

BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Joint Application of Vadata,)
Inc. and Ohio Power Company for Approval of a) Case No. 17-1827-EL-AEC
Unique Economic Development Arrangement for)
Ohio Data Center Campuses)

DIRECT TESTIMONY OF CHARLES DAITCH

1 **Q.1. Please state your name, title and business address.**

2 My name is Charles (Charley) Daitch. I am the Manager of Energy Initiatives for
3 Amazon, supporting Amazon Web Services, Inc. ("AWS"), an affiliate of Vadata, Inc. ("Vadata").
4 My business address is 2001 8th Ave., Seattle, WA 98101.

5 **Q.2. Please describe your educational background.**

6 I earned a Bachelor of Science (B.S.) degree in mechanical engineering from Cornell
7 University. I also earned a Master of Business Administration (M.B.A.) from the Michael G.
8 Foster School of Business at the University of Washington with a concentration in
9 entrepreneurship and finance.

10 **Q.3. What is your professional background?**

11 I have been supporting AWS since December 2015, first as Energy Project Manager and,
12 since June of 2017, as Manager of Energy Initiatives. Throughout that time, I have worked with
13 and managed a team focused on creating and executing electric infrastructure strategies with
14 utilities and energy companies across the globe to support the expansion of cloud computing.

15 Before joining Amazon, I worked at Puget Sound Energy (PSE) from June 2011 to
16 December 2015. My first six months at PSE provided me first-hand experience rotating through

1 assignments and projects with utility engineering, planning and operations groups including
2 electrical and gas distribution, planning, and power generation engineering services. Then,
3 from November 2011 to December 2015, I worked as an Energy Resource Analyst in PSE's
4 Strategic Initiatives group developing innovative energy infrastructure projects. My
5 responsibilities in that role included modeling project finances and risks, contracting and
6 negotiating commercial terms, and managing project consultants, both technical and financial.
7 In that role, I implemented PSE's first grid scale energy storage project in partnership with
8 Pacific Northwest National Laboratory and led the investigation and valuation of emerging
9 technologies including energy storage, distributed solar, alternative fuel vehicles and fuel cells.

10 While in school, I worked in an EID Coop Program at GE Energy as part of an engineering
11 design team and also worked as a researcher at Cornell University's Laboratory for Intelligent
12 Machine Systems.

13 **Q.4. On whose behalf are you offering testimony?**

14 I am testifying on behalf of Vadata, Inc. in support of the Joint Application filed in this
15 proceeding by Vadata and Ohio Power Company ("AEP Ohio").

16 **Q.5. What is the purpose of your testimony?**

17 The purpose of my testimony is to sponsor the Joint Application for approval of a unique
18 economic development arrangement. True and accurate copies of the public and confidential
19 versions of the Joint Application have been marked as Exhibits 2 and 2C respectively. I also will
20 provide a brief overview of the business and operations of Vadata and AWS data centers. As
21 well, I'll explain the terms and incentive-based structure of the proposed arrangement. And, I'll

1 address Vadata's commitments in the Joint Application and the economic impact and other
2 benefits of the proposed arrangement.

3 **Q.6. Please describe the business and operations of Vadata.**

4 Vadata is an affiliate of AWS, which is a wholly-owned subsidiary and operating segment
5 of Amazon.com. AWS provides state-of-the-art cloud computing infrastructure and services.
6 Cloud computing is the on-demand delivery of IT resources and applications via the internet
7 with pay-as-you-go pricing. A key benefit of cloud computing is the opportunity to replace up-
8 front capital infrastructure expenses with low variable costs that scale with enterprises of all
9 sizes. The AWS cloud provides secure and affordable computing capacity to more than 1
10 million customers across 190 countries, including mission-critical government agencies, large
11 enterprises and fast-growing startups.

12 The AWS cloud currently runs from data center locations in 16 geographic regions
13 around the world. In the United States, there are five existing regions, including the U.S. East
14 (Ohio) Region (“Ohio Region”).

15 Vadata selected Ohio for significant capital investment in three Ohio Campuses – one
16 each in Dublin, Hilliard and New Albany. Each Ohio Campus currently has one operating data
17 center that became available to customers on October 17, 2016. Vadata also agreed to pay for
18 a transmission level substation at each of the Ohio Campuses to be served off of AEP Ohio’s
19 138 kV transmission system. Vadata is positioned to continue growing in Ohio as a result of
20 these investments. Each Ohio Campus has the potential to hold five data centers – for a
21 cumulative total of up to 15 Ohio Data Centers on the three campuses.

1 Q.7. **How do Vadata’s operations affect its energy costs?**

2 Vadata’s data center designs are optimized to limit resources used while maximizing
3 productivity and efficiency of resources in use. Vadata’s data centers utilize servers that are
4 designed to maximize energy efficiency and are operated at high utilization rates, employ highly
5 efficient data storage devices and networking equipment, and are characterized by high
6 infrastructure efficiency or “power use effectiveness” (PUE).

7 Nevertheless, [REDACTED].
8 Data center servers demand a consistent and sizable supply of power for critical IT load and
9 essential support systems. When fully built out, each Ohio Data Center will have an average
10 load of about [REDACTED] MW, with an even greater maximum load. Combined, the average load at all
11 Ohio Data Centers could be on the order of [REDACTED] MW of steady electricity use. At an average
12 load, the annual cost of Wire Services for a single Ohio Data Center may be greater than
13 \$[REDACTED] at rates under AEP Ohio's Open Access Distribution Tariff and \$[REDACTED] at full
14 build out of the sites.

15 Q.8. **Why does Vadata require the proposed arrangement?**

16 The proposed arrangement is intended to align Vadata's cost structure with its relatively
17 unique load profile and characteristics making the Ohio region competitive with our other data
18 center regions which will support and incentivize Vadata's development of up to 15 data
19 centers in Ohio. Many of the data center capital and operating costs are similar across U.S.
20 regions. [REDACTED] Data centers
21 in Ohio will be competing for growth with other low energy price regions in the U.S. Other
22 regions may also have existing advantages based on existing scale as well as personnel and

1 support operations. Providing competitive power costs through this reasonable arrangement
2 will allow the Ohio region to remain competitive from an operating cost perspective and will
3 position the Ohio region for additional capital investment and economic development.

4 **Q.9. Are you familiar with the Joint Application for the unique economic development**
5 **arrangement in this proceeding?**

6 Yes.

7 **Q.10. Please describe the framework of the proposed unique economic development**
8 **arrangement.**

9 The proposed arrangement will provide a cost for electric service in the Ohio Region
10 that is competitive with other data center regions in the U.S. and that incentivizes additional
11 data center development in Ohio while still supporting a reasonable and increasing contribution
12 toward AEP Ohio's distribution system costs. The primary features of the proposed
13 arrangement are:

- 14 (1) A 120-month term commencing with the first billing month following approval of
15 this Joint Application for the Proposed Arrangement;
- 16 (2) Vadata, at its discretion, may receive energy and capacity from a competitive
17 retail electric service (“CRES”) provider or the standard service offer (“SSO”);
18 and,
- 19 (3) Vadata will pay AEP Ohio's charges for transmission services, distribution
20 services, ancillary services and non-bypassable riders (together, “Wire Services”)
21 to each Ohio Campus subject to certain conditions and adjustments as set forth

1 in the schedule attached as Appendix C to the Joint Application (the “Applicant
2 Schedule”).

3 **Q.11. Please describe the Applicant Schedule proposed in the Joint Application?**

4 The Applicant Schedule adjusts Vadata's overall cost of Wire Services but still provides
5 for reasonable contributions to rider charges but in a manner that does not penalize Vadata for
6 increasing its load. And the adjustment will drive economic development associated with
7 additional data centers.

8 To understand what the Applicant Schedule does, it helps to begin with what it does not
9 change. The Applicant Schedule does not discount Vadata's costs for generation, although the
10 proposed arrangement does permit Vadata to shop the competitive markets for energy and
11 capacity. The Applicant Schedule also does not affect kW-based charges under transmission
12 and distribution riders. Thus, Vadata will continue to pay all transmission and distribution
13 riders that are not billed on a kWh basis, including the component of the Basic Transmission
14 Cost Rider that is assessed on a kW basis, at the [REDACTED] tariff rate.

15 The Applicant Schedule has three components that will support the ability of the Ohio
16 Region to compete with other data center regions across the U.S and the globe. First, due to
17 Vadata's significant current and potential load, combined load profile, and economic
18 development potential, Vadata’s kWh billing determinant per AEP Ohio account¹ will be subject
19 to a discount starting at [REDACTED]% for one data center and increasing incrementally up to [REDACTED]% for
20 fifteen data centers. By growing only with additional data center investment, the discount
21 levels provide an incentive for Vadata to continue creating jobs and investments in additional

¹ One account per Ohio Campus.

1 Ohio Data Centers and a cost structure that allows the Ohio Region to compete with other data
2 center regions including other Vadata data center regions.

3 Second, for riders relating to energy supply, such as the Power Purchase Agreement
4 rider, Vadata's kWh billing determinant will be capped at [REDACTED] kWh per AEP Ohio account
5 in recognition of Vadata's steady and sizable load and independent support for sustainable and
6 renewable energy generation. This rate design using a large initial rate block of energy is based
7 on a similar rate design approved by the Commission in other cases.

8 Third, the Proposed Arrangement exempts Vadata from charges under the Retail
9 Stability Rider. Those charges are for deferred capacity costs incurred before Vadata's first
10 Ohio Data Centers became operational in October 2016.

11 Collectively, the discounts and adjustments under the Applicant Schedule will
12 incentivize economic development for additional data centers in Ohio and provide a rate
13 structure that does not penalize Vadata for the significant load it has and will add to the AEP
14 Ohio system.

1 Q.12. **Please explain the schedule attached to your testimony that is titled Appendix 1.**

2 Since filing the Application, Vadata has answered questions from interested parties on
3 the Applicant Schedule. To avoid future questions and any ambiguity, Vadata prepared
4 Appendix 1 which restates in simpler format (but does not change) the components in the
5 Applicant Schedule.

6 Q.13. **How is the proposed arrangement unique?**

7 As a result of Vadata's significant capital investment in three Ohio Campuses – including
8 in transmission substations supporting direct connection to AEP Ohio's 138 kV service to each
9 campus – Vadata is uniquely positioned to drive economic development and significant job
10 creation in Ohio. The rider adjustments under the proposed arrangement will require Vadata
11 to make a reasonable contribution toward AEP Ohio's distribution system costs by more closely
12 aligning the rates for electric service to the minimal additional system costs associated with the
13 unique load and load profile of up to 15 Ohio Data Centers. At the same time, the proposed
14 arrangement provides support and incentives for unique and highly desirable economic
15 development in Ohio.

16 Q.14. **How will the proposed arrangement support economic development?**

17 Vadata's significant capital investment in three Ohio Campuses has set a solid
18 foundation for development of additional Ohio Data Centers. Each Ohio Campus currently has
19 one operating data center and, together, those three data centers support more than [REDACTED] full-
20 time positions with a combined annual payroll of approximately \$[REDACTED].

1 Under the proposed arrangement, Vadata will commit to maintaining operations in
2 Ohio. As well, Vadata will commit, as required by the Commission's rules, to adding more than
3 25 full-time or full time equivalent jobs within the first three years of the Proposed
4 Arrangement. Many of those jobs will be in relatively high-paying occupations such as design,
5 engineering, telecommunications, and IT such that the average hourly base wage rate for those
6 jobs would meet or exceed the Commission's base wage rate requirements for an economic
7 development arrangement.²

8 The proposed arrangement also provides structural support and incentives for
9 additional investment in Ohio data centers, including capital expenditures of more than
10 \$[REDACTED] in Ohio to construct and equip future Ohio Data Centers and keep them updated
11 as technology evolves over the next five years as well as more than \$[REDACTED] for long-term
12 operating expenditures in Ohio for utilities, facility costs, transport costs and purchases of
13 goods and services, as well as wages and salaries. Beyond five years, billions more dollars in
14 capital and operating expenditures could be spent in Ohio. Those expenditures would support
15 significant economic benefits in Ohio, including increased employment, income and regional
16 GDP as a result of the cumulative effects of additional data center development.

17 **Q.15. Did Vadata estimate the economic benefits of data center development?**

18 Yes. The cumulative effects from Vadata's data center development could create more
19 than [REDACTED] new jobs and nearly \$[REDACTED] in increased annual regional income and GDP in

² O.A.C. 4901:1-38-03(A)(2)(b)-(c) (requiring that, within three years of initial operations, "[a]t least twenty-five new, full-time or full-time equivalent jobs shall be created" and that the "average hourly base wage rate of the new, full-time or full-time equivalent jobs shall be at least one hundred fifty per cent of the federal minimum wage").

1 just three years.³ In just five years, the cumulative effects from additional expenditures for and
2 investments in data centers could support more than [REDACTED] jobs and more than \$[REDACTED]
3 in new income and GDP in Ohio over the five year period, with additional increases expected
4 over time.⁴ With additional data centers, the benefits would be even greater.

5 **Q.16. How were those benefits estimated?**

6 The benefits of additional data center development are explained in the economic
7 impact analysis included as Appendix B to the Joint Application and titled "Estimates of the
8 Regional Economic Impact of Proposed Amazon Web Services Data Centers in Ohio" (the
9 "Report"). In short, Vadata used the U.S. Department of Commerce, Bureau of Economic
10 Analysis ("BEA") Regional Input-Output Modeling System ("RIMS II") to perform a regional
11 multiplier analysis to estimate the regional economic impacts of potential capital expenditures
12 (CAPEX) and operational expenditures (OPEX) for purchases from Ohio companies ("non-
13 imported") associated with additional data centers in Ohio.

14 **Q.17. What is a regional multiplier analysis?**

15 Regional multiplier analysis is widely-used and relied upon in the public and private
16 sector to study and quantify both the direct impacts of economic activity, such as the
17 development of additional data centers, and the additional indirect and induced effects on
18 other businesses and households whose income and spending depend in part on the demand

³ See "Estimates of the Regional Economic Impact of Proposed Amazon Web Services Data Centers in Ohio," Sep. 11, 2016 [hereafter, the "Report"] (p.11-12 & Figs.5b & 6; p.19 at Table A.2), at Appendix B to the Joint Application. The Report provides a point of reference for the significant economic impacts associated with data center growth in Ohio.

⁴ See Report (p.8 n.4; p.11-12 & Figs.5b & 6; p.19 at Table A.2).

1 created by the new data centers. Regional multipliers capture the combined direct, indirect,
2 and induced effects of project expenditures on the regional economy, and, when combined
3 with estimates of non-imported CAPEX and OPEX, yield estimates of the incremental increases
4 in Ohio income and GDP as well as the additional employment and earnings associated with a
5 project.

6 **Q.18. Please explain the direct and additional impacts that are measured in a regional**
7 **multiplier analysis.**

8 For a given level of CAPEX and OPEX, regional multiplier analysis measures the
9 cumulative estimated direct, indirect, and induced economic effects within a region.

10 Direct effects reflect the direct economic impacts of expenditures, such as increases in
11 earnings of individuals who are either newly employed by the new Vadata data center or newly
12 employed by firms that directly supply Vadata, and the increases in income and GDP by Ohio
13 businesses, such as construction companies and various goods and services providers, directly
14 attributable to Vadata's CAPEX and OPEX. Indirect effects reflect the "ripple" or "spillover"
15 effects of expenditures such as increased employment, earnings, output, and value-added
16 created at other regional businesses, such as construction subcontractors and other goods and
17 services providers, that are not direct suppliers to Vadata but experience increases in demand
18 due to the increase in expenditures by the companies that directly supply Vadata. And, induced
19 effects arise when Ohio residents spend their increased income at state businesses, including
20 for items such as meals at restaurants, purchases from retail establishments including vehicles
21 and other consumer durable goods, purchases or rental of housing, and purchases from the
22 providers of personal services.

1 Q.19. **What data and inputs did Vadata use for the Report?**

2 Vadata provided estimates of CAPEX and OPEX. Regional multipliers were drawn from
3 industry-specific input-output tables in the U.S. Department of Commerce, Bureau of Economic
4 Affairs ("BEA") 2007 Benchmark Input-Output Table for the nation and 2013 regional BEA data.⁵

5 Based on the RIMS II model and data, the combined direct, indirect, and induced
6 regional multipliers for CAPEX include [REDACTED] for income and GDP and [REDACTED] for
7 employment, per \$[REDACTED] of CAPEX. That means that for every \$[REDACTED] in CAPEX,
8 \$[REDACTED] is created in additional regional GDP and over [REDACTED] new jobs are created in
9 Ohio. Even more pronounced are the combined regional multipliers for OPEX, including [REDACTED]
10 for income and GDP and [REDACTED] for employment, per \$[REDACTED] of OPEX. That means that
11 for every \$[REDACTED] in OPEX, \$[REDACTED] is created in additional regional GDP and over [REDACTED]
12 new jobs are created in Ohio.

13 Q.20. **Can you summarize the economic impact of Vadata's Ohio Campuses?**

14 Yes. The Report provides a point of reference for the significant economic impacts
15 associated with data center growth in Ohio. As illustrated in the report, Vadata's development
16 on the Ohio Campuses could create more than [REDACTED] new jobs and nearly \$[REDACTED] in
17 increased annual regional income and GDP in just three years.⁶ And as capital and operational
18 expenditures for and investments in those data centers increase over time, the combined
19 economic effects could support more than [REDACTED] jobs and more than \$[REDACTED] in new

⁵ See Bureau of Economic Analysis, U.S. Department of Commerce, Regional Input-Output Modeling System (RIMS II), 2015.

⁶ See Report (p.11-12 & Figs.5b & 6; p.19 at Table A.2).

1 income and GDP in Ohio over a five year period, with additional increases expected thereafter.⁷
2 Development of additional data centers would have additional benefits.

3 **Q.21. Are there other benefits of the proposed arrangement that the Commission should**
4 **consider?**

5 Yes, there are. Although the benefit was not quantified, entrepreneurial growth,
6 innovation and business productivity may increase as additional data centers provide scalable,
7 flexible and low-cost infrastructure services and productivity enhancing technologies to small
8 and medium sized businesses.

9 Another significant benefit of increased cloud computing at Vadata's Ohio Data Centers
10 would be an increase in energy efficiency due, in large part, to movement from localized on-
11 premises data centers to Vadata's large-scale data centers. By using fewer, more power
12 efficient servers in design-optimized data centers, customers realize a dramatic improvement in
13 energy efficiency and reduction in the amount of power required as compared to on-premises
14 infrastructure.

15 And, with support under the Proposed Arrangement as the Ohio Campuses grow,
16 Vadata will apply and implement in Ohio its four core principles of customer obsession, passion
17 for invention, commitment to operational excellence, and long-term thinking by:

- 18 • Exploring suitable opportunities to participate in and/or support energy efficiency and
19 innovation including, for example, through increased used of commercial batteries and
20 energy storage devices;

⁷ See Report (p.8 n.4; p.11-12 & Figs.5b & 6; p.19 at Table A.2).

- 1 • Considering prospects to strengthen STEM initiatives in Ohio’s universities and schools;
- 2 and,
- 3 • Continuing to evaluate additional development of reliable renewable energy generation
- 4 and jobs in Ohio as part of its commitment to achieve 100% renewable energy usage for
- 5 AWS’s global infrastructure footprint.

6 **Q.22. Why would Vadata be exempt from the Retail Stability Rider under the proposed**
7 **arrangement?**

8 The Retail Stability Rider (RSR) was approved to allow AEP Ohio to recover capacity costs
9 incurred before but deferred to 2015. Vadata was not operating any data centers in Ohio at the
10 time and was not a beneficiary of any of those costs. While other AEP Ohio customers have
11 benefitted over the last year from Vadata's monthly payments of RSR charges for the three
12 operational data centers, Vadata's potential for future growth should not be subject to RSR
13 payments.

14 **Q.23. Why is Vadata asking to cap charges for riders relating to energy supply?**

15 It is important to understand that Vadata will pay charges for riders relating to energy
16 supply up to a significant cap and, therefore, will make a reasonable contribution to reduce AEP
17 Ohio's revenue requirements. But it is equally important to know that Vadata and its affiliate
18 AWS have invested aggressively in opportunities and arrangements to manage energy costs to
19 meet increasing customer demand for greater reliance on renewable energy supplies. Paying
20 uncapped energy supply riders for the amount and baseload nature of Vadata's energy use
21 could uniquely disadvantage Vadata, and constrain growth of the Ohio Region. The proposed
22 arrangement strikes a balance, providing a cost structure that incentivizes development of

1 additional Ohio data centers and does not competitively disadvantage the Ohio Region relative
2 to other data center regions while ensuring that Vadata still pays a reasonable share of charges
3 under energy supply related riders.

4 **Q.24. Will the proposed arrangement affect charges for other Ohio Power customers?**

5 As rider adjustments under the proposed arrangement incentivize and support
6 expansion of the Ohio Campuses, both Vadata's total energy usage and Vadata's total rider
7 payments for Wire Services will increase. At the same time, there will be little additional direct
8 cost to AEP Ohio's system because Vadata paid for a transmission level substation at each Ohio
9 Campus to take service from AEP Ohio's 138 kV transmission system regardless whether each
10 Ohio Campus has only one data center or five data centers. Therefore, AEP Ohio's revenue
11 requirements due to Vadata's growth should be exceeded by revenue receipts due Vadata's
12 growth. As revenues exceed requirements, other AEP Ohio customers should pay less monthly
13 with Vadata's growth versus without Vadata's growth.

14 **Q.25. Will the proposed arrangement affect Vadata's charges for generation service?**

15 No. Vadata will be able to shop for generation service from a CRES provider or take SSO
16 supply like any other customer.

17 **Q.26. Why is Vadata asking for approval of the proposed arrangement?**

18 The General Assembly has provided the reasonable arrangement mechanism to
19 mercantile customers, like Vadata. The unique economic development arrangement proposed
20 in this Joint Application will support capital investment in and development of additional Ohio
21 data centers. It also provides a competitive price for electricity that supports the ability of the

1 Ohio Region to compete with other data center regions through future data center
2 development and operations in Ohio.

3 **Q.27. Is the proposed arrangement for the purpose of obtaining an advantage over**
4 **competitors?**

5 No. The proposed arrangement is intended to provide the electricity rates that fairly
6 reflect the unique nature of Vadata's capital investment in infrastructure and unique data
7 center load characteristics and profile and to support additional capital investment that could
8 drive important economic development, including jobs, entrepreneurial opportunities and
9 increased regional income and GDP in Ohio.

10 **Q.28. Does the proposed arrangement give Vadata any undue or unreasonable preference**
11 **or advantage?**

12 No. The discounts in the Applicant Schedule will incentivize – and increase only with –
13 Vadata's additional investment and development in Ohio and align costs of electric service with
14 the unique load characteristics and the unique potential for economic development associated
15 with additional Ohio data centers.

16 **Q.29. Did Vadata provide the Commission with verifiable information detailing the rationale**
17 **for the proposed arrangement?**

18 Yes. Both the testimony and the Joint Application filed in this proceeding provide
19 verifiable information detailing the rationale for the proposed arrangement.

1 Q.30. **Does the proposed arrangement further the policy of the State of Ohio as stated in**
2 **Section 4928.02 of the Revised Code?**

3 Yes. The proposed arrangement is in the public interest and will facilitate the State's
4 effectiveness in the global economy. The potential for investment in and development of
5 additional Ohio data centers could support thousands of new jobs and hundreds of millions of
6 dollars of increased regional income and GDP in Ohio's 21st Century knowledge economy.

7 Q.31. **Does this conclude your direct testimony?**

8 Yes it does, although I reserve the right to supplement my testimony.

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Inc. and Ohio Power Company for Approval of a) Case No. 17-1827-EL-AEC
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Ohio Data Center Campuses)

DIRECT TESTIMONY OF CHARLES DAITCH

APPENDIX 1

RESTATED APPLICANT SCHEDULE*

* This Appendix 1 is intended to change only the form, but not the substance, of the Applicant Schedule at Appendix C to the Joint Application.

Applicant Schedule (17-1827-EL-AEC)

<u>Nonbypassable Riders as of September 1, 2017</u>	<u>Determinant</u>
Universal Service Fund	kWh
kWh Tax	kWh
Deferred Asset Phase-In Rider	Base (Dist)
Power Purchase Agreement Rider	kWh
Basic Transmission Cost Rider	kWh
Basic Transmission Cost Rider	kW
Energy Efficiency & Peak Demand Reduction Cost Recovery	kWh
Energy Efficiency & Peak Demand Reduction Cost Recovery	kW
Economic Development Cost Recovery	Base (Dist)
Enhanced Service Reliability	Base (Dist)
gridSmart Phase 1 Rider	Month
gridSmart Phase 2 Rider	Month
Retail Stability Rider	kWh
Distribution Investment Rider	Base (Dist)
Significant Excess Earnings Test Credit Rider	kWh

Applicant will be subject only to (i) the eight non-kWh based riders shown above in this Applicant Schedule, as they may be amended or adjusted, and any new non-kWh based riders as implemented, and (ii) with the exception of the Retail Stability Rider (which Applicant shall not pay) and the kWh tax (which shall not be discounted), the kWh based riders shown above in this Applicant Schedule and any new riders that authorize AEP Ohio to provide credits or recover costs incurred after September 1, 2017 for providing transmission and distribution service with all such kWh based riders subject to the Tiered Rate Discount below. Notwithstanding the application of the Tiered Rate Discount in the immediately foregoing sentence, any riders related to energy supply shall be paid by Applicant up to [REDACTED] kWh/month/account – all riders related to energy supply will be billed at \$[REDACTED]/kWh for load in excess of [REDACTED] kWh/month/account. Riders related to energy supply include, but are not limited to, riders to support renewable energy, new or legacy gas/coal/nuclear generating plants or any other rider intended to provide generation services, rate stability in energy supply and/or fuel costs, and shall include the Power Purchase Agreement rider. In the event any rider related to energy supply is billed in full or in part on a kW basis, the kW basis shall be adjusted to provide as near as possible an adjustment that Applicant would receive if the rider was billed on a kWh basis. If Applicant decides during the term of the reasonable arrangement to take SSO service, it will also be responsible for paying all bypassable riders.

Applicant Schedule (continued) (17-1827-EL-AEC)

Tiered Rate Discount

# of Energized Applicant Data Centers	Discount off of kWh
1	[REDACTED]
2	[REDACTED]
3	[REDACTED]
4	[REDACTED]
5	[REDACTED]
6	[REDACTED]
7	[REDACTED]
8	[REDACTED]
9	[REDACTED]
10	[REDACTED]
11	[REDACTED]
12	[REDACTED]
13	[REDACTED]
14	[REDACTED]
15	[REDACTED]

Notwithstanding the proposed rate structure as set forth in this schedule, and for avoidance of doubt, Applicant shall: (i) have the right but not the obligation to self-assess the kWh tax; and (ii) have the right but not the obligation to opt-out of the Energy Efficiency & Peak Demand Reduction Cost Recovery Rider. If Applicant and AEP Ohio cannot agree on whether a new rider is related to energy supply, AEP Ohio may submit a motion to the Commission in this docket with responses and replies to be in accordance with Commission rules.

CERTIFICATE OF SERVICE

The Public Utilities Commission of Ohio e-filing system will electronically serve notice of the filing of the foregoing document on the parties referenced in the service list of the docket card who have electronically subscribed to this case. In addition, the undersigned certifies that a courtesy copy of the foregoing document is also being served upon the persons below via electronic mail this 7th day of November, 2017.

s/ William A. Sieck
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