP Ohio to be approximately $1.2 million per year, and under the pilot, AEP Ohio would not seek to recover the reduction in revenue due to energy efficiency achieved in the program. If the impact of the pilot to AEP Ohio exceeds $1.2 million in any given calendar year, AEP may lower the numbers of participants below the 1,000 customer cap. I also recommend that within 60 days after the Commission approves the pilot, interested parties in these proceedings meet to identify the process for customers to sign-up for the pilot. The Commission, AEP Ohio and AEP Ohio's commercial customers will benefit from the pilot as not only will it provide all the opportunity to evaluate a low-load factor rate schedule, but it will create an incentive for energy efficiency without any additional cost to AEP Ohio's customers.

Q20. CAN YOU SUMMARIZE YOUR TESTIMONY?

A20. Yes. Low-load factor customers are disproportionately harmed by cost increases that are strictly imposed on demand charges as contemplated by the Stipulation. While this is the rate design currently in place, I am proposing an improvement to the current design for these customers that cannot easily manage their monthly peak demand. The improvement will allow AEP Ohio some guaranteed cost recovery through demand charges while allowing customers the benefit of controlling costs through energy efficiency and other consumption reducing efforts. If the Commission elects to not adopt the new low-load factor tariff, I am proposing a pilot program be implemented so that the Commission, AEP Ohio and customers can evaluate the costs and benefits of such a program.

Q21. DOES THIS CONCLUDE YOUR TESTIMONY?

A21. Yes.

Exhibit A

TABLE 1

		kW	kWh	Load Factor	Load Factor	Consumption Size	Current Monthly Charges (Dec 2019)	Stipulation Monthly Charges (DIR 5%)	Monthly Increase	Annual Increase	% Increase	Increase per kWh ($/kWh)
GS 2	Secondary	67	18,400	37%	Low	Medium	$ 401.98 ~~404.30~~	$ 535.62 ~~538.76~~	$ 133.65 ~~134.46~~	$ 1603.74 ~~1,613.49~~	33%	$ 0.0073
GS 2	Secondary	71	41,200	79%	High	Medium	$ 425.20	$ 566.97	$ 141.77	$ 1,701.28	33%	$ 0.0034
GS 3	Primary	641	142,625	30%	Low	High	$ 3102.93 ~~3,104.76~~	$ 4347.34 ~~4,349.96~~	$ 1244.41 ~~1,245.20~~	$ 14932.9 ~~14,942.35~~	40%	$ 0.0087
GS 3	Primary	336	165,200	67%	High	High	$ 1,705.46	$ 2,352.47	$ 647.01	$ 7,764.14	38%	$ 0.0039

Assumptions:

Includes: Customer Charge, Distribution Demand Charge and all riders that are % of Distribution (Distribution Investment Rider, Economic Development Cost Recovery Rider and Enhanced Service Reliability Rider).
Proposed riders: DIR at 5%, EDCR and ESRR remain unchanged at 1.35% and 3.48%, respectively.

TABLE 2

		kW	kWh	Load Factor	Load Factor	Consumption Size	Current Monthly Charges (March 2021)	Stipulation Monthly Charges (DIR 5%)	Monthly Increase	Annual Increase	% Increase	Increase per kWh ($/kWh)
GS 2	Secondary	67	18,400	37%	Low	Medium	$ 425.35 ~~427.81~~	$ 535.62 ~~538.76~~	$ 110.27 ~~110.95~~	$ 1323.24 ~~1,331.37~~	26%	$ 0.0060
GS 2	Secondary	71	41,200	79%	High	Medium	$ 449.92	$ 566.97	$ 117.05	$ 1,404.58	26%	$ 0.0028
GS 3	Primary	641	142,625	30%	Low	High	$ 3283.33 ~~3,285.30~~	$ 4347.34 ~~4,349.96~~	$ 1063.98 ~~1,064.65~~	$ 12767.32 ~~12,775.85~~	32%	$ 0.0075
GS 3	Primary	336	165,200	67%	High	High	$ 1,804.64	$ 2,352.47	$ 547.84	$ 6,574.07	30%	$ 0.0033

Assumptions:

Includes: Customer Charge, Distribution Demand Charge and all riders that are % of Distribution (Distribution Investment Rider, Economic Development Cost Recovery Rider and Enhanced Service Reliability Rider).
Proposed riders: DIR at 5%, EDCR and ESRR remain unchanged at 2.23% and 4.57%, respectively.

TABLE 3

		kW	kWh	Load Factor	Load Factor	Consumption Size	Current Monthly Charges (Dec 2019)	Stipulation Monthly Charges (DIR 11%)	Monthly Increase	Annual Increase	% Increase	Increase per kWh ($/kWh)
GS 2	Secondary	67	18,400	37%	Low	Medium	$ 401.98 ~~404.30~~	$ 564.37 ~~567.67~~	$ 162.39 ~~163.37~~	$ 1948.67 ~~1,960.44~~	40%	$ 0.0089
GS 2	Secondary	71	41,200	79%	High	Medium	$ 425.20	$ 597.40	$ 172.20	$ 2,066.40	40%	$ 0.0042
GS 3	Primary	641	142,625	30%	Low	High	$ 3102.93 ~~3,104.76~~	$ 4580.64 ~~4,583.40~~	$ 1477.71 ~~1,478.64~~	$ 17732.5 ~~17,743.65~~	48%	$ 0.0104
GS 3	Primary	336	165,200	67%	High	High	$ 1,705.46	$ 2,478.72	$ 773.26	$ 9,279.09	45%	$ 0.0047

Assumptions:

Includes: Customer Charge, Distribution Demand Charge and all riders that are % of Distribution (Distribution Investment Rider, Economic Development Cost Recovery Rider and Enhanced Service Reliability Rider).
Uses March 2021 as basline tariff. Proposed riders: DIR at 11%, EDCR and ESRR remain unchanged at 1.35% and 3.48%, respectively.

TABLE 4

		kW	kWh	Load Factor	Load Factor	Consumption Size	Current Monthly Charges (March 2021)	Stipulation Monthly Charges (DIR 11%)	Monthly Increase	Annual Increase	% Increase	Increase per kWh ($/kWh)
GS 2	Secondary	67	18,400	37%	Low	Medium	$ 425.35 ~~427.81~~	$ 564.37 ~~567.67~~	$ 139.01 ~~139.86~~	$ 1668.17 ~~1,678.32~~	33%	$ 0.0076
GS 2	Secondary	71	41,200	79%	High	Medium	$ 449.92	$ 597.40	$ 147.47	$ 1,769.70	33%	$ 0.0036
GS 3	Primary	641	142,625	30%	Low	High	$ 3283.33 ~~3,285.30~~	$ 4580.64 ~~4,583.40~~	$ 1297.28 ~~1,298.10~~	$ 15567.95 ~~15,577.14~~	40%	$ 0.0091
GS 3	Primary	336	165,200	67%	High	High	$ 1,804.64	$ 2,478.72	$ 674.08	$ 8,089.02	37%	$ 0.0041

Assumptions:

Includes: Customer Charge, Distribution Demand Charge and all riders that are % of Distribution (Distribution Investment Rider, Economic Development Cost Recovery Rider and Enhanced Service Reliability Rider).
Uses March 2021 as basline tariff. Proposed riders: DIR at 11%, EDCR and ESRR remain unchanged at 2.23% and 4.57%, respectively.

TABLE 5

	DIR Cap ($ millions)	YOY % Cap increase	% DIR	DIR Source
2021	$ 57		5%	Initial Estimate
2022	$ 96	68%	8%	Calculated from Intial Estimate
2023	$ 126	38%	11%	Calculated from Intial Estimate
2024 thru May	$ 57	-55%	5%	Calculated from Intial Estimate

TABLE 6

		kW	kWh	Load Factor	Load Factor	Consumption Size	Current Distribution Costs (Dec 2019)	Current Distribution Costs (Dec 2019) ($/kWh)	Stipulation Distribution Costs (per Month)	Stipulation Distribution Cost ($/kWh)
GS 2	Secondary	67	18,400	37%	Low	Medium	$ 401.98 ~~404.30~~	$ 0.02185 ~~0.02197~~	$ 535.62 ~~538.76~~	$ 0.02911 ~~0.02928~~
GS 2	Secondary	71	41,200	79%	High	Medium	$ 425.20	$ 0.01032	$ 566.97	$ 0.01376
GS 3	Primary	641	142,625	30%	Low	High	$ 3102.93 ~~3,104.76~~	$ 0.02176 ~~0.02177~~	$ 4347.34 ~~4,349.96~~	$ 0.03048 ~~0.03050~~
GS 3	Primary	336	165,200	67%	High	High	$ 1,705.46	$ 0.01032	$ 2,352.47	$ 0.01424

Includes: Customer Charge, Distribution Demand Charge and all riders that are % of Distribution (Distribution Investment Rider, Economic Development Cost Recovery Rider and Enhanced Service Reliability Rider).
Uses March 2021 as basline tariff. Proposed riders: DIR at 5%, EDCR and ESRR remain unchanged at 1.35% and 3.48%, respectively.

TABLE 7

		kW	kWh	Load Factor	Load Factor	Consumption Size	Stipulation Demand Charge ($/kW)	Stipulation Distribtuion Costs (per Month)	New Tariff Low-load Factor Demand ($/kW)	New Tariff Low-Load Factor Energy ($/kWh)	New Tariff Distribution Cost ($/kWh)
GS 2	Secondary	67	19,681	40%	Low	Medium	$ 7.01	$ 472	$ 5.041	$ 0.0067	$ 473
GS 3	Primary	641	187,289	40%	Low	High	$ 5.85	$ 3,752	$ 3.979	$ 0.0064	$ 3,758

Includes: Customer Charge, Distribution Demand Charge and all riders that are % of Distribution (Distribution Investment Rider, Economic Development Cost Recovery Rider and Enhanced Service Reliability Rider).
Uses March 2021 as basline tariff. Proposed riders: DIR at 5%, EDCR and ESRR remain unchanged at 2.23% and 4.57%, respectively.

Eric L. Rehberg, P.E.

E-Mail: eric@armadapower.com

Experience

Armada Power – Chief Engineer and Founder **March 2015 - Present**

- Leads strategic planning of the business to successfully establish direct utility sales with products and software as a service (SAAS)
- Leads business development and marketing efforts to grow sales pipeline and develop qualified leads into closed sales
- Leads systems engineering design and project management for software and hardware product lines.
    - Requirements development for core cloud-based software system to manage electric loads in real time for the PJM dynamic regulation market and local distribution grid support.
    - Requirements development for 3 hardware product lines including collaboration with a major manufacturer to produce an integrated energy management water heater.
    - Utilized Agile Methodology principles to translate business needs into prioritized Sprint Plans.
    - Established and delivered against key milestones while balancing company resources, costs, and business risks.
- Leads Market Operations team to ensure reliable high-performance energy product sales to wholesale markets and utility customers.
    - PJM Liaison to ensure frequency regulation energy product complies with market requirements.
    - Coordinated qualification testing and resource registration with PJM.
    - Led forecasting and automation design to enable reliable 24/7/365 operations.
- Coordinated water heater controller installations across 11 states at Investor Owned Utilities, Co-ops, and Regional Transmission Organizations.
    - Managed relationships with client property owners and installers to deploy 3000+ load controllers on residential water heaters.
    - Created early detection maintenance reports to property owners and utility customers services, improving customer response time.

Battelle Memorial Institute – Principal Research Scientist **January 2010 – March 2015**

- 2013 Emerging Scientist of the Year for developing the concepts, technology, and business case for the Battelle Frequency Regulation System (BFRS), which was commercialized via Armada Power.
- 14 U.S. patents. 10 Canadian patents.
- Managed a $1.2M internal project in collaboration with external stakeholders to develop, validate, and test core concepts in controlling water heaters for Frequency Regulation.
- Provided subject matter expertise and support on a wide range of energy systems projects including the $150M AEP GridSMART deployment project, Brookhaven National Labs Electric Infrastructure Operations Center design project, and supported commercialization of Battelle's Grid COMMAND product line.
- 15+ internal invention records, with many currently in commercial use as trade secrets and patents.

American Electric Power – Engineer, Research Programs **September 2004 – January 2010**

- Led companywide safety initiative to complete overhead distribution arc flash hazard engineering analysis across 11 states, 7 operating companies, and over 200,000 miles of distribution circuits.
    - Balanced technical and safety considerations with legislative and economic requirements.
    - Managed a diverse team of engineers, training specialists, safety coordinators and field personnel to complete the project on time with a limited budget.
    - Developed practical recommendations still in use today.
- Directed new technology testing and development for Smart Grid modernization projects.
    - Supported operating company management and engineering teams in analyzing new product deployments.
    - Advised senior management on cyber-security and protocol requirements for new communication technologies.
- Supported storm restoration efforts for AEP Ohio and AEP I&M.
    - Provided outage assessment reports to crew leaders by identifying damaged equipment.
    - Escorted out of state crews through the AEP distribution system.
- Fostered culture of innovation and inclusion at Dolan Technology Center.
    - Participated in Open Mike forum for 2 years to support the CEO's cultural improvement goals.
    - Cross trained with multiple AEP business units to understand and solve hard problems.

Education

The Ohio State University **2004**

Bachelor of Science in Electrical and Computer Engineering

Professional Engineer **2009**

State of Ohio – License No. PE.73543

U.S. Patents

1. 10,620,244 Remote leak and failure detection of electrical water heaters through temperature and power monitoring
2. 10,547,176 Method and system for using demand side resources to provide frequency regulation using a dynamic allocation of energy resources
3. 10,490,999 Hierarchical operational control of aggregated load management resources
4. 10,302,312 Estimation of unknown states for an electric water heater with thermal stratification and use of same in demand response and condition-based maintenance
5. 10,243,359 Method and system for using demand side resources to provide frequency regulation using a dynamic allocation of energy resources
6. 10,145,869 Remote leak and failure detection of electrical water heaters through temperature and power monitoring
7. 10,116,136 Primary frequency control through simulated droop control with electric loads
8. 10,114,397 Cold load pickup support through local condition detection
9. 9,997,915 Method and system for using demand side resources to provide frequency regulation using a dynamic allocation of energy resources
10. 9,991,711 Automated voltage support from load resources
11. 9,954,363 Whole house and power system analysis via grid connected appliance
12. 9,880,576 Direct load control frequency regulation support system
13. 9,748,770 Using demand side resources to provide frequency regulation
14. 9,537,313 Method and system for using demand side resources to provide frequency regulation using a dynamic allocation of energy resources

Summary: Notice of Witness Substitution electronically filed by Mr. Michael J. Settineri on behalf of Nationwide Energy Partners, LLC