

EXHIBIT NO. \_\_\_\_\_

BEFORE  
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of )  
Ohio Power Company to Initiate ) Case No. 19-1475-EL-RDR  
its gridSMART® Phase 3 Project. )

SUPPLEMENTAL TESTIMONY OF  
SCOTT S. OSTERHOLT  
ON BEHALF OF  
OHIO POWER COMPANY

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SCOTT S. OSTERHOLT

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1 **PERSONAL DATA**

2 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

3 A. My name is Scott S. Osterholt, and my business address is 1 Riverside Plaza, Columbus,  
4 Ohio 43215.

5 **Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?**

6 A. I am employed by American Electric Power Service Corporation, known as “AEPSC”  
7 representing AEP Ohio as the “Company,” as Director – Broadband & Telecom Business  
8 Development. At the time of the filing and up until recently, I was the Director – Grid  
9 Modernization for AEP Ohio and was responsible for directing the smart grid and grid  
10 modernization activities for the Company. I am testifying on behalf of AEP Ohio based  
11 on my former capacity as Director – Grid Modernization.

12 **PURPOSE OF SUPPLEMENTAL TESTIMONY**

13 **Q. WHAT IS THE PURPOSE OF YOUR SUPPLEMENTAL TESTIMONY?**

14 A. The purpose of my supplemental testimony is to provide updates regarding AEP Ohio’s  
15 proposed gridSMART Phase 3 implementation (“Phase 3 project”). Since the filing of  
16 my direct testimony on July 26, 2019, a number of factors have occurred that have  
17 affected the Company’s proposed Phase 3 project that include cost escalations for  
18 materials and labor, as well as policy changes related to dark fiber. As part of my

1 supplemental testimony, I will describe these factors, as well as how they have impacted  
2 the Company's Phase 3 project proposal.

3 **PROPOSED GRIDSMART PHASE 3 OVERVIEW**

4 **Q. CAN YOU PLEASE SUMMARIZE THE ITEMS FROM YOUR DIRECT**  
5 **TESTIMONY THAT HAVE NOT CHANGED?**

6 A. Yes. The Company's proposed gridSMART Phase 3 is comprised of implementing the  
7 following technologies, which has not changed:

- 8 • Deploying additional DACR (Osterholt Direct pgs 9-12, and 14);
- 9 • D-SCADA, aka DA-Lite (Osterholt Direct pgs 15-17, and lines 1-3 of pg 18);
- 10 • Deploying additional VVO (Osterholt Direct pgs 19, lines 1-16 of pg 20, lines 14-23  
11 of pg 21, and lines 1-6 of pg 22);
- 12 • Completing the deployment of AMI in the remainder of AEP Ohio's service area  
13 (Osterholt Direct lines 7-22 of pg 22, pg 23, and lines 1-15 of pg 24);
- 14 • Installation of fiber optical cable to select Access Points (APs) (Osterholt Direct lines  
15 16-24 of pg 24, pgs 25-34);
- 16 • An Intelligent Distribution Line Sensors Demonstration (Osterholt Direct pgs 35-38);
- 17 • An Incremental VVO Pilot (Osterholt Direct lines 6-23 of pg 39, pgs 40-43, and lines  
18 1-2 of pg 44);
- 19 • Continued deployment of the It's Your Power App (Osterholt Direct lines 3-22 of pg  
20 44, pg 45, and lines 1-2 of pg 46); and
- 21 • Adding functionality to provide AMI data to CRES providers via EDI for customers  
22 on TOU programs.

1 The subsequent timeline for deployment of these technologies also has not changed. The  
2 Company is proposing to install DACR, VVO, and fiber over a 10-year period; D-  
3 SCADA (DA-Lite) over a 5-year period; Intelligent Distribution Line Sensors over a 5-  
4 year period; AMI over a 4-year period; and Incremental VVO and AMI data via EDI over  
5 a one-year to 18-month period. The Company proposes to continue to market the It's  
6 Your Power App over a 5-year period.

7 **Q. CAN YOU PLEASE DISCUSS THE ITEMS THAT YOU ARE SUPPLEMENTING**  
8 **FROM YOUR DIRECT TESTIMONY?**

9 A. Yes. The increased costs, as well as other factors that I discuss in my supplemental  
10 testimony, have necessitated changes to the following items:

- 11 • DACR business case update;
- 12 • DA-Lite business case update;
- 13 • VVO business case update;
- 14 • AMI cost update;
- 15 • Public policy development changes related to fiber connections since the Company  
16 filed this case; and
- 17 • Company efforts related to the It's Your Power App.

18 Additionally, I provide clarification on the technology correlation with grid  
19 modernization efforts for DA-Lite and Intelligent Distribution Line Sensors.

1 **Q. COULD YOU PROVIDE MORE DETAILS RELATED TO THE COMPANY'S**  
2 **PROPOSAL FOR ADDING FUNCTIONALITY TO PROVIDE AMI DATA TO**  
3 **CRES PROVIDERS VIA EDI FOR CUSTOMERS ON TOU PROGRAMS?**

4 A. Yes. Based on the Commission's directive in Case No. 17-1234-EL-ATA, the Company  
5 was required to provide a timeline to update the wholesale settlement systems and  
6 processes needed to calculate and settle individual THEO, NSPL, and PLC values for all  
7 customers with AMI meters, as well as the estimated cost of implementation as part of  
8 testimony in this proceeding. Company witness Gabbard provides information regarding  
9 this item in his supplemental testimony in this proceeding.

10 **Q. PLEASE DESCRIBE THE COST CHANGES THAT HAVE OCCURRED SINCE**  
11 **THE COMPANY ORIGINALLY FILED ITS CASE.**

12 A. Since the Company's original filing date, costs have increased. One of the largest cost  
13 differences is labor cost. With the labor shortage in the electrical industry, the Company  
14 expects this to drive up anticipated project labor expenses. The Company has also  
15 adjusted the anticipated costs to reflect cost of living increases as well as a larger  
16 allocation of labor to be completed by contractors and consultants. Additionally, material  
17 costs have increased, and this issue has been compounded by shortages created by supply  
18 chain issues brought about by the COVID-19 pandemic.

19 **Q. PLEASE DISCUSS HOW THE COST CHANGES HAVE IMPACTED THE**  
20 **BUSINESS CASES SUPPORTING THE COMPANY'S PROPOSAL.**

21 A. At a high level, the costs increases impact the overall benefit to cost ratio of the Phase 3  
22 project. Table 1 summarizes the updated business case outcomes for DACR, VVO, and  
23 cost increases for AMI.

1  
2

**Table 1**  
**15-Year Business Case Summary for DACR, VVO, and AMI**

<b>Description</b>	<b>Total</b>
Present Value Benefits	\$927,937,887
Present Value Costs	\$751,035,822
Net Present Value	\$176,902,065
Benefit-Cost Ratio	1.24
Reduced CO <sub>2</sub> Emissions	5,840,806 t

3 The proposed Phase 3 deployment of DACR, VVO, and AMI results in a net present  
4 value (NPV) of nearly \$177M for AEP Ohio customers. Stated another way, for every  
5 \$1.00 spent in project costs, the aggregate deployment yields \$1.24 in benefits.  
6 Additionally, the Phase 3 program delivers nearly 5.8M tons of reduced CO<sub>2</sub> emissions.  
7 Expanding the Phase 3 deployment to include D-SCADA, also known as DA-Lite,  
8 Intelligent Distribution Line Sensors, Fiber, Incremental VVO, the It's Your Power App,  
9 and AMI via EDI for TOU customers as shown in Table 2, also yields a positive NPV for  
10 Company customers.

**Table 2**  
**15-Year Business Case Summary for the Phase 3 Technologies**

<b>Description</b>	<b>Total</b>
Present Value Benefits	\$1,083,859,112
Present Value Costs	\$906,183,361
Net Present Value	\$177,675,751
Benefit-Cost Ratio	1.20
Reduced CO <sub>2</sub> Emissions	5,840,506 t

11 As shown in Table 2, even with the updated costs, this holistic approach provides  
12 for Present Value Benefits of approximately \$1.1B with a positive NPV of approximately  
13 \$178M. Stated another way, for every \$1.00 spent on project costs, customers will  
14 realize a benefit of \$1.20.

1 **DACR BUSINESS CASE UPDATE**

2 **Q. WHAT ARE THE IMPACTS OF THE COST INCREASES ON THE DACR**  
3 **BUSINESS CASE?**

4 A. The Company has updated the estimated costs for DACR because of cost increases from  
5 numerous factors. These updated costs have been compared to the anticipated benefits to  
6 recalculate the benefit to cost comparison. As a result of these increased costs and the  
7 associated cost to benefit analysis, 73 schemes impacting 377 distribution circuits had  
8 positive 15-year NPVs. The difference is 39 of the original 416 circuits went from being  
9 cost justified to not cost justified. These 39 circuits have been removed from the  
10 proposed Phase 3 deployment. These remaining schemes and circuits collectively  
11 provide an estimated 15-year NPV of \$194,380,766 in reliability benefits to customers.  
12 In other words, the proposed deployment of DACR is anticipated to deliver \$1.57 of  
13 DACR-related reliability benefits per \$1.00 of DACR costs incurred.

14 **DA LITE (FORMERLY DISTRIBUTION SCADA) BUSINESS CASE UPDATE**

15 **Q. WHY IS THE COMPANY CHANGING THE NAME OF THE PROGRAM**  
16 **FORMERLY CALLED DISTRIBUTION SCADA?**

17 A. The use of the term Distribution SCADA has been confusing to many parties.  
18 Distribution SCADA is not a new technology when referencing supervisory control of  
19 equipment inside of the Company's stations. The technology being discussed is not  
20 located within the station, rather it is new technology equipment installed on the  
21 distribution line. The proposed DA Lite deployment utilizes the same Smart Reclosers



1 used on DACR just without the automated circuit reconfiguration components and  
2 therefore a smart grid technology.

3 **Q. WHAT ARE THE IMPACTS OF THE COST INCREASES ON THE DA LITE**  
4 **BUSINESS CASE?**

5 A. The Company has updated the estimated costs for DA Lite because of cost increases from  
6 numerous factors. These updated costs have been compared to the anticipated benefits to  
7 recalculate the benefit to cost comparison. As a result of these increased costs and the  
8 associated cost to benefit analysis, 151 distribution circuits had positive 15-year NPVs  
9 The difference is 9 of the original 160 circuits went from being cost justified to not cost  
10 justified. These nine circuits have been removed from the proposed Phase 3 deployment.  
11 The remaining 151 circuits collectively provide an estimated 15-year NPV of  
12 \$82,916,360 in reliability benefits to customers. In other words, the proposed  
13 deployment of DA-Lite on these 151 distribution circuits is anticipated to deliver \$2.21 of  
14 DA-Lite-related reliability benefits per \$1.00 of DA-Lite-related costs incurred.

15 **Q. IS DA LITE A SMART GRID TECHNOLOGY?**

16 A. Yes. The proposed DA Lite deployment utilizes the same Smart Reclosers used on  
17 DACR, but without the automated circuit reconfiguration component; and therefore is a  
18 smart grid technology.

19 **VVO BUSINESS CASE UPDATE**

20 **Q. WHAT ARE THE IMPACTS OF THE COST INCREASES ON THE VVO**  
21 **BUSINESS CASE?**

22 A. The Company has updated the estimated costs for VVO because of cost increases from  
23 numerous factors. These updated costs have been compared to the anticipated benefits to

1 recalculate the benefit to cost comparison. As a result of these increased costs and the  
2 associated cost to benefit analysis, 155 substation buses impacting 406 distribution  
3 circuits had positive 15-year NPVs. The difference is 86 of the original 492 circuits went  
4 from being cost justified to not cost justified. These 86 circuits have been removed from  
5 the proposed Phase 3 deployment. The remaining 155 substation buses impacting 406  
6 distribution circuits had positive 15-year NPVs where the benefit of customer power cost  
7 savings achievable exceeded the cost of deployment. These buses and circuits  
8 collectively provide an estimated 15-year NPV of \$69,241,174 in customer power cost  
9 savings. In other words, the proposed deployment of VVO on these 155 substation buses  
10 and 406 distribution circuits is anticipated to deliver \$1.24 of VVO related power cost  
11 savings per \$1.00 of VVO-related costs incurred.

## 12 **AMI COST CHANGES**

13 **Q. PLEASE SUMMARIZE THE CHANGES RELATED TO AMI.**

14 A. As previously mentioned, the costs for AMI meters has increased since the Company  
15 filed its case. Although the costs have increased, the results of business case remains the  
16 same: including AMI with the other proposed gridSMART Phase 3 technologies results  
17 in an overall positive benefit-cost ratio (see Table 2).

1 **FIBER CONNECTIONS**

2 **Q. PLEASE DESCRIBE RURAL BROADBAND PUBLIC POLICY**  
3 **DEVELOPMENTS SINCE THE CASE WAS FILED AND HOW THEY**  
4 **SUPPORT THE COMPANY’S PROPOSAL.**

5 A. Rural broadband has become a highly visible policy objective at state and federal levels  
6 of government, with attention to the issues increasing dramatically since AEP filed the  
7 original petition in July 2019. Multiple funding programs now focus on broadband,  
8 either as a dedicated purpose fund or as funding for which broadband is an eligible  
9 expense. Consider, as examples, the following:

- 10 • FCC Rural Digital Opportunity Fund (RDOF): While in the works at the time of the  
11 filing, the FCC subsequently identified 191,000 unserved homes in Ohio eligible for  
12 funding under Phase 1 of RDOF. The reverse auction held by the FCC in late 2020  
13 received bids covering all eligible homes but, in an odd distortion, the funding  
14 potentially allocated was only 20 percent of what is needed based on the FCC’s own  
15 formulas. The FCC has yet to authorize funding for any of the large Ohio bidders.
- 16 • Ohio House Bill 2: This legislative effort, supported by Governor Dewine, resulted in  
17 the creation of the Ohio Residential Broadband Expansion Grant Program, now with  
18 a total of \$250 million in funding. The first round of applications is due in November  
19 2021.
- 20 • U.S. Treasury Coronavirus Capital Projects Fund: This \$10 billion fund was  
21 established as part of the Coronavirus relief efforts and has been dedicated to  
22 broadband expansion based on rules released by the Treasury. Ohio’s allocation  
23 under this fund will be nearly \$270 million.

- 1           • U.S. American Rescue Plan Act (ARPA): The ARPA included multiple programs  
2           impacting broadband:
- 3           ○ Emergency Broadband Benefit (EBB) subsidizes residential broadband  
4           connections via a program administered by the FCC.
- 5           ○ Emergency Connectivity Fund (ECF) helps schools and libraries provide remote  
6           learning capacity to students, staff and library patrons via a program administered  
7           by the FCC.
- 8           ○ State and Local Fiscal Recovery Fund provides funding to recover from the  
9           pandemic with broadband as one of the eligible uses.
- 10          • FCC Rural 5G Fund: Much of Appalachian Ohio, in addition to lacking broadband  
11          services, also lacks mobile services. The FCC Rural 5G Fund is intended to erase the  
12          mobile coverage gaps nationwide.
- 13          • U.S. Infrastructure Legislation: The bipartisan infrastructure package that passed the  
14          senate includes some \$42 billion for broadband expansion.

15 **Q. HOW HAS THE PANDEMIC IMPACTED THE RURAL BROADBAND NEEDS?**

16 A. The COVID-19 pandemic has brought the absence of broadband and mobile services in  
17 rural Ohio into sharp focus. Press stories have alerted the public to children and teachers  
18 working from parking lots of libraries as research reports highlight the loss in educational  
19 progress for affected children. The attention to the pandemic’s impact has helped propel  
20 the funding programs described in answer to question above.

1 **Q. HOW HAVE THE UNSERVED AREAS IN OHIO CHANGED SINCE THE CASE**  
2 **WAS FILED?**

3 A. Prior to the case being filed, the most widely accepted map of unserved areas in Ohio was  
4 published by the FCC, who has acknowledged that up to now it has lacked the data it  
5 needs about precisely where service is and is not throughout the country. The startling  
6 extent of the digital desert in Ohio was further revealed by a mapping project using  
7 crowdsourced speed test data licensed by InnovateOhio. The Buckeye Hills Regional  
8 Council utilized the 9+ million consumer-initiated speed tests to bring truth on the ground  
9 to the statewide broadband maps (includes 15 months of data). Under the collective  
10 banner of “Connecting Appalachia” the other three Local Development Districts serving  
11 Appalachia Ohio joined in endorsing the resulting maps. BroadbandOhio will soon  
12 publish the statewide results as well.

13 **Q. IN LIGHT OF THESE PUBLIC POLICY DEVELOPMENTS, IS THERE STILL**  
14 **AN ISSUE THAT NEEDS TO BE ADDRESSED?**

15 A. Yes. Even with these public policy developments, there is still a significant number of  
16 underserved customers. Connecting Appalachia’s findings show that the digital desert  
17 remains widespread, with nearly 50 percent of the populated areas of Ohio unable to  
18 receive even the minimal speeds of 10 Mbps down and 1 Mbps up and an additional 17  
19 percent unable to receive 25 Mbps down and 3 Mbps up. This digital desert leaves over  
20 700,000 Ohio households unable to participate in the information age. This improved  
21 mapping approach revealed that the problem is 3.7x worse than what the FCC maps have  
22 projected.

1 **Q. WITH THE NUMEROUS GRANTS FOR RURAL BROADBAND EFFORTS,**  
2 **WILL THIS SOLVE 100 PERCENT OF THE UNSERVED CUSTOMERS?**

3 A. No. If the FCC authorizes the RDOF funding in Ohio and if the recipients meet their  
4 obligations, we would see relief for 191,000 unserved households, which is just 27  
5 percent of the need. Further, the RDOF timelines are overly long resulting in a project  
6 period of six-to-eight years to achieve these modest results. Due to the FCC's lax  
7 enforcement rules, funding recipients are financially incentivized to abandon the most  
8 remote 30 percent of the service areas, decisions we are unlikely to know about until  
9 2030.

10 **Q. PLEASE DESCRIBE THE RECENT EFFORTS OTHER AEP OPERATING**  
11 **COMPANIES ARE UNDERTAKING TO ASSIST THE EXPANSION OF HIGH**  
12 **SPEED INTERNET TO UNSERVED CUSTOMERS IN THE STATES THAT**  
13 **THEY OPERATE.**

14 A. Appalachian Power Company, an AEP Company operating in Virginia and West  
15 Virginia, has five projects in different stages of design and construction between both of  
16 its jurisdictions. In Virginia, investor owned electric utilities are now able to apply to the  
17 Virginia State Corporation Commission to build fiber in support of rural broadband  
18 projects as well as lease dark fiber. In West Virginia, the statutory framework to support,  
19 encourage, and expedite the expansion of broadband through the State has been created  
20 for investor owned electric utilities to apply for and develop broadband infrastructure.

1 **Q. WHAT TYPE OF DARK FIBER LEASE REVENUE HAS THE COMPANY SEEN**  
2 **FOR THE AEP PROJECTS IN VIRGINIA AND WEST VIRGINIA?**

3 A. The Company has not yet received any lease revenues because the projects are still in the  
4 design and construction stages, and the Internet Service Providers (ISP) have not yet  
5 begun to use the middle-mile fiber in either jurisdiction. Lease terms are negotiated with  
6 individual ISPs on a case-by-case basis. Additionally, the ISPs for the VA and WV  
7 broadband projects have only leased a portion of the 48 fibers that are available.

8 **Q. HOW DO THESE PUBLIC POLICY DEVELOPMENTS IMPACT THE**  
9 **COMPANY’S PROPOSAL?**

10 A. These public policy developments underscore that the Company’s proposal to provide  
11 fiber connections is still needed. As I stated previously, the RDOF funding would only  
12 help 27 percent of the underserved households in Ohio, leaving 509,000 Ohio households  
13 still in need. Other AEP operating companies have already demonstrated that public  
14 electric utilities can be part of the solution, just as AEP Ohio can be part of the solution.

## 15 **INTELLIGENT DISTRIBUTION LINE SENSORS**

16 **Q. ARE INTELLIGENT LINE SENSORS A SMART GRID TECHNOLOGY?**

17 A. Yes. As described by the U.S. Department of Energy, the smart grid as “digital  
18 technology that allows for enhanced sensing and control of grid elements, more  
19 widespread information sharing, and communication, more powerful computing, and  
20 finer control.”<sup>1</sup> Intelligent sensors are a smart grid technology due to the advanced

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<sup>1</sup> Smart Grid System Report. 2018 Report to Congress. 2018. Page 11.  
[https://www.energy.gov/sites/prod/files/2019/02/f59/Smart%20Grid%20System%20Report%20November%202018\\_1.pdf](https://www.energy.gov/sites/prod/files/2019/02/f59/Smart%20Grid%20System%20Report%20November%202018_1.pdf)

1 capabilities and features included in the device and supporting software platform.  
2 Intelligent sensors utilize advanced electronics to detect distribution system faults and  
3 send high accuracy data back to control systems to reduce outage times and enable  
4 automated fault restoration applications. Additionally, intelligent sensors provide data  
5 that can be used to leverage sophisticated algorithms to detect and capture electrical  
6 disturbance waveforms. The granular data and waveforms provided by these sensors are  
7 leveraged for advanced analytics capabilities that can be used to proactively locate and  
8 repair incipient faults prior to becoming sustained interruptions.

## 9 **IT'S YOUR POWER**

10 **Q. SINCE THE TIME OF THE FILING, HAS THE COMPANY ADVANCED ANY**  
11 **EFFORTS TO REMEDY CONCERNS FROM INTERVENING PARTIES**  
12 **REGARDING CONCERNS OF ALLOWING THIRD PARTY THERMOSTATS**  
13 **TO CONNECT TO THE ENERGY BRIDGE?**

14 A. Yes. The Energy Bridge is an open platform that supports any communicating thermostat  
15 that connects via WiFi, Zigbee, or Z-Wave, across dozens of manufactures such as  
16 Honeywell, ecobee, Zen, Radio, Stelpro, and more. For some WiFi communicating  
17 thermostats, the manufacturer must grant access for the Energy Bridge to connect. The  
18 Company and its IYP solution provider are open to continue collaborating with all third  
19 party thermostat makers. This includes:

- 20 • ecobee: The Company's IYP solution provider has deployed ecobee integration in  
21 other territories in North America and the Company conducted a lab test in AEP's  
22 Dolan Lab along with an AEP Ohio customer home showing connectivity between  
23 ecobee thermostat and the Energy Bridge.



- 1 • Honeywell: The Company’s IYP solution provider has deployed a Honeywell  
2 integration in other territories and ran a DR program in collaboration with Honeywell  
3 in 2021
- 4 • Emerson: The Company’s IYP solution provider is in conversations about Emerson  
5 thermostat integration for 2022
- 6 • Amazon Smart Thermostat: recently announced (9/28) new Amazon Smart  
7 Thermostat, the Company’s IYP solution provider is in discussions to provide support  
8 in 2022 for this thermostat.

9 **Q. WILL THE COMPANY ALLOW THIRD PARTY THERMOSTATS TO**  
10 **CONNECT TO THE ENERGY BRIDGE UNDER THE PROPOSED PROGRAM?**

11 A. Yes. The Energy Bridge works with over many different Z-Wave or Zigbee thermostats,  
12 which includes popular thermostats like Zen, Radio, Stelpro, Sinope, Honeywell and  
13 more as discussed above.

14 **Q. DOES THIS CONCLUDE YOUR SUPPLEMENTAL TESTIMONY?**

15 A. Yes.

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1 **CERTIFICATE OF SERVICE**

2 In accordance with Rule 4901-1-05, Ohio Administrative Code, the PUCO's e-filing  
3 system will electronically serve notice of the filing of this document upon the following parties. In  
4 addition, I hereby certify that a service copy of the foregoing *Supplemental Testimony Of Scott S.*  
5 *Osterholt* was sent by, or on behalf of, the undersigned counsel to the following parties of record  
6 this 15<sup>th</sup> day of October 15, via electronic transmission.

7 /s/ Steven T. Nourse

8 Steven T. Nourse

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