

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

ENTRY

Entered in the Journal on May 27, 2021

{¶ 1} Ohio Power Company d/b/a AEP Ohio (AEP Ohio or Company) is an electric light company as defined by R.C. 4905.03 and a public utility as defined by R.C. 4905.02, and, as such, is subject to the jurisdiction of this Commission.

{¶ 2} In Case No. 16-1852-EL-SSO, et al., the Commission modified and approved a stipulation and recommendation filed by AEP Ohio, Staff, and numerous other signatory parties, which authorized the Company to implement an electric security plan for the period of June 1, 2018, through May 31, 2024. Among the commitments in the stipulation and recommendation, AEP Ohio agreed to file a base distribution rate case by June 1, 2020. *In re Ohio Power Co.*, Case No. 16-1852-EL-SSO, et al., Opinion and Order (Apr. 25, 2018) at ¶ 45.

{¶ 3} On April 29, 2020, in the above-captioned cases, AEP Ohio filed a pre-filing notice of its intent to file an application for approval of an increase in its electric distribution rates, tariff modifications, and changes in accounting methods.

{¶ 4} On June 8, 2020, AEP Ohio filed its application to increase its rates pursuant to R.C. 4909.18.¹ AEP Ohio filed direct testimony in support of its application on June 15, 2020.

{¶ 5} On November 18, 2020, as amended on November 25, 2020, Staff filed a written report of its investigation (Staff Report). Pursuant to R.C. 4909.19 and Ohio Adm.Code 4901-1-28(B), objections to the Staff Report were due by December 18, 2020.

{¶ 6} Objections to the Staff Report were filed by various parties on December 18, 2020.

{¶ 7} By Entry issued on November 23, 2020, as amended by Entries issued on December 1, 2020, January 14, 2021, January 27, 2021, and February 1, 2021, the procedural schedule was established in these cases such that a public hearing was held on February 8, 2021. Prehearing conferences were held on February 11, 2021, March 26, 2021, and May 10, 2021, via Webex.

{¶ 8} On March 4, 2021, the evidentiary hearing was called and the proceedings continued to permit the parties to engage in further settlement negotiations.

{¶ 9} On March 12, 2021, as amended on April 7, 2021, a Joint Stipulation and Recommendation (Stipulation) was filed by AEP Ohio and 13 other parties to the proceedings.

{¶ 10} On April 30, 2021, Environmental Law & Policy Center (ELPC) and Ohio Environmental Council (OEC) filed a joint motion for a hearing subpoena of Jon F. Williams, Managing Director of Customer Experience and Distribution Technology for AEP Ohio.

¹ Due to the closure of the Commission's offices from June 1, 2020, through June 5, 2020, the application for a rate increase, which was submitted by AEP Ohio on June 1, 2020, was accepted for filing on June 8, 2020, and deemed timely filed in accordance with R.C. 1.14 and Ohio Adm.Code 4901-1-07 and 4901-1-13. *In re the Extension of Filing Dates for Pleadings and Other Papers Due to a Building Emergency*, Case No. 20-1132-AU-UNC, Entry (June 8, 2020).

{¶ 11} On May 4, 2021, the signed subpoena was filed by an attorney examiner. Subsequently, on the same day, ELPC and OEC filed a joint motion withdrawing their request for a subpoena of Jon F. Williams. According to the motion to withdraw, ELPC and OEC amicably resolved the issue with AEP Ohio and AEP Ohio agreed to present Mr. Williams at the hearing without the need for a subpoena.

{¶ 12} The evidentiary hearing reconvened on May 12, 2021, and continued each business day through May 18, 2021. Mr. Williams testified, as if on cross-examination, on May 18, 2021.

{¶ 13} At the conclusion of Mr. Williams' testimony, counsel for ELPC sought to have admitted into evidence, as ELPC Ex. 2, a document that was filed in these dockets on June 15, 2020, as the pre-filed direct testimony of Jon F. Williams in support of the Company's application. AEP Ohio and several other parties objected to the admission of ELPC Ex. 2. Rather than admit the filed document, in total, the attorney examiner directed counsel for AEP Ohio, ELPC, and OEC to work together to come to an agreement to highlight the portions of the filed document discussed in the course of Mr. Williams' cross-examination for the parties to be able to cite in their briefs and present the proposed exhibit for the attorney examiners' consideration (Tr. Vol. V at 992-1,002, 1,004-1,005).

{¶ 14} On May 24, 2021, AEP Ohio, ELPC, and OEC presented to the attorney examiners a proposed exhibit with highlights. In addition, counsel for ELPC and OEC presented additional sections in the document which they argue should be highlighted and, therefore, may be cited in parties' briefs.

{¶ 15} In consideration of the manner in which the witness was called to testify and the arguments of counsel, and after reviewing the transcript, the attorney examiner finds that ELPC Ex. 2 should be highlighted as attached hereto and the parties may cite the highlighted portions of the document in their respective briefs.

{¶ 16} On May 18, 2021, Frank Lacey presented testimony in opposition to the Stipulation on behalf of Interstate Gas Supply, Inc. (IGS), Direct Energy Business, LLC, and Direct Energy Services, LLC. Attached to the direct testimony of Mr. Lacey as Ex. FPL-14 is a four-page excerpt (including the cover page) from the National Association of Regulatory Utility Commissioners (NARUC) Electric Utility Cost Allocation Manual (CAM). During Mr. Lacey's cross-examination, AEP Ohio introduced the entire NARUC CAM as an exhibit. At the conclusion of Mr. Lacey's testimony, counsel for IGS sought to have the entire NARUC CAM admitted into the record; AEP Ohio opposed the request. AEP Ohio and IGS, however, agreed to work together to create an excerpt from the manual and present it for the attorney examiners' consideration as AEP Ohio Ex. 15. (Tr. Vol. V at 1,152-1,155.) On May 19, 2021, consistent with the directives of the attorney examiner, IGS and AEP Ohio presented an agreed-upon excerpt of the CAM.

{¶ 17} Consistent with the attorney examiner's directives during the evidentiary hearing, the attorney examiner finds that AEP Ohio Ex. 15 should be admitted into the record, as agreed by IGS and AEP Ohio, and as filed in these dockets on May 21, 2021. The exhibit may, therefore, be cited in the parties' briefs.

{¶ 18} It is, therefore,

{¶ 19} ORDERED, That, consistent with the attorney examiner's ruling during the evidentiary hearing, AEP Ohio Ex. 15 be admitted into the record, as filed on May 21, 2021. It is, further,

{¶ 20} ORDERED, That, consistent with the attorney examiner's ruling during the evidentiary hearing, ELPC Ex. 2 be admitted into the record and the highlighted sections of the document, as attached hereto, may be cited by the parties in their briefs, in accordance with this Entry. It is, further,

{¶ 21} ORDERED, That a copy of this Entry be served upon all parties of record.

THE PUBLIC UTILITIES COMMISSION OF OHIO

/s/ Greta See

By: Greta See
Attorney Examiner

SJP/hac

EXHIBIT NO. _____

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

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

DIRECT TESTIMONY OF
JON F. WILLIAMS
ON BEHALF OF
OHIO POWER COMPANY

Management Policies, Practices & Organizations

Operating Income

Rate Base

Allocations

Rate of Return

Rates and Tariffs

X Other

Filed: June 15th, 2020

INDEX TO DIRECT TESTIMONY OF
JON F. WILLIAMS

I.	PERSONAL DATA.....	2
II.	PURPOSE OF TESTIMONY	4
III.	CUSTOMER PROGRAM – DEMAND SIDE MANAGEMENT PLAN	5
IV.	CUSTOMER PROGRAM – STREET (“SL”) AND AREA (“AL”) LIGHT CONVERSION (SALC) PLAN.....	19
V.	ENHANCING CUSTOMER COMMUNICATIONS PLAN	35
VI.	MUNICIPAL UNDERGROUNDING OPTION	44

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO
DIRECT TESTIMONY OF
JON F. WILLIAMS
ON BEHALF OF
OHIO POWER COMPANY

1 **I. PERSONAL DATA**

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

3 A. My name is Jon F. Williams. My business address is 301 Cleveland Ave., S.W., Canton,
4 OH 44702.

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

6 A. I am employed by Ohio Power Company (“AEP Ohio” or the “Company”), a subsidiary of
7 American Electric Power Company, Inc. (“AEP”), as Managing Director of Customer
8 Experience and Distribution Technology.

9 **Q. WOULD YOU PLEASE DESCRIBE YOUR EDUCATIONAL AND**
10 **PROFESSIONAL BACKGROUND?**

11 A. I graduated with a Bachelor of Science Degree in Mechanical Engineering from Clemson
12 University in May 1981. I joined Appalachian Power Company, an AEP operating
13 company, in June 1981 as a Commercial Engineer. I was promoted to Energy Services
14 Engineer in 1985, Marketing & Customer Services Supervisor – Logan/Williamson
15 Division in 1986, Marketing & Customer Services Supervisor – Roanoke Division in 1988,
16 Business Services Supervisor & Healthcare Segment Manager in 1996, and Business
17 Services Manager in 1998. I transferred to AEP Ohio and was promoted to Customer
18 Service & Marketing Supervisor in 2000 and Customer Service & Marketing Manager in
19 2003. I was promoted to Manager of Energy Efficiency and Peak Demand Reduction

1 Programs in 2008 and was promoted to Director of Distribution Technology and
2 Innovation in 2018. I was promoted to my current position in 2019.

3 **Q. WHAT ARE YOUR RESPONSIBILITIES AS MANAGING DIRECTOR OF**
4 **CUSTOMER EXPERIENCE AND DISTRIBUTION TECHNOLOGY?**

5 **A.** I am responsible for all customer service activities for AEP Ohio, including all classes of
6 customers. I support economic development activities to help grow Ohio businesses and
7 communities. I am also responsible for alternative energy, the development of new “smart”
8 distribution-related technologies for customers, as well as other projects and opportunities
9 to benefit customers of all classes. I am responsible for the design, development, and
10 implementation of customer programs helping customers understand and optimize their
11 demand and energy use such as demand side management (“DSM”).

12 **Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY IN ANY REGULATORY**
13 **PROCEEDINGS?**

14 **A.** Yes. I have previously testified before the Public Utilities Commission of Ohio
15 (“Commission”) and filed testimony on behalf of AEP Ohio in proceedings concerning the
16 Company’s current and previous EE/PDR Program Portfolio Plans. I testified in support
17 of AEP Ohio’s 2009-2011 Plan (Case Nos. 09-1089-EL-POR and 09-1090-EL-POR) and
18 AEP Ohio’s 2017-2020 Plan (Case No. 16-574-EL-POR) and filed written testimony in
19 support of AEP Ohio’s 2012-2014 Plan (Case Nos. 11-5568-EL-POR and 11-5569-EL-
20 POR). I filed testimony on behalf of AEP Ohio in the Solar Application case (Case No.
21 18-1392-EL-RDR).

1 **II. PURPOSE OF TESTIMONY**

2 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

3 **A.** The purpose of my testimony is to support the following customer programs:

- 4 1. The AEP Ohio Demand Side Management (“DSM Plan”) – provides a diverse suite of
- 5 programs to cost effectively help customers overall with opportunities to optimize their
- 6 peak demand with their overall energy use. This DSM Plan represents a return to a
- 7 more traditional utility role of engaging customers to help manage the peak usage of
- 8 energy along with ways to reduce energy through more efficient technology. Incentives
- 9 to encourage customers to make more efficient choices, along with time of use, as well
- 10 as low income programs, pilots and customer education and awareness are all part of
- 11 the DSM Plan. In addition, the DSM Plan provides more overall benefits than costs.
- 12 2. Street and Area Light Conversion Plan (“SALC”) – provides a five year conversion
- 13 plan to replace inefficient and aging Company-owned and customer-provided street
- 14 and area lighting to more efficient LED (light emitting diode) lighting with controls.
- 15 3. Communication Plan – provides targeted and enhanced communications to customers
- 16 on safety, reliability and service as well as other opportunities to educate and raise
- 17 awareness for customers.
- 18 4. Municipality Undergrounding Option – provides villages, towns and cities additional
- 19 payment options to place existing Company overhead facilities in their footprint
- 20 underground.

21 **Q. ARE YOU SPONSORING ANY EXHIBITS?**

22 **A.** Yes, I sponsor the following exhibits:

- 23 • Exhibit JFW-1 – DSM Plan

- Exhibit JFW-2 – DSM Plan Appendices
- Exhibit JFW-3 - Communication Plan

III. CUSTOMER PROGRAM – DEMAND SIDE MANAGEMENT PLAN

Q. ARE YOU THE ONLY COMPANY WITNESS PROVIDING TESTIMONY IN SUPPORT OF THE DSM PLAN?

A. No, I am the overall witness supporting the DSM Plan, but Company witness Lehman supports the Electric Transportation program as a part of the DSM Plan.

Q. PLEASE SUMMARIZE YOUR TESTIMONY IN SUPPORT OF THE DSM PLAN.

A. The DSM Plan proposed represents a return to the more traditional focus of the utility in helping customers save energy while also managing system demand at peak. While participants in the programs save energy and reduce demand, participants and non-participants alike benefit as well through the avoidance of generation costs in the Company's service territory over the life of the demand and energy saving programs. These avoided costs are less than the DSM Plan's costs for programs, so the DSM Plan is cost effective. The DSM Plan represents a suite of residential, business and cross sector programs that provide opportunities to benefit all customers. Additionally, the cost of the proposed DSM Plan is significantly lower than previous EE/PDR Plans submitted during the legislatively required energy efficiency period for each of the last eleven years, going back to 2010. Features of the DSM Plan include low income, small business, demand response, residential and business incentives, innovation funding for pilots to test new technology and approaches to optimize energy use, as well as community focus, education and training, and targeted outreach to raise customer awareness. Also, the DSM Plan

1 includes the growing use category of electric transportation to support managed charging
2 for peak avoidance, innovation and access as electric vehicle use grows in the AEP Ohio
3 service territory. Finally, AEP Ohio proposes an earned annual program administration
4 fee of ten percent of DSM Plan spend if the DSM Plan is cost effective. An annual report
5 of performance of the DSM Plan will be filed with the Commission.

6 **Q. WHAT ARE THE DSM PLAN COSTS AND COST EFFECTIVENESS?**

7 **A.** AEP Ohio proposes a diverse suite of demand side management programs to assist
8 customers in lowering the peak demand of electricity, optimizing the use of energy,
9 increasing customer satisfaction and supporting economic development in Ohio. The cost
10 of the DSM Plan is \$36.6 million annually, while the total benefits are \$100 million
11 annually. Net of other costs including the assumption that the Company earns the program
12 administration fee and internal base labor costs, for every \$1 spent over \$3 in benefits are
13 generated. Demand response is a key feature of the DSM Plan to develop the capability of
14 reducing peak demand at scale for residential and business customers and helping to raise
15 customer awareness of peak demand impacts. The DSM Plan relies on cost effective
16 programs that are proven with the ability to upgrade the programs over time through pilots
17 that can test new and innovative approaches. The DSM Plan cost is lower than programs
18 approved ten years ago counting the inclusion of an electric transportation program to help
19 customers with wider availability of charging as well as support to encourage off peak
20 electric vehicle charging in this growing area of electric use. Annual reporting and
21 evaluation of programs will be provided by the Company with a performance based
22 program administration fee included for implementing a cost effective DSM Plan annually
23 discussed in more detail later in testimony. Cost effectiveness is determined utilizing the

utility cost test (“UCT”) and resource value test (“RVT”) at the DSM Plan level and for each measurable program (Exhibit JFW-1, VI, Benefit-Cost Analysis). Figure 1 breaks down the annual demand and energy savings goals by program, budget, UCT benefits and ratios and RVT benefits and ratios.

Figure 1 – DSM Plan Benefit-Cost Details

Proposed Program	Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT Benefits	UCT	Non-Energy Benefits	Total Benefits	RVT
Efficient Products	5,900	30,039	\$ 4,423,500	\$ 13,454,935	3.0	\$ -	\$ 13,454,935	3.0
Retrofit Low Income	800	2,758	\$ 7,000,000	\$ 1,253,712	0.2	\$ 7,595,000	\$ 8,848,712	1.3
Residential Demand Response	17,400	58,015	\$ 2,000,000	\$ 2,540,391	1.3	\$ -	\$ 2,540,391	1.3
New Homes	2,400	4,317	\$ 2,000,000	\$ 2,768,313	1.4	\$ -	\$ 2,768,313	1.4
e3smart	400	3,817	\$ 1,000,000	\$ 1,535,912	1.5	\$ -	\$ 1,535,912	1.5
Residential Subtotal	26,900	98,945	\$ 16,423,500	\$ 21,553,263	2.2	\$ 7,595,000	\$ 29,148,263	2.2
Efficient Products for Business	13,200	88,244	\$ 8,426,500	\$ 34,815,742	4.1	\$ 14,434,436	\$ 49,250,178	5.8
Process Efficiency	900	18,068	\$ 1,500,000	\$ 7,629,883	5.1	\$ 3,003,927	\$ 10,633,811	7.1
Business New Construction	1,900	13,503	\$ 1,500,000	\$ 5,009,133	3.3	\$ 2,174,870	\$ 7,184,003	4.8
Small Business Express	1,200	7,091	\$ 2,000,000	\$ 2,835,349	1.4	\$ 1,159,898	\$ 3,995,246	2.0
C&I Demand Response	0	0	\$ -	\$ -	N/A	\$ -	\$ -	N/A
Business Subtotal	17,200	126,906	\$ 13,426,500	\$ 50,290,107	3.7	\$ 20,773,131	\$ 71,063,237	5.3
Community Energy Savers			\$ 500,000					
Targeted Customer Outreach			\$ 500,000					
Innovation and Technology			\$ 1,300,000					
Education and Training			\$ 450,000					
Electric Transportation			\$ 4,000,000					
Cross Sector Subtotal			\$ 6,750,000					
Total*	44,100	225,851	\$ 36,600,000	\$ 71,843,370	2.3	\$ 28,368,131	\$ 100,211,500	3.0

*Plan cost effectiveness tests include estimated base rate internal labor and program administration fee. Exclusions include: Retrofit Low Income and Cross Sector programs.

Q. WHY IS THE COMPANY PROPOSING A DSM PLAN AT THIS TIME?

A. The Company supports a more traditional role for DSM as discussed in previous testimony and also continues to support state policy objectives relative to this proposal. The timing fits with the elimination of requirements for electric distribution utilities to achieve mandatory annual energy and demand savings as a percent of sales. The Company has reviewed its past offerings as well as customer satisfaction with programs and determined that a return to a much smaller suite of cost effective DSM programs that focuses more on

1 traditional peak demand response and management along with helping customers save
2 energy is beneficial through this cost effective DSM Plan proposal.

3 **Q. HOW IS THIS DSM PLAN MORE OF A TRADITIONAL ROLE FOR THE**
4 **COMPANY IN MANAGING ITS SYSTEM PEAK DEMAND AND HELPING**
5 **CUSTOMERS SAVE ENERGY?**

6 A. Historically, the Company has provided programs to help customers save energy and
7 manage peak demand prior to any legislative requirements to do so. Examples include:

- 8 • programs that encourage customers to use equipment such as storage water heaters to
9 heat water off-peak
- 10 • load management space heating equipment
- 11 • programmable thermostats to lower energy usage during peak times
- 12 • high efficiency heat pumps with a focus on proper installation and ductwork sizing to
13 maximize comfort and system efficiency
- 14 • energy saving tips and education
- 15 • residential, business and industry analysis and audits to help customers understand and
16 make informed decisions on options to optimize their demand and energy use
- 17 • incentives and pilot offerings to give residential and business customers the information
18 and support to make more efficient choices in equipment
- 19 • programs targeted to provide lower income customers access to efficiency and demand
20 reduction programs to save energy

21 The DSM Plan is a return to this more traditional role.

1 Q. WHAT ARE THE BENEFITS OF MOVING TO A MORE TRADITIONAL
2 OFFERING OF DSM PROGRAMS TODAY?

3 A. It is even more important today to offer these traditional programs that the Company is
4 uniquely positioned to provide to all customers. For example:

- 5 • The Company has invested in the smart grid with smart meters and a network that
6 provides the opportunity to work with customers and a wide variety of partners in new
7 ways to help optimize the grid through demand side management, helping all customers
8 control cost and maximize their benefit as well as the system benefit for all customers.

9 Many major end uses of electricity in homes, businesses and industry such as heating,
10 ventilation and air conditioning, water heating, specialty and controlled lighting, plug
11 loads and some industry specific processes are good candidates for reduction of peak
12 demand through control. The customer needs to be aware of the opportunity, there
13 should be a benefit to participate, and the customer needs the capability or technology
14 to participate.

- 15 • Technology is evolving and growing. The Company can be an effective partner with
16 customers and solution providers in taking full advantage of new opportunities. The
17 combination of the DSM Plan along with increased technology can help customers
18 manage demand and usage to optimize the grid. Demand management is a key
19 component of the DSM Plan to reduce costs for customers. The DSM Plan can support
20 and encourage the demand side management technologies that provide the most
21 customer and system benefit. Lowering peak demand has system cost benefits at the
22 generation, transmission and distribution levels. Generation benefits can be realized
23 immediately. Transmission and distribution level benefits from demand response

incentives as well as participation in proposed rate offerings that encourage shifting to off peak use can be analyzed and included over time with the DSM Plan.

- In addition to the traditional role that supports offering a DSM Plan, the Company has significant experience on how to run cost effective programs and used this knowledge to inform the DSM Plan offerings.
- Another benefit is that Columbia Gas has long running energy efficiency programs and has a similar footprint as AEP Ohio. Having programs available from both companies can provide a greater benefit to shared customers. Both utilities work together on program offerings where it makes sense to maximize cost effectiveness.

Q. PLEASE PROVIDE A BRIEF COMPARISON OF THE COMPANY'S DSM PLAN TO COLUMBIA GAS OF OHIO'S MOST RECENTLY FILED DSM PLAN.

A. While each Plan focuses on improving efficiency and saving energy for customers, the energy sources, electricity versus natural gas, require differences in programs across sectors. For example, demand response, advanced or specialty lighting, air conditioning and plug loads are primarily electric options for improving efficiency, while customers have choices for improving efficiency with electricity or natural gas for space heating, water heating and cooking. Processes can also have options between the two energy sources for energy savings. The Plans of both Companies align closely on the e3smart school education program, the retrofit low income program, new homes program, energy benchmarking and incentives for business customers. AEP Ohio and Columbia Gas of Ohio have a long track record of working collaboratively to help our shared customers save energy, including working jointly to deliver similar programs to increase cost effectiveness. Recent examples are the e3smart program and energy benchmarking. Both Company's

1 Plans have similar levels of annual spending. AEP Ohio's total DSM Plan annual budget
2 is \$36.6 million compared to Columbia Gas proposed budget of approximately \$35 million
3 in 2020 and \$35.7 million in 2021, the last year of their six year plan. (See PUCO Case
4 No. 16-1309 Application Appendix B3 p. 25). Columbia Gas of Ohio serves
5 approximately 1.4 million customers and AEP Ohio serves approximately 1.5 million
6 customers.

7 **Q. DO THE BENEFITS OF THE DSM PLAN OUTWEIGH THE PROGRAM COSTS?**

8 A. Yes. The DSM Plan is designed to lower peak demand and energy use which avoids
9 generation costs. Generation costs, current and forecasted, remain higher than the cost of
10 the DSM Plan (Exhibit JFW-1, VI, Avoided Costs). By avoiding these higher costs of
11 generation the DSM Plan is cost effective. Other financial benefits also could apply to
12 further increase the cost effectiveness of the DSM Plan. Avoided transmission capacity
13 costs are not included to justify cost effectiveness at this time because those benefits require
14 further study to quantify. While avoided distribution costs are also not included as
15 justification in this DSM Plan, reaching sufficient demand response capability for a given
16 distribution circuit or station could defer distribution cost if additional capacity is required
17 in that specific location. Developing scale to defer distribution cost for load growth at the
18 distribution level would require circuit and station level concentration of customer
19 participation sufficient to delay load growth impacts at the specific circuit and station,
20 requiring a commitment to this effort over time. Another key financial benefit from the
21 residential Retrofit Low Income Program is a reduction in charge-offs that occur from the
22 energy and resulting bill savings by PIPP (percent of income payment plan) customers
23 (Exhibit JFW-2, V, CAP Non Energy Benefits). Also, there are significant non-energy

benefits from business customer participation in programs due to operations and maintenance savings. (Exhibit JFW-2, IV, AEP Ohio C&I Non Energy Benefits Study). Participation in the DSM Plan supports sustainability goals and provides environmental benefits (Exhibit JFW-1, V.g., Benefits - Greenhouse Gas Reductions).

Finally, the Company will bid DSM Plan Resources into PJM, as opportunities are available. 80% of PJM revenues received will be utilized to supplement the DSM Plan budget in the years the revenues are realized, with 20% retained by the Company. The Company will bid eligible resources into base residual auctions, incremental auctions, or both at company discretion to manage risk and optimize revenue.

Q. DOES THE COMPANY'S DSM PLAN PROPOSED IN YOUR TESTIMONY SUPPORT STATE POLICY OBJECTIVES?

A. Yes, the DSM Plan encourages the state policy objectives in Ohio Revised Code 4928.02, including:

Policy Objective	AEP Ohio DSM Plan supports by:
(A) Ensure the availability to consumers of adequate, safe, efficient, nondiscriminatory, and reasonably priced retail electric service	<ul style="list-style-type: none"> Helping customers manage their peak demand, ensuring adequate and efficient service. (Exhibit JFW-1, III., Programs) Increasing customers' home or business energy efficiency while also managing demand helps to ensure reasonable cost of energy. (Exhibit JFW-1, III., Programs)
D) Encourage innovation and market access for cost-effective supply- and demand-side retail electric service including, but not limited to, demand-side management, time-differentiated pricing, waste energy recovery systems, smart grid programs, and implementation of advanced metering infrastructure	<ul style="list-style-type: none"> The DSM Plan is positioned to respond to current, and adjust to new opportunities for demand side management and maximize the smart grid benefits. Pilot opportunities are included to support innovation and adopt new approaches for cost effective DSM customer solutions. (Exhibit JFW-1, III. c., Cross Sector Programs).
(J) Provide coherent, transparent means of giving appropriate incentives to technologies that can adapt successfully to potential environmental mandates	<ul style="list-style-type: none"> The DSM Plan is designed to provide incentives for cost effective technologies generating other benefits, including environmental, that will be captured and

	reported. (Exhibit JFW-1, V.g., Benefits - Greenhouse Gas Reductions)
(L) Protect at-risk populations, including, but not limited to, when considering the implementation of any new advanced energy or renewable energy resource	<ul style="list-style-type: none"> • The DSM Plan has a focus on low income programs and low income geographic area support to provide both programming and incentive levels that are aligned with means (Exhibit JFW-1, III., Programs)
(M) Encourage the education of small business owners in this state regarding the use of, and encourage the use of, energy efficiency programs and alternative energy resources in their businesses	<ul style="list-style-type: none"> • Just as with low income, small business has a specific program focused on that segment to provide higher incentives to support this group. (Exhibit JFW-1, III.b.iv., Small Business Express Program).
(N) Facilitate the state's effectiveness in the global economy	<ul style="list-style-type: none"> • The DSM Plan is cost effective, providing a net benefit to all customers. (Figure 1). • The DSM Plan supports economic development through a focus on improving energy density of products and services, reducing the cost of those products and services and making customers more competitive. (Exhibit JFW-1, V.h., Economic Development) • The DSM Plan is an added benefit for new business and industry considering local communities throughout the Company's service territory.

Q. PLEASE PROVIDE A BRIEF OVERVIEW OF THE RESIDENTIAL CUSTOMER PROGRAMS.

A. The residential programs include low income programs, efficient products, new homes, energy education and demand response incentives to help residential customers manage their peak demand (Exhibit JFW-1, III.a., Residential Programs).

Q. PLEASE PROVIDE A BRIEF OVERVIEW OF THE BUSINESS CUSTOMER PROGRAMS.

A. The business programs include small business, efficient products for business, new construction, process efficiency and demand response incentives to help business customers manage their peak demand (Exhibit JFW-1, III.b., Business Programs).

1 **Q. PLEASE PROVIDE A BRIEF OVERVIEW OF THE CROSS SECTOR**
2 **PROGRAMS.**

3 A. The cross sector programs (Exhibit JFW-1, III.c., Cross-Sector Programs) include raising
4 customer awareness of programs through community based efforts and targeted customer
5 outreach to drive participation, education and training, to help customers understand better
6 the opportunities and benefits of demand side management and energy efficiency.
7 Programs also include innovation and technology to support new opportunities to pilot
8 emerging technology and foster more cost effective program implementation. The Electric
9 Transportation program focuses on supporting the growing electric vehicle charging sector
10 to maximize demand side management of electric vehicle charging as well as supporting
11 fleet opportunities and corridor charging growth. See (Exhibit JFW-1, III.d., Electric
12 Transportation Programs) for program details and for supporting testimony of the Electric
13 Transportation program see Company witness Lehman's testimony.

14 **Q. PLEASE DESCRIBE HOW THESE PROGRAMS WERE SELECTED AND IF**
15 **THEY ARE SUPPORTED BY A MARKET POTENTIAL STUDY.**

16 A. The focus was to identify the more traditional role for the utility and how to incorporate
17 that with the Company's significant experience running a mix of cost effective programs.
18 A specific focus missing from current programs was demand side management efforts such
19 as demand response. The Company also included inputs from the latest market potential
20 study completed in 2019 along with actual program results to develop this DSM Plan. A
21 growing electricity demand segment of electric vehicles and charging was included
22 because the impact on peak demand is expected to be significant. The Electric
23 Transportation program addresses and supports this growth through managed charging,

1 access to charging and by raising customer awareness. The measures and programs
2 selected were based on cost effectiveness, opportunities for customer participation across
3 customer classes and/or covered a critical segment such as lower income customers and
4 small businesses where additional customer assistance is needed to manage costs and
5 increase efficiency. Demand response incentives are now included to manage peak
6 demand, increase customer awareness of the benefits of reducing system demand at peak
7 and reduce future associated costs of utility resources needed to meet peak demands. The
8 DSM Plan was further supported by a market potential study completed by Navigant in
9 2019. The market potential study is available for review with the Company by request due
10 to its complexity and size. The Company took the results of the market potential study and
11 program results to determine the measures and programs to include in this DSM Plan (
12 Exhibit JFW-2, section I, DSM Plan Measure List). The Electric Transportation program
13 was also informed by the initial results of the EV Charging program pilot (Exhibit JFW-2,
14 VIII., Electric Vehicle Status Report) as well as supported in Company witness Lehman's
15 testimony.

16 **Q. IS THE COMPANY PROPOSING A FEE FOR PROGRAM ADMINISTRATION?**

17 A. Yes, the fee is earned if the Company achieves a cost effective overall DSM Plan
18 performance in a program year. The Company achieves a cost effective DSM Plan by
19 focusing on keeping administrative costs low and participation as high as possible through
20 effective implementation and incentive levels. If the DSM Plan is cost effective for the
21 year based on the RVT test as defined in the DSM Plan (Exhibit JFW-1, VI., Cost-Benefit
22 Analysis), the program administration fee will be calculated by multiplying the overall
23 DSM Plan spend in the program year (twelve months) by ten percent. However, if the

DSM Plan is not cost effective in a given program year (twelve months), the Company will not receive the program administration fee. The program year will begin two months following the date of approval of the base case to allow for ramp up of programs.

Q. HOW WILL DSM PLAN COSTS BE MANAGED?

A. The Company will manage to the DSM Plan budget of \$36.6 million. Any costs incurred in excess of this limit will not be recoverable. Any unspent DSM Plan dollars will be adjusted in the annual Economic Development Cost Recovery Rider as explained by Company witness Moore. Residential costs will be recovered from residential customers and non-residential costs will be recovered from non-residential customers. The Company will be able to shift program dollars within residential and business sectors to meet customer needs and/or improve cost effectiveness, with the exception of designated low income funding.

Q. HOW WILL AEP OHIO MEASURE PROGRAM SAVINGS AND REPORT PERFORMANCE?

A. The Company will evaluate programs through Evaluation, Measurement and Verification activities to verify gross program demand and energy savings impacts and provide annual reporting to monitor program and DSM Plan performance. The Company plans to use a variety of methods to measure performance including direct measurement of savings, calculated savings using methods found in the Ohio Technical Reference Manual (“TRM”) or other reasonable statistical and/or engineering methods. The Company will use the Ohio TRM as long as it is available and will justify additional measures as needed to supplement the TRM. These activities will determine actual program level gross savings and help

1 maximize the net benefits of each program and the DSM Plan overall. The Company will
2 file annual reports with the Commission on performance and cost/benefits achieved at the
3 DSM Plan and program level, including justification for the performance based program
4 administration fee, no later than five months following the end of the program year.

5 **Q. WILL THE COMPANY EXECUTE THESE PROGRAMS INTERNALLY OR**
6 **HIRE EXTERNAL IMPLEMENTERS TO ASSIST THE COMPANY?**

7 A. The Company has significant experience internally to manage and run programs and will
8 bring that customer program experience to the successful execution of the DSM Plan,
9 including internal labor costs moved into base rates from the test year of approximately
10 \$5.1 million in total (see Adjustment C-3.8). The entire labor amount moved will not be
11 solely focused on the DSM Plan and will be utilized for other necessary work in support
12 of customer service, customer communications and other customer program work, such as
13 smart cities and alternative energy work. \$4.2 million of the \$5.1 million amount was used
14 as an estimate of internal labor cost in the calculation of cost effectiveness of the overall
15 DSM Plan. Any actual base rate labor costs used to manage and run programs will be
16 included in the cost effectiveness calculations of the overall DSM Plan on an annual basis.
17 The internal cost component is expected to be lower than historical costs due to the smaller
18 scale of programs offered. External contractors to implement programs, process
19 applications and pay incentives are also important. Some programs may be better served
20 to implement with external parties such as a marketplace, the community assistance
21 program if utilizing community action agencies or efficient products programs for
22 residential or business that are more application and process focused. Other programs may
23 be more cost effective to run in-house such as community programs, education and

1 outreach. For those programs that are implemented externally, qualified third party
2 contractors should be selected through a competitively bid process to the extent possible
3 and the costs should be comparable or lower than the cost of implementing the programs
4 internally.

5 **Q. HOW DOES THE DSM PLAN SUPPORT ECONOMIC DEVELOPMENT AND**
6 **JOBS IN OHIO?**

7 A. The DSM Plan supports economic development and jobs in Ohio as approximately 2,600
8 direct and indirect jobs in the energy services industry are created and retained (Exhibit
9 JFW-1, V.h., Economic Development). Ohio based employers who manufacture,
10 distribute, sell and install energy efficiency measures have consistently benefitted from
11 programs to raise awareness, inform customers and incentivize highly efficient equipment
12 and process sales. The new area of demand response and the enabling equipment that
13 support it are provided by a number of companies in Ohio to help customers. Many energy
14 services firms provide consulting and engineering services to help customers and the DSM
15 Plan will provide further assistance to support their efforts. AEP Ohio already has over
16 600 solution provider firms that are supporting current programs with almost 1,200
17 employees engaged. Those jobs could be at risk without the DSM Plan.

18 **Q. HOW DOES THE COMPANY EXPECT CUSTOMER SATISFACTION TO BE**
19 **IMPACTED BY OFFERING DSM PROGRAMS?**

20 A. From surveys, previous experience and customer feedback from similar programs, we
21 expect that customer satisfaction will be very positive. Based on 2019 JD Power survey
22 results of AEP Ohio residential customers, respondents familiar with AEP Ohio's Energy

1 Efficiency Programs were 230 points (23% higher on a scale of 1000) more satisfied with
2 AEP Ohio overall than those respondents not at all familiar with energy efficiency.

3 Also, a survey completed by Opinion Dynamics in January 2020 showed 72% of
4 customers rated the AEP Ohio Marketplace a satisfaction of 4 or 5 on a 5 point scale. Less
5 than one percent (0.9%) said they were not at all satisfied.

6 According to the ESource Business Survey 2019, the question was asked of the
7 Company's business customers: "Should the Utility offer a variety of rate options,
8 programs, and services?" AEP Ohio customer responses were 8.2 out of 10. Another
9 question asked was "Should the Utility provide resources that help me manage energy costs
10 and make informed decisions?" AEP Ohio customer's response was 8.4 out of 10.

11 **Q. DOES THE COMPANY INTEND TO USE A COLLABORATIVE PROCESS**
12 **WITH STAKEHOLDERS TO INFORM AND OBTAIN FEEDBACK ON THE DSM**
13 **PLAN AND PROGRAMS?**

14 A. Yes. AEP Ohio has had a successful collaborative in place since 2010 and plans to continue
15 that effort to help inform and gain input on DSM Plan performance and ways to improve
16 and enhance the programs.

17 **IV. CUSTOMER PROGRAM – STREET AND AREA LIGHT CONVERSION PLAN**

18 **Q. PLEASE SUMMARIZE YOUR TESTIMONY IN SUPPORT OF THE STREET**
19 **AND AREA LIGHT CONVERSION (SALC) PLAN.**

20 A. The Company has aging and inefficient street lights ("SL") and area lights ("AL") that
21 need to be replaced. The choice includes staying with the same high intensity discharge
22 ("HID") lighting sources such as high pressure sodium, mercury vapor and metal halide or
23 moving to more efficient and higher quality LED lighting. Over the years, the Company

1 has studied its lighting offerings to customers to determine when a cost effective switch
2 could be made to LED lighting. With the smart grid deployment, lighting control also
3 became viable. Combined with that development, along with lower costs as the technology
4 improved and more energy efficient and higher light quality, the SALC Plan with LED
5 lighting became the best option to replacing AEP Ohio's aging infrastructure. The SALC
6 Plan is cost effective and the Company is proposing to make the approximately \$101.5
7 million in capital costs and \$3.0 million in annual ongoing Operations and Maintenance
8 (O&M) expenditures over five years to change out the lights. As supported by Company
9 witness Roush, the proposed LED monthly costs are lower than the existing lighting
10 monthly costs on average.

11 **Q. HOW IS AEP OHIO PROPOSING TO ADVANCE SL AND AL?**

12 A AEP Ohio is proposing a program to replace all existing SL and AL with LED fixtures
13 with networked controllers installed at each of the approximate 225,000 locations
14 identified. This work is planned to be completed over a period of 5 years.

15 Replacing existing SL and AL with LED fixtures provides a number of benefits to
16 the customers including:

- 17 • Lower energy costs
- 18 • Lower average monthly cost across customer base
- 19 • Metered energy costs
- 20 • Capability for customers to dim lights for further savings
- 21 • Reduced carbon output
- 22 • Better quality light
- 23 • Longer life

- Better maintenance response

The Company has the opportunity to provide our customers with better lighting capability, control and service while also saving energy.

Q. WHY IS NOW THE RIGHT TIME TO EXECUTE THE SALC PLAN?

A. Not only are our customers increasingly requesting LED lighting, but over 90 percent of our lighting fixtures are past their useful life. Accordingly, it makes sense to begin to deploy customer-requested lighting that also offers a host of operational and economic benefits that our current lighting does not. Additionally, with rising maintenance costs and the industry shift to LED lighting, it is no longer practical to offer HID lighting. The overall benefits of updating the SL and AL fixtures to LED include updating obsolete fixtures with more energy efficient, longer-lasting, networked enabled hardware that provide energy and maintenance costs savings to our customers.

Q. HOW HAVE SL AND AL EVOLVED?

A. In the late 1960's, High Pressure Sodium ("HPS") fixtures were developed and over the course of a decade became the most common lighting fixtures used for SL and AL. These HPS fixtures were more efficient than their predecessors were, and their distinct yellow glow identifies them easily. They are still the most common fixtures that AEP Ohio provides as a service for SL and AL. LED lighting started to become popular for SL and AL around 2006, and although the cost of the fixtures was initially high, the quality and control of the light output as well as the energy and maintenance savings made them desirable to customers.

1 **Q. PLEASE GIVE AN OVERVIEW OF AEP OHIO’S CURRENT STANDARD FOR**
2 **SL AND AL.**

3 A. AEP Ohio provides SL as a service on roadside poles to our municipal customers to light
4 up roadways and provide safety and security to residents of these communities. Fixtures
5 facing down onto the roadway (cobra head) are the most common fixture, but we also
6 provide post-top fixtures along roadways for SL as a service as well. Additionally, AEP
7 Ohio also provides AL as a service on roadside and non-roadside poles to residential and
8 business customers. These AL are directed so as to light up our customers’ properties from
9 dusk to dawn.

10 The dominant technology currently used to provide AEP Ohio’s SL and AL service
11 are HPS fixtures. AEP Ohio installs SL and AL only on AEP Ohio’s poles, and are
12 responsible for the installation and maintenance of these fixtures and facilities under the
13 terms of the service we provide our customers, and are responsible for billing our customers
14 accurately for these services.

15 **Q. HOW MANY SL AND AL DOES AEP OHIO MANAGE TODAY?**

16 A. AEP Ohio provides a SL service for about 700 accounts with our municipal customers,
17 with about 100,000 individual SL being billed on those accounts. Additionally, AEP Ohio
18 also currently provides AL services to about 115,000 fixtures with our residential and
19 business customers.

20 **Q. WHY ARE SL AND AL IMPORTANT FOR AEP OHIO CUSTOMERS?**

21 A. AEP Ohio’s SL and AL services provide a number of important benefits for our
22 communities and customers. Properly designed SL and AL provide a pleasant
23 environment, discourage crime and add safety and security to the public. SL and AL can

1 extend the hours in which there is available light for activity to take place. SL and AL also
2 assist drivers, cyclists, and pedestrians to find their way in what otherwise would be
3 darkness. SL and AL provide our customers with a sense of safety and security, on the
4 roadways, at their businesses and at their homes.

5 **Q. IS A LARGE PERCENTAGE OF AEP OHIO'S EXISTING SL AND AL BEYOND**
6 **THEIR USEFUL LIFE?**

7 A. Yes, more than 90 percent of the currently deployed SL and AL fixtures have been installed
8 and operating for more than twenty years, which is the useful life of an SL or AL. This
9 includes over 50 Incandescent ("INC") and more than 9,300 Mercury Vapor ("MV")
10 fixtures, technologies that were considered outdated about 40 years ago when the Company
11 began installing HPS fixtures only.

12 **Q. HAS THE CHALLENGE TO MAINTAIN THE EXISTING SL AND AL**
13 **INCREASED?**

14 A. Yes. AEP Ohio's inventory of SL and AL consists of older technology and antiquated
15 fixtures, including INC, MV, Metal Halide ("MH"), and HPS lamps. This creates
16 limitations that lead to higher maintenance costs. Another limitation is the inability to
17 determine remotely whether a SL or AL is operating properly. Existing controls on
18 Company-owned SL and AL do not alert the Company when the light malfunctions. As a
19 result, the Company often is unaware of inoperative SL and AL until the customer informs
20 the Company. The Company relies upon customer feedback and sometimes complaints to
21 learn of malfunctioning lights. As a result, the Company is unable to plan and schedule
22 maintenance efficiently. Repair crews have no way of efficiently testing whether there are
23 additional SL or AL that need maintenance in the area they are currently dispatched.

1 Finally, multiple notifications of the same non-functioning SL or AL often can result in
2 additional repairs being made to a SL or AL that had already been repaired.

3 The SALC Plan to upgrade to LED fixtures with networked controls remedies much
4 of this situation where we will know which fixtures are operating well and which need
5 repair, thereby reducing energy cost and increasing operation and maintenance savings. By
6 deploying LED fixtures with networked controllers, the Company will immediately and
7 automatically be alerted to lighting malfunctions, and will no longer need to rely upon
8 customers to call in and report malfunctioning fixtures. Not only will this reduce AEP
9 Ohio's call center volume (and thus lead to operational savings), it will also allow for more
10 efficient dispatch of repair crews to ensure all failed SL and AL are scheduled to be repaired
11 appropriately. These actions also improve customer satisfaction by helping the Company
12 repair malfunctioning lights more quickly.

13 **Q. DO YOU CURRENTLY HAVE SYSTEM AND PROCESS CHALLENGES THAT**
14 **MAY LEAD TO INACCURATE BILLING?**

15 A. Yes. The SL and AL currently deployed are not metered devices. The Company bills
16 customers for energy use by estimating the power utilization based upon the wattage of the
17 SL or AL fixtures and the number of hours of darkness each month based upon the U.S.
18 Naval Observatory's astronomical chart. This system has been used for years but is unable
19 to validate each individual SL or AL's power usage. Customers can also be billed for
20 power usage based on unreported failed SL or AL.

21 Further, while pole inventories are scheduled every 5 years, SL and AL that are
22 removed between inventories are not always trued-up until the next inventory. This can
23 lead to customers being billed for SL or AL that have been removed for years. Municipal

1 customers can request an audit of their SL account to ensure the billing is accurate for the
2 size and quantify of the provided SL service. These audits are currently done manually
3 and are time consuming for both the Company and its customers.

4 **Q. DO YOU CURRENTLY HAVE THE ABILITY TO EASILY TURN ON OR OFF**
5 **YOUR SL OR AL?**

6 A. No. The Company currently must send a servicer (and truck) to the location of the SL or
7 AL in question, access the fixture either by bucket truck or by climbing the pole to connect
8 or disconnect the fixture, and then turn the light on or off. This cost is only slightly less
9 than having to service or replace a SL or AL fixture altogether. The request to turn on or
10 off a fixture occurs more often with AL customers where there are more frequent tenant
11 changes.

12 **Q. DO YOU CURRENTLY KNOW WHEN SL OR AL ARE NOT FUNCTIONING**
13 **CORRECTLY OR ARE IN NEED OF REPAIR?**

14 A. No. AEP Ohio's current SL and AL do not have the capacity to self-identify any repair
15 needs. The only way AEP Ohio can tell if a SL or AL is not functioning properly is by
16 visual observation of that fixture when it should be on. Most frequently, AEP Ohio is
17 alerted to a problem of a fixture not performing properly by notification from the municipal
18 SL customer or a member of the municipality. Typically, we also need to be notified by
19 AL account holders when one of their fixtures are not performing properly.

20 **Q. DO YOU EXPERIENCE CUSTOMER FRUSTRATIONS WITH THE EXISTING**
21 **SL AND AL SERVICES FROM AEP OHIO?**

22 A. Yes, AEP Ohio has experienced customer frustration with our SL and AL programs over
23 three central issues. The first issue is that municipal, residential and business customers

1 question why AEP Ohio is not able to tell the working status of our fixtures, and they are
2 frustrated with the need for customer notification for AEP Ohio to respond and repair the
3 fixtures.

4 A second issue is that our municipal SL customers often voice concern over
5 whether we are billing for the correct number and type of SL fixtures. Inquiries can lead
6 to requests for audits of our facilities that, depending on the size of the community, can
7 take a considerable amount of time and effort on behalf of both parties to physically audit
8 the fixtures in the field.

9 The third central frustration point is more recent. A number of our municipal
10 customers have asked us to replace our existing SL and AL systems with LED fixtures for
11 multiple reasons. Over time, LED SL and AL technology has proven to provide a better
12 quality of light that enhances the appearance of the community. Customers are also very
13 aware of the energy savings from LED lighting. The fact that we cannot yet change these
14 fixtures to LED for our municipal customers gives them the impression that we do not want
15 to offer them the energy savings and benefits LED fixtures provide.

16 **Q. DOES THE SALC PLAN UTILIZE ANY EXISTING MODERN TECHNOLOGIES**
17 **RECENTLY DEPLOYED?**

18 A. Yes. AEP Ohio has pre-qualified LED SL and AL fixtures as well as networked light
19 controllers with billing quality metering capabilities. These technologies have also been
20 deployed on over 500,000 SL and AL at Florida Power and Light as well as another
21 270,000 SL and ALs in the City of Chicago. Both these locations have weather conditions
22 meeting or exceeding the expectations for conditions within the AEP Ohio territory.

Results reported from each of these deployments have been positive for operation and reliability.

Q. WHAT ARE THE ESTIMATED DIRECT COSTS?

A. The proposed deployment of LED fixtures with networked controllers installed will require approximately \$101.5 million in capital costs and \$3.0 million in annual ongoing O&M expenditures. The estimated average direct capital costs of an LED street light with a networked controller is approximately \$437 each. The estimated average direct capital costs of an LED area light with a networked controller is \$504 each. The blended estimated direct capital costs of both LED SL and AL with network controllers is approximately \$451 each for the full deployment across AEP Ohio's footprint. Figure 2 below provides the estimated direct cost across the 5-year deployment:

Figure 2 - Direct Cost of Street and Area Light Conversion Plan

Total Costs	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Deployed	45,000	45,000	45,000	45,000	45,000	225,000
Capital Costs	\$20.3M	\$20.3M	\$20.3M	\$20.3M	\$20.3M	\$101.5M
Ongoing O&M Cost	\$0.2M	\$0.4M	\$0.6M	\$0.8M	\$1.0M	\$3.0M
Total	\$20.5M	\$20.7M	\$20.9M	\$21.1M	\$21.3M	\$104.5M

Q. HOW DOES PROPOSED LED TECHNOLOGY RATE COSTS COMPARE WITH CURRENT SL AND AL TECHNOLOGY RATE COSTS?

A. The proposed rates for LED replacement of AL and SL across the Company's service territory saves the customers a weighted average of \$1.71 per fixture per month (including

1 the base rate and energy cost), over the existing SL and AL rates. AL on average save
2 \$3.25 per fixture per month across the footprint while SL saves an average of \$0.03 per
3 fixture per month. While there are different savings across historical territory boundaries,
4 the new rates true-up charges so each customer pays the same rate for similar
5 implementations regardless of location.

6 **Q. WHAT IS THE PROPOSED DEPLOYMENT PERIOD?**

7 A. AEP Ohio is proposing the replacement of all Company-owned SL and AL over 5 years.
8 The SALC Plan proposes a balance between moving quickly to take advantage of the
9 benefits and minimizing the disruption to Customers and cities. The plan is to address all
10 the SL in a particular area first to minimize the confusion of mixing HPS and LED lights
11 on the same street. We will also coordinate with customers to address changing out AL
12 when our crews are in that area. We will move through the AEP Ohio territory coordinating
13 with customers and our contract crews to meet the scheduled timeline. The exact number
14 of SL and AL changed during each year of the deployment may vary based upon customer
15 requests and schedules.

16 Detailed schedule planning will begin once AEP Ohio receives approval for the
17 project. The Company estimates kicking off the project in 2021 and completing all work
18 by the end of Q4 2026. All requests for new SL or AL installations received from
19 Customers after the approval of the tariff will be fulfilled using the LED lights with
20 network controller technology.

1 **Q. PLEASE DESCRIBE HOW LED LIGHTING COMBINED WITH NETWORK**
2 **CONTROLLERS LEADS TO MORE ACCURATE BILLING.**

3 A. The networked controllers installed on the LED SL and AL provide billing-quality meter
4 data to the Company to allow our customers to be billed for their actual energy usage
5 instead of estimated energy usage. This becomes critically important should the customer
6 decide to take advantage of SL or AL dimming capabilities to further reduce their energy
7 usage.

8 In addition, the networked controllers provide real-time status, and identify the
9 Global Positioning System (GPS) coordinates location to the central network control
10 system. The Company plans to integrate this information into our pole inventory system
11 to maintain the real-time status of the SL and AL. This system will allow the Company to
12 true up customer accounts in a timely manner.

13 **Q. PLEASE DESCRIBE HOW THE NETWORKED CONTROLLERS METERING**
14 **CAPABILITIES WOULD BE USED FOR BILLING PURPOSES OF THE LED SL**
15 **AND AL ELECTRIC ACCOUNTS.**

16 A. The Company plan is that all LED SL and AL shall be metered and billed the metered
17 kilowatt-hour usage each month after the transition period when the Company has metering
18 capability.

19 **Q. DO LED SL AND AL USE LESS ELECTRICITY AND LOWER ELECTRICITY**
20 **COSTS?**

21 A. Yes, LED SL are 63 percent more energy efficient on average and AL fixtures are 52
22 percent more energy efficient on average compared to the SL and AL currently deployed
23 across AEP Ohio's footprint. Combined, a full replacement of both SL and AL results in

over 111,000 MWh of energy saved per year. This provides direct savings to our customers of approximately \$6.5 million annually.

Q. HOW DO LED SL AND AL REDUCE MAINTENANCE COSTS?

A. LED SL and AL fixtures have a much longer anticipated life span than the AEP Ohio legacy lighting currently in service. The older MV, MH and HPS fixtures last between 12,000 and 24,000 hours (roughly 3 to 6 years) before they must be replaced. In contrast, LED lights last between 100,000 and 110,000 hours (up to 25 years) depending upon operation mode. LED SL and AL should only require scheduled maintenance at roughly one quarter of the rate of our current technology. The need for fewer repairs means reduced maintenance costs.

Q. ARE LED SL AND AL BETTER FOR THE ENVIRONMENT?

A. Yes. Approximately 111,000 MWh of energy saved per year translates to an annual reduction in Greenhouse gas emissions of nearly 99,000 metric tons. Further, LED lighting provides better quality light for visibility while directing the majority of the light towards the intended area. The LED SL and AL provide a clean white light that is directed at its target with little spill over or light trespass. LEDs also generate far less heat than older technologies. Simply by switching to LED SL and AL, it is possible to provide better quality lighting, lower energy consumption, and reduced CO2 emissions.

Q. ARE THERE ADDITIONAL BENEFITS OF LED SL AND AL WITH NETWORKED CONTROLLERS?

A. Yes. In addition to enabling better responsiveness to installation and repair of the lights, the LED SL and AL with networked controllers allow for additional benefits such as providing customers the capability to dim their SL or AL for additional energy savings.

1 The networked controllers being deployed support dimming as well as other features such
2 as the ability to integrate external proximity sensors to detect activity in the area and bring
3 the lights back up to full power until the activity ceases.

4 **Q. DO LED SL AND AL WITH NETWORKED CONTROLLERS HELP FURTHER**
5 **REDUCE ELECTRICITY CONSUMPTION AND LOWER ELECTRICITY**
6 **COSTS?**

7 A. Yes. In addition to the customer-controlled dimming capability, the LED SL and AL with
8 networked controllers have the capability to allow AEP Ohio to set a maximum power
9 setting. This feature can be used to prevent over lighting the area and provides additional
10 savings to the Customer while extending the life of the LED fixture, further reducing
11 operational costs.¹ The networked controller and software can be set to automatically
12 adjust the virtual power output over time to compensate for detected reductions in lumen
13 output. Typically, these adjustments occur in increments of a 1% increase to the fixture's
14 virtual power output approximately once per year. This strategy has been implemented by
15 utilities such as Florida Power and Light with great success.

16 **Q. HAS AEP OHIO DEMONSTRATED LED SL WITH NETWORK CONTROLLERS**
17 **FOR ENERGY SAVINGS AND CUSTOMER REACTION?**

18 A. Yes, the Company has been operating a pilot with LED SL and networked controllers in
19 several cities since December of 2019. The pilot is of limited scale within each city, with
20 approximately 200 LED SL fixtures and networked controllers deployed. The feedback
21 has been positive during the pilot as each of the pilot cities had some customer-owned LED

¹ SMART STREET LIGHTING 101: Control systems make street lights smarter, Smart Cities Council,
http://www.lightinglab.dk/_files/Dokumenter/presse/2015decembersmartcitiescouncil.pdf, pp 5.

1 SL already, so each city's residents have likely become used to the LED fixtures. We did
2 received a few initial comments regarding the brightness of the new fixtures and even
3 reduced the power output level of one of our larger fixtures as a result of customer
4 feedback. We had initially deployed all LED SL fixtures at 100 percent power level and
5 have found the controllers have metered the full power levels as expected for those initial
6 three months. We also recently utilized the controllers to reduce the power level output of
7 about 30 of the LED SL fixtures to various levels and will analyze the data to help our
8 customers optimize the dimming capabilities and outdoor power level settings available
9 for their locations. AEP Ohio's strategy for deployment of the new LED fixtures and
10 controllers will be to install each fixture type with the power output level optimized to
11 extended the life of the fixture, and to provide the desired security and increased energy
12 savings for our customers.

13 **Q. HOW DO LED SL AND AL WITH NETWORKED CONTROLLERS HELP TO**
14 **FURTHER REDUCE MAINTENANCE COSTS?**

15 A. LED SL and AL with networked controllers can identify trending problems of individual
16 SL or AL. Automatic notifications from the controllers allow analysis to spot common
17 issues across the populations of the SL and AL and address potential future issues. Further,
18 the LED SL and AL with networked controllers provide the voltage and power output to
19 further assist in remote diagnostics of potential problems with the fixture or the electric
20 circuit that powers it.

1 **Q. DO LED SL AND AL WITH NETWORKED CONTROLLERS FURTHER**
2 **IMPROVE SIGHT VISIBILITY AND SAFETY?**

3 A. Yes. The capability to individually dim SL and AL with networked controllers provide
4 opportunities to tune the lighting to optimal coverage and brightness. Just as lighting that
5 is too dim can be a safety problem, lights that are too bright can be a distraction to drivers.
6 The LED SL and AL with networked controllers provide the capability to balance the
7 lighting control settings after the installation is complete.

8 An additional future strategy could be to oversize SL in dangerous intersections or
9 known trouble spots, and then dim the light to a normal level. It is also possible to provide
10 control to local emergency or city officials that enable them to bring the lights up to full
11 power in the event of a traffic accident or at the request of the police.

12 **Q. ARE LED SL AND AL WITH NETWORKED CONTROLLERS DESIGNED TO**
13 **PROVIDE INSIGHT REGARDING WHEN THE FIXTURES ARE NOT**
14 **FUNCTIONING CORRECTLY AND IN NEED OF REPAIR?**

15 A. Yes, the LED SL and AL with networked controllers provide a number of discrete
16 notifications for conditions that provide insight into LED fixture malfunctions. Included
17 in these are the following:

- 18 • Commissioning failure
- 19 • Communication failure
- 20 • Day burner alert (using power during daylight hours)
- 21 • Door Open/Tamper alert
- 22 • High Power alert
- 23 • High Current alert

- High Voltage alert
- Invalid Program
- Lamp Failure
- Low Current alert
- Low Power alert
- Low Power Factor alert
- Low Voltage alert
- Relay Failure (for external interfaces)

Further, the networked controls system software is able to evaluate one or more groups of these discrete notifications to determine higher-level alarms. As an example, the software can generate an alarm when it stops communicating or receiving data from a controller. It can also compare data received on any day with the data received at the same time on previous days and flag a discrepancy. More commonly, it can differentiate between alarms happening on a single device, indicating a localized issue, and instances of the same alarm happening across multiple devices within the same timeframe, which may indicate a systemic issue.

Q. DO LED SL AND AL WITH NETWORKED CONTROLLERS OFFER FUNCTIONALITY TO TURN THE LIGHTS ON OR OFF REMOTELY?

A. Yes. The LED SL and AL with networked controllers communicate with a central network control system that allows remote monitoring and control capabilities. In addition to collecting alarms, LED status and meter reads, the networked control system allows operators real-time control of SL and AL. LED fixtures can be turned on, off, or even dimmed as the situation requires. If a Customer wishes to have a SL or AL removed, AEP

Ohio can turn the light off immediately until the light can be removed. This prevents future issues with customers being billed for power on a SL or AL they have asked to be removed.

V. ENHANCING CUSTOMER COMMUNICATIONS PLAN

Q. PLEASE SUMMARIZE YOUR TESTIMONY IN SUPPORT OF THE COMMUNICATIONS PLAN.

A. The enhancement to the Communications Plan funding of \$1 million is needed to support reliability, safety, service, bill understanding and general customer communications for AEP Ohio's 1.5 million customers. The current budget is less than half that amount and doesn't allow the Company an effective opportunity to raise customer awareness on reliability improvements and service work under way that directly impacts customers in its service territory. Effective communications to raise customer awareness on safety, reliability and billing are important and the additional funding will support these efforts. Even with approval of the enhancement, the total Communications Plan cost is approximately \$1 per customer per year.

Q. WHAT IS THE PURPOSE OF THE REQUESTED ADJUSTMENT TO ENHANCE CUSTOMER COMMUNICATIONS?

A. The Company is seeking additional funding to more broadly and more effectively communicate with customers on critical, important and educational needs. Informing customers about important issues like safety, reliability, consumer scams, outage information, infrastructure and vegetation management work in their area, available assistance programs, billing and customer programs is part of AEP Ohio's responsibility and commitment to meeting customer needs and keeping the public safe.

1 **Q. WHAT IS THE CURRENT FUNDING FOR COMMUNICATIONS AND WHAT**
2 **TYPES OF ACTIVITIES ARE BEING DONE WITH THAT FUNDING?**

3 A. Current funding includes \$452,000 to support communications activities to share
4 information with our 1.5 million customers about the work AEP Ohio is doing to provide
5 safe and reliable electric service. Some of these activities include media relations and
6 content development for external materials, talking points, media releases, as well as
7 generating website and social media content. The AEP Ohio communications team's
8 skillset and their ability to implement a variety of communication plans has helped AEP
9 Ohio customers better understand the work taking place to ensure we are able to provide
10 safe, reliable electric service.

11 Additionally, a limited use of external support augments the efforts of the AEP
12 Ohio communications team. The contract agency assists with the activities outlined above
13 and offers services for creative design, video production/editing, primary research, media
14 training, direct marketing and special event coordination. Use of an external contractor
15 allows the team to access resources that are able to scale to accommodate needs.

16 **Q. WHAT COMMUNICATIONS STRATEGIES AND TACTICS DOES AEP OHIO**
17 **UTILIZE CURRENTLY?**

18 AEP Ohio uses a number of strategies and tactics to engage with our customers. For
19 example, current funding is used to communicate with a limited number of customers on
20 reliability improvements, planned outages, safety and bill payment options. These
21 messages are central to the mission of AEP Ohio – to provide safe, reliable electricity to
22 our customers – and helping customers understand our efforts. We utilize traditional media

1 channels, social media networks, and in person interaction at community events, legally
2 required notices, customer newsletters and community meetings to reach customers.

3 With nearly 1.5 million customers throughout the AEP Ohio service territory, our
4 challenges include ensuring that we are reaching a large volume of customers and engaging
5 with customers using the method they prefer.

6 **Q. HOW MUCH OF AN ADJUSTMENT IS AEP OHIO SEEKING TO SUPPORT**
7 **ENHANCED CUSTOMER COMMUNICATION EFFORTS?**

8 A. AEP Ohio is requesting an adjustment of \$1,000,000, annually, for all customer class
9 communications. These funds will support outreach and awareness of specific service-
10 related activities across the state and will not be used for any general marketing or
11 advertising efforts.

12 **Q. WHY IS THE CURRENT FUNDING LEVEL INSUFFICIENT?**

13 A. Relative to the number of customers we serve, AEP Ohio has maintained a small team and
14 limited the expenditure of resources for customer communications. The current funding
15 level would not provide enough resources to pay for the postage (not including design or
16 printing) to mail a single postcard to every customer each year,

17 As outlined in Company witness Kratt's testimony, AEP Ohio has developed a
18 work plan to make reliability improvements. The activities taking place to improve
19 reliability requires that AEP Ohio make a greater effort than current resources allow to
20 inform customers of these efforts. In the Columbus region alone, 40 projects have been
21 identified in the work plan. These reliability-related communications are just one area
22 where additional communication efforts will be required. We also project additional need
23 for forestry and safety work, as well as continued energy use awareness communications.

1 Without additional communications funding we will not be able to provide customers the
2 information necessary to understand the work taking place in their communities.

3 The AEP Ohio service territory includes a major media market (Columbus) and
4 numerous smaller markets. With 1.5 million customers and 44,000 miles of distribution
5 lines throughout the state, the current communications budget does not allow us to
6 effectively keep customers informed about safety, reliability upgrades and other relevant
7 information.

8 We believe it will be important to adopt a “meet customers where they are”
9 approach because we understand the importance of the messages we are sharing, and want
10 to ensure we are maximizing our opportunities to reach customers through a multi-channel
11 approach.

12 For example, to help customers understand residential rate options to best fit their
13 usage patterns, a multi-channel communications effort will be needed to inform customers
14 and build awareness of these options.

15 **Q. HOW DOES AEP OHIO INTEND TO USE THESE ADDITIONAL FUNDS TO**
16 **COMMUNICATE WITH CUSTOMERS?**

17 A. Exhibit JFW-3 provides an overview of how funds from the adjustment request might be
18 used to enhance and expand our customer communications efforts. Our expanded
19 communications needs include sharing information about the reliability improvements,
20 safety, and forestry program. The exhibit, offers sample costs, based on previous efforts,
21 for the activities necessary to provide customers with information about these topics.

22 Competition for customer attention has increased as customers turn to mobile
23 phones as their main device to interact with companies. Our efforts to inform customers

1 through social channels, text messages, and mobile alerts are competing in a crowded
2 space. Our focus on creating compelling educational content about electrical safety,
3 savings opportunities, outages and service improvements will be critical to breaking
4 through the noise.

5 In addition, digital channels provide us with an opportunity to have a two-way
6 dialogue with customers through post comments and other interactions. This allows us to
7 hear directly from customers and for customers to share their thoughts with others. This
8 offers a richer customer experience, but also requires more resources than currently
9 available. Monitoring digital channels and responding in a timely manner are critical for
10 this two-way experience to work, but are not supported in the current budget.

11 We recognize that not all customers have transitioned to online information
12 sources, so we also have to maintain more traditional communication channels such as post
13 cards, door hangers, phone calls, and letters.

14 Digital communication opportunities haven't replaced traditional communication
15 channels; rather they have increased the number of channels which we must utilize to
16 connect with our customers. Increased funding allows us to support this traditional
17 communication to a wider audience and on a broader range of topics of interest to our
18 customers.

19 **Q. WHY ARE A VARIETY OF COMMUNICATIONS METHODS NECESSARY?**

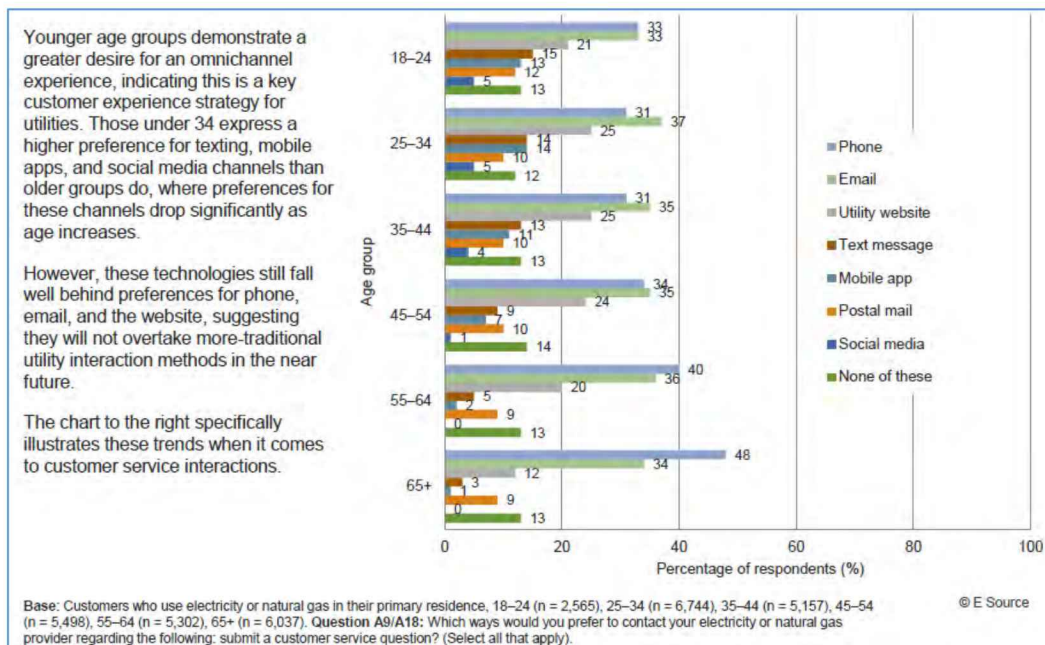
20 A. AEP Ohio needs to use a variety of communication methods to continue to meet customers'
21 increasing demands and to capture their attention. Research from Questline, a leading
22 energy utility digital communications expert, has demonstrated that customers who receive

newsletters are more receptive to other messaging from their utility, such as public safety messaging, savings tips and information about assistance programs.

Figure 3 below displays the results of a survey conducted by E-Source in 2016. With customers spanning generations with numerous communication preferences, it is critical to use multiple methods of communication.

While this information specifically summarizes attitudes related to customer service interactions, it also demonstrates that there is no “one size fits all” solution when it comes to connecting with customers.

Figure 3 – E-Source Survey Results



Q. EXPLAIN WHY SOCIAL MEDIA AND DIGITAL MESSAGES ON LOW-COST PLATFORMS REQUIRE ADDITIONAL RESOURCES.

A. While social media platforms, like Facebook and Twitter are cost effective means of communicating with customers, we have found that engaging customers requires creating compelling content. We have increased our use of video and other imagery to capture

attention. We plan to increase our use of these media forms and that will require additional investment in production elements supported by this adjustment request. Figure 4 below demonstrates that social media posts that include images and video vastly outperform text-only messages. Messages with text only generated an average of 3,000 impressions per post, while video posts earned 23,000 impressions per post and photo messages earned 7,700 impressions per post. Photo and video increase the reach of messages, but also require additional effort to effectively produce.

Figure 4 – Social Media Content Performance Comparison

Media Type	Volume of Published Messages	Average Engagements Per Post	Total Engagements	Total Impressions - Custom
Link	55	145.13	8K	1.8M
Video	166	42.59	7.1K	3.8M
Photo	1.3K	41.64	55.4K	10.1M
Carousel	31	32.45	1K	10.8K
Text	109	20.06	2.2K	333.2K
Album	1	0	0	0

Q. DID YOU ENGAGE IN ANY SUCCESSFUL INFORMATIONAL CAMPAIGNS THAT YOU WOULD REPLICATE FOR OTHER AREAS WITH THESE ADDITIONAL RESOURCES?

A. Yes. AEP Ohio utilized to great success a public outreach campaign strategy centered on our vegetation management efforts. Tree trimming is a necessary element of our business. Traditionally, due to budget constraints, AEP Ohio had struggled to provide customers with timely information about tree trimming work taking place in their communities. This has led to an undesirable customer experience and increased commission complaints.

1 In 2019, AEP Ohio's forestry division worked with our corporate communications
2 department to develop a customer communication campaign and improve communication
3 processes to help inform customers about scheduled vegetation management activities in a
4 timely and efficient manner. For example, before any vegetation work began, a postcard
5 was sent to customers briefly explaining the vegetation work that would be completed.
6 Approximately one week before vegetation management activities began, an automated
7 phone call was sent to customers informing them that vegetation work would be starting
8 shortly. That was followed by face-to-face contacts by contract work planners or a member
9 of the vegetation crew that went house-to-house to notify customers, in-person, of the work
10 to be conducted, as well as answer any questions that the customers may have had. If a
11 customer was not home, the work planner left a door hanger with information about the
12 vegetation management work to be completed.

13 More information on vegetation management communications, as well as sample
14 collateral pieces are included as part of the Forestry portion of the Management Report
15 (Schedule S-4.2, which is sponsored by Company witness Kratt). Funding for this effort
16 was not earmarked in the vegetation management program, but understanding the
17 importance of a positive customer experience we utilized a limited amount of the
18 communications budget to execute this campaign for a limited number of projects. The
19 communications included a customer door hanger, telephone calls, contacts via email and
20 sharing information with community-forums on social media channels.

21 In Q1 2020 AEP Ohio mailed approximately 30,000 postcards at a cost of \$16,000.
22 From 2019 to present, an additional \$16,000 has supported community outreach events,
23 production of an animated hazardous tree video, a pocket card about tree trimming and two

1 additional video pieces. This does not include costs for boosted social media posts to
2 promote these materials, but does demonstrate that there can be significant cost for these
3 campaigns.

4 Spending these additional funds reduced by 50% customer complaints related to
5 AEP Ohio's tree trimming maintenance schedule. They better understood the necessity of
6 the work and how it impacted their electric service. Also, by making them aware that work
7 would be occurring in their area, we were able to limit the surprise of seeing forestry crews.

8 The adjustment request would expand the use of the multi-channel communications
9 approach demonstrated here into additional areas, such as reliability, safety and other
10 topics.

11 **Q. WHAT ADDITIONAL AREAS WOULD AEP OHIO LIKE TO USE THIS MULTI-**
12 **CHANNEL APPROACH TO CUSTOMER COMMUNICATION?**

13 A. AEP Ohio proposes to use a similar strategy to engage customers in other service-related
14 areas such as reliability and safety, and to continue the forestry effort outlined previously.
15 Reliability communications will be critical as the work plan outlined in Company witness
16 Kratt's testimony is put into place. In addition to previous approaches, we plan to introduce
17 the use of the NextDoor social media platform. NextDoor is a members-only platform
18 organized around specific neighborhoods within a geographic region. Use of this platform
19 will allow us to target specific neighborhoods where work is taking place. We are
20 developing a strategy to work with our planning team to identify particular circuits where
21 work will occur and then will share information with neighborhoods about the specific
22 work being done. This targeted approach will allow us to share relevant information with
23 the customers the work will directly impact.

1 Additionally, we plan to augment our existing process of notifying customers about
2 planned outages with NextDoor posts. Utilizing this new channel effectively, however,
3 requires additional resources provided for in the adjustment request.

4 Safety is also a critically important area where additional education and outreach is
5 necessary. In recent years, we have seen increased public contacts with electrical
6 equipment. The contacts result in serious injury or death and are preventable. Safety audits
7 have indicated that we need to invest more resources in this area. We have increased the
8 inclusion of safety messaging on social channels and in our other communications.
9 However, as outlined previously, we need to communicate in additional ways to reach more
10 customers. Utilizing our existing “Live Line” trailer at public events and with first
11 responders will be an important part of our safety outreach. Sharing information about
12 public events and first-responder training where the “Live Line” trailer will be supported
13 by the adjustment request.

14 **VI. MUNICIPAL UNDERGROUNDING OPTION**

15 **Q. PLEASE SUMMARIZE YOUR TESTIMONY IN SUPPORT OF THE**
16 **MUNICIPALITY UNDERGROUND SERVICE TARIFF.**

17 A. As more local communities look to update streetscapes and downtown areas to serve their
18 residents and attract new businesses, the interest in converting overhead to underground
19 facilities in certain areas has grown. The Company receives requests each year by villages,
20 towns and cities interested in placing some overhead facilities in their footprint
21 underground. The upfront Contribution In Aid of Construction (CIAC) payment has been
22 a barrier for many municipalities. This tariff provides alternatives to the upfront payment
23 requirement to help these customers move forward with their plans.

1 **Q. HOW DOES THIS TARIFF SOLVE THE ISSUE OF PAYING CIAC UPFRONT**
2 **FOR THIS WORK?**

3 A. The tariff provides two options for municipalities to pay the cost difference over time.
4 However, the municipality still retains the current option of paying CIAC upfront.

5 **Q. PLEASE DESCRIBE THE PAYMENT PROCESS.**

6 A. The primary option in the proposed tariff involves calculation of a surcharge to be applied
7 to all customers that are residents of the respective municipality over the life of the installed
8 facilities. The tariff also preserves an option to provide a CIAC payment arrangement for
9 the municipality to pay over time.

10 **Q. DOES THE UNDERGROUND SERVICE TARIFF TRANSFER THESE COSTS TO**
11 **OTHER CUSTOMERS?**

12 A. No, it provides an alternative to municipalities to pay for underground service over time.
13 The participating municipality or its customers pay the entire cost, depending on the option
14 selected.

15 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

16 A. Yes.

AEP Ohio Demand Side Management Plan

6/15/2020

Table of Contents

I.	Introduction	4
II.	Objectives	5
III.	Programs.....	6
a.	Residential Programs.....	7
i.	Efficient Products.....	7
ii.	Retrofit Low Income.....	7
iii.	Residential Demand Response	8
iv.	New Homes	8
v.	E3Smart.....	9
b.	Business Programs	9
i.	Efficient Products for Business	9
ii.	Process Efficiency.....	10
iii.	Business New Construction.....	10
iv.	Small Business Express.....	10
v.	Business Demand Response	11
c.	Cross-Sector Programs	11
i.	Community Energy Savers.....	11
ii.	Targeted Customer Outreach.....	11
iii.	Innovation and Technology.....	12
iv.	Education & Training.....	12
d.	Electric Transportation Programs	12
i.	Corridor Charging.....	14
ii.	Residential Charging	14
iii.	Commercial and Public Charging.....	14
iv.	Electric Transportation - Innovation and Technology.....	14
v.	Electric Transportation – Outreach and Engagement.....	15
IV.	Incentive Strategy.....	16
a.	Residential	16
b.	Business	16
V.	Benefits	17
a.	Avoided Supply Costs	18
b.	Avoided Transmission and Distribution Costs	18

c.	Discount Rate for Present Value Benefits/Costs.....	18
d.	Electric Vehicles Can Lower Rates for all Customers	18
e.	Non-Energy Benefits	19
f.	Energy DRIPE.....	20
g.	Greenhouse Gas Reductions.....	21
h.	Economic Development	21
i.	Customer Satisfaction	22
VI.	Benefit-Cost Analysis	24
a.	Utility Cost Test (“UCT”)	24
b.	Resource Value Test (“RVT”) - NEW.....	24
c.	Benefit / Costs Tests.....	25
	Evaluation, Measurement, and Verification	26
a.	Annual Performance Verification.....	26

I. Introduction

In this application, Ohio Power (“AEP Ohio”, or “Company”) seeks approval of its Demand Side Management (“Plan”) by the Public Utilities Commission of Ohio (“Commission”). The Plan is designed to achieve a number of objectives, including delivering a cost-effective and comprehensive suite of Demand Side Management (“DSM”) programs that provide participation opportunities for all classes of customers and every major customer segment of the Company’s service territory in a manner that optimizes electricity usage while managing the peak demand on the AEP Ohio system. In addition, the Plan seeks to reduce inefficient uses of electricity while improving customer productivity, enhancing customer comfort and safety, increasing customer satisfaction, and supporting economic development and retention in Ohio. The Company seeks to accomplish these goals by overcoming barriers that prevent residential and business customers from adopting energy efficient technologies. The Plan aims to help customers manage electricity demand during peak periods and encourage flexible load to be shifted to lower cost off peak periods. All things being equal, this in turn avoids generation cost through a more cost effective demand side management approach, while also lowering emissions from electric generators serving Ohio customers. AEP Ohio is committed to helping its customers use energy more efficiently by implementing the Plan.

AEP Ohio proposes to invest approximately \$36.6 million annually for the programs described in the Plan. In addition, a program administration fee of 10% of the annual spend is earned for cost effective delivery of the Plan to customers. The focus of the Plan is on demand side management opportunities where the Company can work with customers and solution providers to deliver programs that help customers manage their peak demand. In addition, the Company will continue to help customers save energy, particularly in the residential, low income, small and medium business segments. An area of significant projected electricity growth is electric transportation, and the Plan include an Electric Transportation Program to provide overall support for this growth while managing the system peak demand.

In conjunction with the return to a more traditional demand side management approach, the Company has taken the learnings from programs offered over the last twelve years to build a suite of programs that are combined to be both cost effective and comprehensive, yet lower cost and more focused on demand side management. Ongoing plan performance, customer acceptance, customer satisfaction and cost effectiveness are critically important; therefore, the Plan continues a rigorous research and development function in order to ensure continuous improvement of programs that deliver innovation and strong performance. The innovation and technology function will also allow new program opportunities to be tested, measured and integrated into the program offerings. AEP Ohio contracted with Guidehouse (formerly known as Navigant) in 2019 to conduct a study on the market potential for applicable DSM measures. AEP Ohio further refined this study using market conditions, budget estimates, and potential baseline changes. These estimates were used to incorporate the assumptions as a basis for goal setting.

II. Objectives

The key objectives of the DSM Program are to:

- Provide programs that provide all customers segments with opportunities for participation.
- Support at-risk customer segments with focused programs to help them manage their demand and energy use.
- Encourage peak load management in a way that ensures a cost effective, healthy and reliable grid.
- Maximize the capabilities and benefits of the Smart Grid.
- Provide customer-oriented solutions for DSM services.
- Provide the lowest cost alternative to new generation, including fossil fuels and renewable generation sources.
- Reduce inefficient uses of electricity while improving customer productivity, providing comfort and safety, and increasing customer satisfaction.
- Help provide and increase sustainable jobs for Ohio.
- Identify and promote non-energy related benefits to support program delivery, providing customers more financial benefits of participation.
- Provide environmental benefits.
- Increase and complement economic development in Ohio by reducing energy density per product or service provided thereby improving competitiveness.
- Help delay the need for new electricity generation and future related rate impacts.

Additional objectives specific to the Electric Transportation Program (one of the Cross Sector Programs) are to:

- Support increased access to electric transportation across all AEP Ohio customer segments and geographical areas.
 - Reduce range anxiety by investing in corridor charging
 - Expand customer access to electric vehicle ("EV") charging including low income customers
- Optimize EV charging infrastructure and management.
 - Utilize electric transportation as a means to reduce system costs for all customers
 - Encourage long-term customer behavior to charge EVs in off-peak periods
 - Manage system peak demand through DSM programs and rate options
- Maximize environmental and other non-energy benefits.
 - Improve air quality by reducing tail pipe emissions in all areas, but specifically in:
 - Urban areas where mass transit busing is a major transportation component.
 - Areas where school bus emissions can be reduced.

III. Programs

The Company used a four-pronged approach for designing the programs within the Plan:

1. Meet the objectives set forth in the DSM Plan,
2. Design programs to satisfy a customer need,
3. Achieve a cost effective plan to benefit to all customers, and
4. Provide programs to all customer segments.

Using these metrics, AEP Ohio has designed the following suite of programs. AEP Ohio proposes an annual budget of \$36.6 million across the various programs, with total annual demand savings of 44.1 MW and annual energy savings of 226 GWhs. The Plan is cost effective, delivering total benefits of \$100 million compared to a Plan cost of \$36.6 million. For cost effectiveness calculations, an estimated annual base rate internal labor cost of \$4.2 million and a \$3.66 million administration fee has been estimated and added to the test. Excluded from cost effectiveness calculations are the Retrofit Low Income program which is not designed to be cost effective but provide a social benefit. Also excluded from cost effectiveness are the Cross Sector programs which are support programs to the Plan, and also includes the Electric Transportation program. Figure 1 shows the summary of proposed programs investments.

Figure 1. DSM Plan Savings, Budget, and Cost Effectiveness

Proposed Program	Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT Benefits	UCT	Non-Energy Benefits	Total Benefits	RVT
Efficient Products	5,900	30,039	\$ 4,423,500	\$ 13,454,935	3.0	\$ -	\$ 13,454,935	3.0
Retrofit Low Income	800	2,758	\$ 7,000,000	\$ 1,253,712	0.2	\$ 7,595,000	\$ 8,848,712	1.3
Residential Demand Response	17,400	58,015	\$ 2,000,000	\$ 2,540,391	1.3	\$ -	\$ 2,540,391	1.3
New Homes	2,400	4,317	\$ 2,000,000	\$ 2,768,313	1.4	\$ -	\$ 2,768,313	1.4
e3smart	400	3,817	\$ 1,000,000	\$ 1,535,912	1.5	\$ -	\$ 1,535,912	1.5
Residential Subtotal	26,900	98,945	\$ 16,423,500	\$ 21,553,263	2.2	\$ 7,595,000	\$ 29,148,263	2.2
Efficient Products for Business	13,200	88,244	\$ 8,426,500	\$ 34,815,742	4.1	\$ 14,434,436	\$ 49,250,178	5.8
Process Efficiency	900	18,068	\$ 1,500,000	\$ 7,629,883	5.1	\$ 3,003,927	\$ 10,633,811	7.1
Business New Construction	1,900	13,503	\$ 1,500,000	\$ 5,009,133	3.3	\$ 2,174,870	\$ 7,184,003	4.8
Small Business Express	1,200	7,091	\$ 2,000,000	\$ 2,835,349	1.4	\$ 1,159,898	\$ 3,995,246	2.0
C&I Demand Response	0	0	\$ -	\$ -	N/A	\$ -	\$ -	N/A
Business Subtotal	17,200	126,906	\$ 13,426,500	\$ 50,290,107	3.7	\$ 20,773,131	\$ 71,063,237	5.3
Community Energy Savers			\$ 500,000					
Targeted Customer Outreach			\$ 500,000					
Innovation and Technology			\$ 1,300,000					
Education and Training			\$ 450,000					
Electric Transportation			\$ 4,000,000					
Cross Sector Subtotal			\$ 6,750,000					
Total*	44,100	225,851	\$ 36,600,000	\$ 71,843,370	2.3	\$ 28,368,131	\$ 100,211,500	3.0

*Plan cost effectiveness tests include estimated base rate internal labor and program administration fee. Exclusions include: Retrofit Low Income and Cross Sector programs.

a. Residential Programs

i. Efficient Products

This DSM program provides retail incentives for LED specialty lighting and incentives for efficient heating and air conditioning (Energy Star Heat Pumps and Mini Split Heat Pumps), appliances and heat pump water heaters. In addition, incentives for demand control devices are included such as smart thermostats and load controllers. This program includes a digital marketplace where consumers can compare energy efficient appliances, receive an energy efficiency rating to help them make an informed decision, and shop for efficient products. The program will also explore midstream opportunities for delivering incentives.				
Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT	RVT
5,900	30,039	\$4,423,500	3.0	3.0
Other Benefits	Improved lighting quality, comfort, improved property values, water savings. Energy efficiency education through a Marketplace.			

ii. Retrofit Low Income

This DSM program is comprised of 2 components.				
<p>The Community Assistance Program (\$5 million) serves low income customers (below 150% of the Federal Poverty Level) by providing energy efficiency retrofit upgrades (lighting, refrigerators and shell measures) in single and multifamily dwellings through local impact agencies. These local agencies identify households requesting and needing assistance and provide an audit to determine which measures are needed. The local agency then installs the measures, and each project is recorded and reported to the utility.</p> <p>The Supplemental Low Income Program (\$2 million) supplements and provides financial assistance to low income customers above the 150% of Federal Poverty Level but defined as low-income. Within our service territory there are significant percentage of households that would qualify and AEP Ohio plans to help these customers more directly. The intent is to provide deeper discounts and/or incentives on the standard energy efficiency programs. This includes but not limited to smart thermostats, air source heat pumps, EV charging, water heating, and insulation. Other areas of focus could be supporting community food banks, senior citizen centers, and schools to provide and install energy efficient measures at a reduced costs and improving the payback period. Access to financing is another focus area.</p>				
Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT	RVT
800	2,758	\$7,000,000	0.2	1.3
Other Benefits	Lowering total electric bill, thus lowering the amount needed to be collected through the Universal Service Fund. Better health, indoor air quality, improved comfort, and increased safety for customers. Education on DSM to help customers understand how to manage bills.			

iii. Residential Demand Response

This DSM program lowers peak demand through behavioral coaching and incentivizing demand response (DR) by residential customers. Demand response and peak shaving will be provided with combinations of: electric water heating, air conditioning, space heating with smart thermostats, and EV charging control. These DR events will be targeted for reducing the demand during peak periods. In doing this, AEP Ohio will be able to reduce its capacity obligation for all customers, thus lowering all customer costs. Incentives will be provided to the customers who participate in the demand response events. The goal of the program is to initially use incentives and customer communications to shift demand, then educate the benefits of changing behavior, and finally migrate customer to a distribution rate plan that best benefits the customer. Once this successful transition of modifying customer behavior occurs, an incentive will no longer be provided to that customer. Incentives will be used to reach and educate other customers to continue to grow participating customers. The demand response program also includes a customer home energy report element targeted to high usage and high demand customers to educate the customer on rate designs, incentives, etc. to influence energy and demand savings over the course of the year.

Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT	RVT
17,400	58,015	\$2,000,000	1.3	1.3
Other Benefits	Customers retain direct control over energy usage. Real time information can be provided as a component of DSM education. Improved grid reliability during peak times.			

iv. New Homes

This DSM program encourages energy efficient construction of new single and multifamily homes well above the current building codes. This provides an easily available reference point for high performance construction, DSM and new technology opportunities in new homes including but not limited to demand response with smart thermostats, heat pump water heating, lighting controls, and EV charging control. The program will also explore enhanced building envelope improvements with air sealing, windows and insulation.

Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT	RVT
2,400	4,317	\$2,000,000	1.4	1.4
Other Benefits	Drives adoption of energy efficient construction for all builders and homebuyers. Educates buyers that DSM should be part of the equation when purchasing a new home.			

v. E3Smart

This DSM program educates and engages Ohio children grades 4-12 about energy, how to save energy at their homes, and new energy technologies. Classroom curriculum is provided to each participating teacher and each teacher is provided hands on training to review and go over the curriculum. Each student is provided a classroom exercise and take home project which includes a weatherization kit that the student, with the assistance of a parent, can install to utilize the energy saving measures. A parent survey is returned to the teacher to gauge the success of the project. This program is recognized as part of the Ohio STEM curriculum and has good coverage in low income school districts.

Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT	RVT
400	3,817	\$1,000,000	1.5	1.5
Other Benefits	Educates and engages the next generation on the importance of demand side management. Gives teachers additional educational materials to enhance their curriculum.			

b. Business Programs

i. Efficient Products for Business

This DSM program provides incentives for businesses to install efficient systems, including lighting, heating, ventilation and air-conditioning (HVAC), food service, compressed air, and refrigeration. Most measures will be sold and incentivized through a point-of-sale program, providing low program administration costs. In addition to DSM benefits, there are significant non-energy benefits for operation and maintenance cost reduction that have been characterized for this program. Incentives under this program can be aligned to concentrate on measures that primarily operate during peak periods. The program contains platforms and tools customers use to monitor and control their energy and demand. These tools may include automated benchmarking of buildings (Energy Star), energy model regression analysis tool, and real time data for small business.

Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT	RVT
13,200	88,244	\$8,426,500	4.1	5.8
Other Benefits	Productivity improvements, O&M reductions, access to Green Loans.			

ii. Process Efficiency

This DSM program is for cost-effective energy efficiency improvements that reduce energy consumption, peak demand, and/or increase productivity. The program will assist commercial and industrial customers with the analysis and selection of high-efficiency equipment or processes not covered under other program offerings. The program approach will identify more complex energy savings projects, provide economic analysis and aid in the design and completion of the project. The program will target measured energy savings on a per kWh and per peak kW reduction basis.

Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT	RVT
900	18,068	\$1,500,000	5.1	7.1
Other Benefits	Productivity improvements, O&M reductions, access to Green Loans.			

iii. Business New Construction

This DSM program provides education and technical assistance to design in maximum efficiency, targeting an average of 30 percent over code, for non-residential buildings of all sizes. The focus of the program is whole building energy modeling to ensure all aspects of efficiency are designed into new buildings. Energy savings in new construction ensures permanent energy efficiency over a long lifetime. New technologies will be incorporated with a focus on peak shaving opportunities.

Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT	RVT
1,900	13,503	\$1,500,000	3.3	4.8
Other Benefits	Productivity improvements, O&M reductions, access to Green Loans.			

iv. Small Business Express

This DSM program is a turnkey direct install program providing an on-site assessment for small businesses that have little understanding of energy savings or demand response opportunities. The primary measures installed are lighting, refrigeration, and heating and air conditioning.

Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT	RVT
1,200	7,091	\$2,000,000	1.4	2.0
Other Benefits	Productivity improvements, O&M reductions, access to Green Loans.			

v. Business Demand Response

This DSM program has multiple components. DR events will target 2 components: (1) where control of thermostat/HVAC, electric transportation, managed process, water heating is available, and (2) where control of networked lighting can reduce lighting levels during peak periods. AEP Ohio will call these DR events when the system demand is at its highest. These DR events will be targeted for reducing the demand for PJM critical peaks. While this program is not currently shown to be cost effective, AEP Ohio believes this program still has value and will be piloted in the Innovation and Technology program to determine more cost effective approaches. AEP Ohio will allocate dollars from other business sector programs or pilot funds if cost effectiveness is achieved.

Coincident Demand Savings (kW)	Energy Savings (MWh)	Annual Budget	UCT	RVT
0	0	N/A	N/A	N/A
Other Benefits	Customers retain direct control over energy usage. Real time information can be provided as a component of DSM education. Improved grid reliability during peak times.			

c. Cross-Sector Programs

i. Community Energy Savers

This DSM program encourages communities of all sizes, types and socio-economic classifications to use local resources with AEP Ohio assistance to increase participation in DSM programs for both residential and small business customers. A participation goal is set and, if achieved, the community receives an award that can be used for an energy efficient project in their community such as LED community park lighting upgrade, upgrade to school classroom lighting or other initiatives selected by that community. In addition, a sustainability plan is offered to the community for reaching 50% of goal. This program can also be offered through businesses to reach employees in a more efficient manner in support of sustainability goals.

ii. Targeted Customer Outreach

This effort will focus on activities that will encourage participation in our DSM programs by completing multi-channel outreach and customer communication activities that will help customers be aware of DSM programs available to help them save money and improve comfort. Our goals are to:

- (1) Increase awareness of energy savings and demand response opportunities and motivating customers to act by providing education on the financial, social and environmental benefits,
- (2) Drive program DSM program participation through targeted outreach efforts utilizing segmentation data from a third party and internal data resources,
- (3) Position AEP Ohio as a key source of information on DSM with a robust website, solution center product knowledge and various outreach efforts for communities in our service territory,
- (4) Use cost effective channels, and
- (5) Focus on digital and social media channels.

iii. Innovation and Technology

This DSM program is designed to develop and test methodologies for DSM Plan programs that, when successful, can be included with other residential and business programs in the Plan. Potential programs include new heat pump applications in packaged units, industrial demand management and advanced networked management systems. In addition, segment-specific innovation is needed to meet the unique opportunities with various customer segments on the business side and demographic needs on the residential side. For example, reaching lower income customers (between 150-400 percent above the federal income poverty line) will be an area of focus where a combination of technology options and outreach capabilities will be needed. Small businesses are another segment that can be difficult to reach, and innovative approaches are needed. Other opportunities will include looking at innovative ways, such as financing, to deliver incentives to our customers more effectively.

iv. Education & Training

This program will provide DSM education, training and materials for all customers, customer groups, contractors, trade associations, and civic associations. Activities and materials will be tailored to specific audiences: facilities managers, building operators, financial decision makers, builders, contractors, trade associations, civic organizations, workforce development practitioners and students, and AEP Ohio employees whose work brings them in contact with customers. Customer education events will continue to be offered via webinar and face-to-face seminars subject to any Ohio guidelines in effect at multiple sites throughout the service area as needed to permit customers to participate while minimizing travel. Seminars will continue to feature subject-matter experts, trade allies, and hands-on demonstrations of DSM technologies. How to and practical knowledge will be a focus to help customers understand how they use energy and how to optimize their usage. Education and training participants will be surveyed for feedback on relevance, quality and satisfaction with activities.

d. Electric Transportation Programs

This DSM program provides education, awareness, innovation and incentives to encourage adoption of electric transportation and managed charging. AEP Ohio's initial Electric Vehicle Charging Station pilot program, approved by the PUCO in 2018, was a highly utilized program across its many customer segments¹. That program was fully subscribed within 17 months of the 4-year pilot period, and continued interest in that program remains high as we have a wait list of applications received even after customers understood the program was fully subscribed. Through that initial pilot, AEP Ohio worked with numerous stakeholders to collect data on charging behavior that has helped guide the development of this proposed program. AEP Ohio proposes to continue the momentum of the previous pilot to address numerous customer charging applications.

Many of the proposed programs provide opportunities to achieve off-peak charging, which helps mitigate incremental load during peak periods and provides downward rate pressure benefits for

¹See JFW-2 Appendix – Section VII EVSE Report

all AEP Ohio customers. The programs also will improve air quality by reducing tail pipe emissions. It includes programs that will enable AEP Ohio to meet the electric transportation needs for all customer classes across many transportation sectors.

In each program, eligible customers will receive incentives to cover a percentage of their cost of the charger and associated infrastructure. AEP Ohio will have the flexibility to modify those percentages throughout this program as customer needs evolve. The program will ensure a portion of funds across these programs is provided to low income customers, and those customers will be eligible for higher incentive amounts. The program will also ensure that the benefits are realized across AEP Ohio's service territory by allocating a portion of the incentives to areas outside of the SMART Columbus territory². Customers that are non-profits, municipalities, or government entities will also have increased incentive eligibility. The program is designed with annual budgets for each program; however, AEP Ohio will evaluate the allocation of funds each year as customer needs evolve. All customers receiving incentives will also provide the required charging data to AEP Ohio.

Figure 2. Electric Transportation Program

Program Component	Included Applications	Estimated Annual Ports	Estimated Annual Budget (\$)
Corridor Charging	<ul style="list-style-type: none"> Highway corridor public charging 	10	\$550,000
Residential Charging	<ul style="list-style-type: none"> Single Family charging Multi-Family charging 	490	\$950,000
Commercial and Public Charging	<ul style="list-style-type: none"> Non-corridor public charging Fleet charging Workplace charging 	120	\$1,450,000
Electric Transportation Innovation and Technology	<ul style="list-style-type: none"> Public transit bus School transit bus New EV technologies 	-	\$650,000
Electric Transportation Outreach and Engagement	<ul style="list-style-type: none"> Program awareness and marketing Technology information and benefits 	-	\$400,000
Total		620	\$4,000,000
Note: Included in the Estimated Annual Budget for Low Income customers is a minimum of \$500,000			

² The SMART Columbus team has identified that approximately 3,800 commercial chargers in the SMART Columbus footprint alone will be necessary to meet the goal of a 15% increase in Electric Vehicles (EVs) by 2025.

i. Corridor Charging

This program provides incentives for public DCFCs in key highway corridor locations. Several organizations are studying the current state of EV charging infrastructure in Ohio in order to identify the geographic gaps that need filled. AEP Ohio will coordinate with those stakeholders to identify key corridors in the Company's service territory where public charging is needed to facilitate long distance travel for EV owners. AEP Ohio plans to develop a list of key corridor sites needed in our service territory and approximately 5 corridor sites will be identified each year. AEP Ohio will guide qualifications for Direct Current Fast Charging (DCFC) equipment deployment and make incentives available to 3rd parties to deploy DCFCs in the identified locations. To qualify for incentives in these corridor locations, chargers must be available to the public.

ii. Residential Charging

This program provides incentives for residential charging applications with participation in the Company's demand response program, helping customers install 240V circuits and level 2 charging equipment so homeowners can easily avoid charging their vehicle during peak periods. Education on time of use and demand rate options will be emphasized.

Approximately 80% of an electric vehicle's charging happens at home³, and being able to optimize those charging periods through managed charging is critical to avoid incremental load during peak periods.

Additionally, the Multi-Family segment provides incentives for the installation of 208/240V circuits and level 2 charging equipment. This segment serves residential tenants in multi-family dwellings, and encourages multi-family developments to add the capabilities necessary to reach all residential customers including those in low income communities.

iii. Commercial and Public Charging

This program provides incentives for commercial customers to install Level 2 and DCFC charging in Public, Workplace and Fleet applications, similar to AEP Ohio's Charging Station EV Incentive Program (2018-2022). This will support customers' ability to charge their EV away from their residences. The Public and Workplace programs will primarily target level 2 charging, but incentives will also be available to customers for DCFCs in locations outside the identified key corridors. The Fleet program will help enable Ohio companies to enhance, or even convert, their fleet to EVs.

iv. Electric Transportation - Innovation and Technology

³ EPRI, "Electric Vehicle Driving, Charging, and Load Shape Analysis", available at: <http://mydocs.epri.com/docs/PublicMeetingMaterials/ee/000000003002013754.pdf>

This program will investigate evolving technologies in the electric transportation space to identify innovative customer solutions throughout the AEP Ohio service territory. Electric transportation will continue to evolve as technology capabilities and customer adoption increases. Initially, AEP Ohio plans to focus pilot efforts on mass transit and school buses replacements of diesel or gasoline buses with electric buses. Mass transit and school districts serve a significant number of customers, increasing the benefits of this pilot effort. Incentives will be provided for managed charging equipment, infrastructure and also toward the purchase of the electric bus. Greater incentives will be allocated for low income target areas. AEP Ohio also plans to pursue other innovative technologies such as integration with storage, autonomous transportation solutions and vehicle sharing applications. AEP Ohio will look for opportunities to match pilot funds with other grants and funding mechanisms to increase opportunities for innovation.

v. Electric Transportation – Outreach and Engagement

Educating customers on the benefits of electric transportation is a fundamental need. A variety of means will be utilized to optimize outreach to all customers, including digital engagement, direct communication and others. AEP Ohio additionally plans to tailor outreach strategies for electric vehicle dealers and business customers to broaden the knowledgebase of these customers on the benefits of electric transportation, charging and program benefits.

IV. Incentive Strategy

a. Residential

AEP Ohio's DSM Plan has programs for all customers, with a specific focus throughout to provide assistance to those with lower income. For the applicable programs with incentive payments to customers, AEP Ohio will provide larger incentive payments to those customers who qualify as low income with the additional incentives available from the Supplemental Low Income program. AEP Ohio does not have granular economic demographics for each customer, but can use various methods to determine the higher incentive low income locations. For example, AEP Ohio can look to focus higher incentives for residential customers in census tracts in AEP Ohio's service territory where 50% of households have income less than two times the federal poverty threshold as defined by 2011 – 2015 American Community Survey (ACS).

1. Standard incentive amount for middle to upper income households
2. Increased incentive amount for households 151-400% federal poverty threshold
3. 100% incentive for 150% and below federal poverty threshold through the Community Assistance program.
4. Leverage interest buy-down financing or other financing opportunities for eligible customers.

b. Business

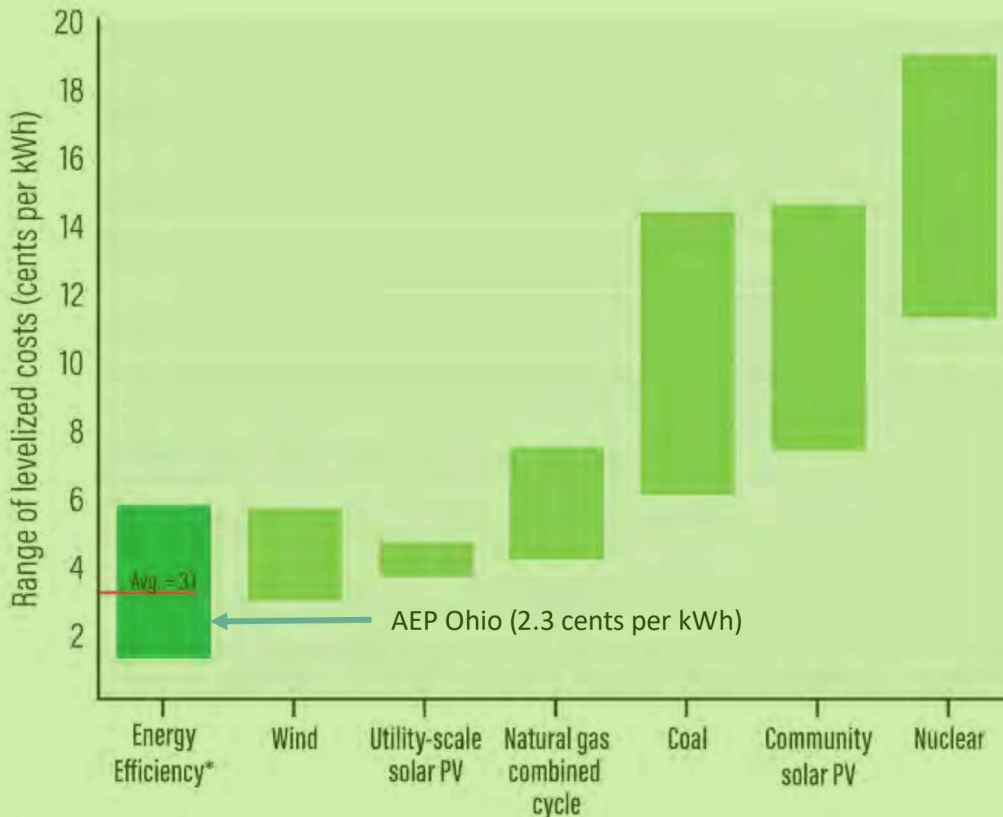
The incentive strategy for Business programs will focus on four main objectives:

1. Maximize incentives through midstream point-of-sale, reducing the higher administrative costs of application programs.
2. Focus incentive levels on measures that also produce demand savings to shape peak demand.
3. Provide incentives to those who need it most. For example, AEP Ohio can look to focus higher incentives for business in census tracts in AEP Ohio's service territory where 50% of households have income less than two times the federal poverty threshold as defined by 2011 – 2015 American Community Survey (ACS). This includes projects in the small business program and new construction program, especially for low income multifamily construction projects where more efficient units lead to lower energy bills for tenants.
4. Leverage interest buy-down financing opportunities or other financing mechanisms for eligible customers to alleviate the first cost barrier.

V. Benefits

The lifetime cost of saved energy is estimated to be \$0.023/kWh for the Company's DSM Plan, comparable to a supply-side generation investment alternative. As compared with supply-side generation investment alternatives (including non-dispatchable technologies such as wind and solar), the AEP Ohio DSM Plan cost compares favorably, and is the lowest cost alternative. Additionally, AEP estimates the nominal cost of saved demand is \$87 per MW/day. In contrast, using the PJM study, states that the least expensive Combined Cycle power plant to be at \$269 per MW/day⁴. The value of this flexible DSM Plan resource is less than one third of the cost of a supply-side resource. AEP Ohio is proposing a cost effective portfolio below the industry average levelized costs per kWh. See Figure 3 below.

Figure 3. DSM is the lowest cost resource⁵



*Notes: Energy efficiency program portfolio data from Molina and Relf 2018. Represents costs to utilities or program administrators only, including shareholder performance incentives if applicable. All other data from Lazard 2018 Unsubsidized Levelized Cost of Energy Comparison.

⁴ <https://www.pjm.com/~media/committees-groups/committees/mic/20180425-special/20180425-pjm-2018-cost-of-new-entry-study.ashx>

⁵ <https://aceee.org/files/proceedings/2018/#/paper/event-data/p191>

a. Avoided Supply Costs

The value of avoided generation and capacity refers to the costs of the electric resources that are deferred or avoided by the DSM resources. The value of the avoided generation and capacity is a fundamentally established concept in DSM. AEP Ohio is using marginal cost values as forecasted by AEP Fundamentals group, which have been used historically as a dependable benefit for DSM programs. The avoided energy generation values are separated by On Peak/Off Peak pricing and these will be blended together by the load shapes of a specific sector. For more detail, please refer to JFW-2 Appendix Section VI.

b. Avoided Transmission and Distribution Costs

The value of avoided transmission requires a separate study to determine accurately and distribution is difficult to quantify until AEP Ohio has demand response capability at sufficient scale on a given circuit or station, so AEP Ohio is proposing to gain scale before attempting quantification of this value. For the purposes of this proposal, no value for avoided transmission or distribution cost is assumed, but AEP Ohio plans to include additional avoided costs if further data becomes available. For more detail, please refer to JFW-2 Appendix section VI.

c. Discount Rate for Present Value Benefits/Costs

For the discount rate in net present value calculations, AEP Ohio will use its Weighted Average Cost of Capital (WACC) as defined by NARUC⁶. The cost of capital is a weighted average costs of all elements in the capital structure. AEP Ohio proposes to use the pre-tax value of 7.921% as its discount rate, which was the calculated WACC as detailed by witness Messner in his testimony.

d. Electric Vehicles Can Lower Rates for all Customers

As identified in a Synapse Energy study, "EVs in California have increased utility revenues more than they have increased utility costs, leading to downward pressure on electric rates for EV-owners and non-EV owners alike."⁷ The need for utility involvement and guidance in grid management is essential to structuring the increased energy usage of electric transportation that will lower costs for all customers.

Electric transportation infrastructure also provides a fundamental opportunity to impact demand side management. The Synapse Energy study of two California utilities noted, when charged during off-peak hours, "EVs impose minimal costs on the grid and help to utilize resources more efficiently"⁸ With AEP Ohio's ET programs in place, efficiently filling the valleys of load with ET charging will benefit all customers of AEP Ohio.

⁶ <https://pubs.naruc.org/pub.cfm?id=5388A091-2354-D714-5150-D873753A9C4C>

⁷ <http://www.synapse-energy.com/sites/default/files/EVs-Driving-Rates-Down-8-122.pdf>

⁸ Id

Consider the example of such included in Figure 4 below. A typical EV driver traveling an average of 40 miles per weekday, charging exclusively at home, with a vehicle efficiency of 3 mi/kWh, and vehicle charging power of 7.4 kW. Using the standard residential tariff, current capacity costs, we can quantify the costs for both on-peak and off-peak charging. The incremental benefits of a single EV charging completely off-peak \$207 (downward rate pressure) when compared to charging completely on-peak. Figure 4 below demonstrates the impacts of the proposed residential program cumulatively over a 5 year period.

Figure 4: Electric Vehicle Financial Impacts Scenario

	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Cumulative Participants	500	1,000	1,500	2,000	2,500	7,500
On-Peak Downward Rate Pressure Benefit	\$14,689	\$29,378	\$44,067	\$58,756	\$73,445	\$220,335
Off-Peak Downward Rate Pressure Benefit	\$117,964	\$235,928	\$353,892	\$471,856	\$589,820	\$1,769,460
Incremental Downward Rate Pressure Benefit	\$103,275	\$206,550	\$309,825	\$413,100	\$516,375	\$1,549,125

e. Non-Energy Benefits

There are multiple benefits to DSM outside of reduced energy costs. For the residential side, AEP Ohio has only quantified a portion of available benefits to use for cost effectiveness test purposes. For the retrofit low income program, AEP Ohio has incorporated an analysis done for the Community Assistance Program. This analysis shows that every dollar spent on the program, provides approximately \$1.52 in benefits to all customers in reduced collections to the Universal Service Fund. Non-energy benefits identified by AEP Ohio non-residential customers can be found in Figure 5. For more detail, please see JFW-2 Appendix section IV. For the business programs there are many various quantifiable operations and maintenance reductions associated to DSM participation, AEP Ohio proposes an additional \$18.3 per MWh of benefits. These benefits will be incorporated into the testing values shown below.

Figure 5. Percent of measures resulting in non-energy benefits by type of benefit (n=79)

Benefit category	Measures resulting in benefit	Percent
Comfort Increased	41	52%
Safety Increased	34	43%
Productivity Increased	22	28%
Other Revenue Increased	3	4%
Sales Increased	2	3%
Other Increase	2	3%
Downtime Decreased	19	24%
Labor Costs Decreased	10	13%
Other Decrease	10	13%
Material Costs Decreased	5	6%
License Costs Decreased	2	3%
Waste Disposal Costs Decreased	0	0%

f. Energy DRIPE

Demand Reduction Induced Price Effects, or DRIPE, is defined from the EPA's Office of Energy Efficiency and Renewable Energy (EERE)⁹ as: In wholesale electricity markets, DRIPE is usually conceptualized as a downward movement in the demand curve, leading to a new equilibrium of supply and demand being established at a lower price point. This basic theoretical model applies to price effects arising from both energy efficiency and demand response, though the duration of demand reductions is much longer in the case of energy efficiency, as the reductions continue throughout the lifetime of the project as opposed to the few minutes or hours during which a demand response resource is dispatched.

DRIPE reduces the marginal cost of electricity by exposing market inefficiencies and substituting lower cost energy efficiency for higher cost supply. This means that greater energy efficiency will decrease the need to purchase energy from higher cost sources, and lower peak demand will lessen the need to invest in new generation capacity.

AEP Ohio has utilized the study completed for ComEd in 2015¹⁰, by Energy Futures Group and Resource Insight. The quantified value AEP Ohio is proposing to use is a 1% decrease in energy costs, thus providing a benefit for energy reductions achieved by AEP Ohio and its customers. For more detail, please refer to JFW-2 Appendix Section VI.i.

⁹ https://www4.eere.energy.gov/seeaction/system/files/documents/DRIPE-finalv3_0.pdf

¹⁰ <https://www.raponline.org/knowledge-center/the-value-of-demand-reduction-induced-price-effects-dripe/>

g. Greenhouse Gas Reductions

The transportation sector generates the largest portion of greenhouse gas emissions; 28.8% in 2019¹¹. The current generation of EVs emits less than half the equivalent carbon dioxide of the average new combustion gasoline vehicle in Columbus.¹² Reducing tailpipe emissions is important to help address local pollution. This will support the State of Ohio in attaining federal standard for air pollutants. “We learned this year that the transportation sector is now the most significant contributor to U.S. greenhouse gas (GHG) emissions, the pollutants at the root of the climate crisis.”¹³ Utilizing the data available for expected lifetime of light duty vehicles¹⁴; average emissions of internal combustion engine¹⁵; and EV (Bolt)¹⁶; and estimated annual miles¹⁷; the proposed ET residential program would directly reduce 15,766 tons of carbon annually. Taking into consideration upstream effects, this equates specifically to 10,410 tons tailpipe emissions. This reduction benefits all customers.

Figure 6. Carbon Emission Inputs

Expected lifetime of light duty vehicle	11 years
Average emissions of internal combustion engine vehicle	410 grams/mile
Emissions of reference EV (Bolt)	170 grams/mile
Estimated annual miles	11,113 miles/year
Upstream GHG emissions Factor(includes production and distribution of the fuel used to power the vehicle)	1.25
Average Tailpipe emissions of internal combustion engine vehicle	328 grams/mile

Moreover, this proposed DSM plan will promote the public interest by reducing total generating plant emissions and, as a result, will provide significant environmental benefits to all customers. This plan estimates that the energy savings from programs will save almost 159,000 tons of CO₂ annually.

h. Economic Development

To capture the full economic impacts of the investments in energy efficiency, three separate effects (direct, indirect, and induced) must be examined for each change in expenditure. The sum of these three effects yields the total effect resulting from a single expenditure.

¹¹ <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

¹² FuelEconomy.gov, “Beyond Tailpipe Emissions”, available at: <https://www.fueleconomy.gov/feg/Find.do?zipCode=43215&year=2019&vehicleId=40520&action=bt3>

¹³ <https://cleanenergy.org/blog/electrifying-transportation-a-holistic-approach/>

¹⁴ <https://www.consumerreports.org/car-repair-maintenance/make-your-car-last-200-000-miles/>

¹⁵ FuelEconomy.gov, “Beyond Tailpipe Emissions”, available at: <https://www.fueleconomy.gov/feg/Find.do?zipCode=43215&year=2019&vehicleId=40520&action=bt3>

¹⁶ Id.

¹⁷ <http://mydocs.epri.com/docs/PublicMeetingMaterials/ee/000000003002013754.pdf>

The **direct effect** refers to the on-site or immediate effects produced by expenditures. In the case of installing energy efficiency upgrades in a home or business, the direct effect is the on-site expenditures and jobs of the construction or trade contractors hired to carry out the work.

The **indirect effect** refers to the increase in economic activity that occurs when a contractor or vendor receives payment for goods or services delivered and is able to pay others who support their businesses. This includes the equipment manufacturer or wholesaler who provided the new technology. It also includes the bank that provides financing to the contractor, the vendor's accountant, and the building owner where the contractor maintains its local offices.

The **induced effect** derives from the change in spending that energy efficiency investments enable. Businesses and households are able to meet their energy, heating, cooling, and lighting needs at a lower total cost, due to efficiency investments. This lower cost of doing business and operating households makes greater wealth available for businesses and families to spend or invest in other goods and services such as food, clothing, entertainment, or marketing (in the case of businesses).

Figure 7 shows the total number of potential jobs—direct and indirect—that are estimated would be created from investing \$36.6 million in electric energy efficiency and peak demand reduction in AEP Ohio customer homes and businesses in 2021. Induced effects were not included in this estimate. On average, based on this analysis, one job potentially will be created for approximately \$13,890 in spending.

Figure 7. Number of Jobs Created – 2021

2021	Direct	Indirect	Induced	Total
Jobs Created	1,012	1,623	0	2,635

i. Customer Satisfaction

AEP Ohio listens to our customers and programmatic adjustments are made per their feedback. We use various tools to measure customer satisfaction with AEP Ohio that includes surveys, social media and the call center. Customer satisfaction is a key focus and we take it very serious and place emphasis on the customer. It is AEP Ohio's belief is that our customers want us to provide programs to meet their needs such as saving on their bill and for environmental purposes.

Based on the 2019 JD Power results¹⁸, on a 1000 point scale respondents familiar with AEP Ohio's Energy Efficiency Programs were 230 points (23% higher) more satisfied with AEP Ohio overall than not at all familiar with energy efficiency. Other key findings include:

A survey completed by Opinion Dynamics in January 2020 showed 72% of customers rated the AEP Ohio Marketplace a satisfaction of 4 or 5 on a 5 point scale. Less than one percent (0.9%) said they were not at all satisfied.

¹⁸ Source: JD Power 2019 Year End results - Residential only.



The 2018 Program Year Evaluations conducted by Guidehouse (formerly Navigant) showed over 92% of the teachers agreed that e3Smart program activities helped students better understand energy efficiency. For Community Assistance - the low income program, customer's average program satisfaction was 8.99 out of 10.

According to the ESource Business Survey 2019, the question was asked of the Company's business customers: "Should the Utility offer a variety of rate options, programs and services?" AEP Ohio customer responses were favorable at 8.2 on a scale of 10 being most positive. Another questions asked was "Should the Utility provide resources that help me manage energy costs and make informed decisions?" AEP Ohio customer responses were favorable at 8.4 on a scale of 10 being most positive. (JFW-2 DSM Plan Appendices, section XIV, Customer Satisfaction).

VI. Benefit-Cost Analysis

Energy efficiency has a long history of being valued using the California Standard Practice Manual (“CaSPM”) tests. These tests were standardized in the National Standards Practice Manual (NSPM), and programs have been historically evaluated with respect to one or more of the four benefit-cost tests¹⁹: Utility Cost Test, Total Resource Cost Test, Ratepayer Impact Measure Test, and Participant Cost Test. The Utility Cost Test has been the primary test for cost effectiveness in measuring performance of AEP Ohio over the last eleven years. From the NSPM, there is also a new test that AEP Ohio is using to evaluate the DSM Plan for cost effectiveness, the Resource Value test, defined below.

a. Utility Cost Test (“UCT”)

The purpose of the UCT is to indicate whether the benefits of an EE resource will exceed its costs from the perspective of the utility system. The UCT includes all costs and benefits that affect the operation of the utility system and the provision of electric and gas services to customers. For vertically integrated utilities, this test includes all of the costs and benefits that affect utility revenue requirements. For utilities that are not vertically integrated, this test includes all costs and benefits that affect utility revenue requirements, plus additional costs and benefits associated with market-based procurement of electricity and gas services. The UCT is sometimes referred to as the Program Administrator Cost test, to include those cases where ratepayer-funded EE programs are implemented by non-utility administrators. The UCT is a more accurate name because the costs and benefits included in this test are those that affect the utility system, not those that affect the Program Administrator.

b. Resource Value Test (“RVT”) - NEW

The RVT is the primary cost-effectiveness test designed to represent a regulatory perspective, which reflects the objective of providing customers with safe, reliable, low-cost energy services, while meeting a jurisdiction’s other applicable policy goals and objectives. As described in detail within the NSPM, each jurisdiction can develop its own RVT using the Resource Value Framework.

The RVT focus on the regulatory perspective differs from the three most common CaSPM traditional tests—the Utility Cost Test (UCT), Total Resource Cost (TRC) test and Societal Cost Test (SCT). These tests provide the perspective of the utility, the utility and participants, and society as a whole, respectively. Depending on a jurisdiction’s energy and other applicable policy goals, the resulting RVT may or may not be different from the traditional cost-effectiveness tests. Put another way, it is possible for a jurisdiction’s applicable policy goals to align with one of the traditional CaSPM tests, in which case its RVT will be identical to one of those tests. However, it is also possible—and indeed likely in many cases—that a jurisdiction’s energy and other policy goals will not align well with goals implicit in any of the traditional tests. In such cases, the RVT will be different than the traditional tests. AEP Ohio is proposing to incorporate a version of the RVT into the cost tests as explained below.

¹⁹ https://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf

Figure 8. Benefit-Cost Test Formulae

Cost Test	Formula	Key of Terms	
Utility Cost Test (UCT)	$UCT = A / (B + C)$	A = PV Avoided Costs	D = PV Non Energy Benefits
Resource Value Test(RVT)	$RVT = (A + D) / (B + C)$	B = PV Administrative Costs	PV = Present Value
		C = PV Incentive Costs	Discount Rate = WACC

c. Benefit / Costs Tests

For purposes of Cost effectiveness, AEP Ohio will use these tests to determine the value and effectiveness of a program. AEP Ohio used the UCT test to guide measure selection and which DSM programs to include that are focused on demand reduction. The Plan as a whole was valued through the RVT, including the administrative costs, and the administrative fee. We have excluded cross sector costs from the tests, and only will be included if they have measurable savings. AEP Ohio created a version of the RVT in which the UCT test incorporates various quantified Non Energy benefits. This purpose of this test is to put value to the various Non Energy Benefits associated to participation in the DSM programs. AEP Ohio plans to study more Non Energy Benefits, and if more Non Energy Benefits become quantifiable, AEP Ohio plans to incorporate them into the RVT.

Figure 9. Projected Benefit Cost Tests

Program	UCT	RVT
Efficient Products	3.0	3.0
Retrofit Low Income	0.2	1.3
Residential Demand Response	1.3	1.3
New Homes	1.4	1.4
e3smart	1.5	1.5
Residential Subtotal	2.2	2.2
Efficient Products for Business	4.1	5.8
Process Efficiency	5.1	7.1
Business New Construction	3.3	4.8
Small Business Express	1.4	2.0
C&I Demand Response	N/A	N/A
Business Subtotal	3.7	6.2
Plan Total	2.3	3.0

Evaluation, Measurement, and Verification

The DSM plan is designed to be cost-effective on a portfolio basis using the Utility Cost Test and Resource Value Test. In general, each program proposed within the plan should also be cost-effective using the Utility Cost Test and Resource Value Test. The portfolio may include programs that are not cost-effective when those programs provides substantial non-energy benefits.

The Company plans to use a variety of methods to measure performance: directly measure savings, calculate using methods found in the Ohio technical reference manual, or other reasonable statistical and/or engineering methods. The Company will use the Ohio TRM as long as it is available and current, with recommendations to justify additional measurements as needed to supplement the TRM.

Stakeholders shall be given an opportunity for participation in program portfolio updates and refinement. At a minimum updates on the energy efficiency and peak demand reductions achieved by programs shall be presented at semi-annual stakeholder meetings.

Costs incurred in implementation of programs, new programs or measures are being considered, and input from stakeholders on existing and potential new programs shall be discussed.

a. Annual Performance Verification

Four months after the end of each program year, a portfolio performance report shall be filed addressing the performance of its energy efficiency and peak demand reduction programs over the previous calendar year.

The portfolio performance report shall detail achieved annualized energy savings, achieved demand reductions, and the demand reductions that programs were reasonably designed to achieve, relative to the corresponding energy and peak demand portfolio reduction goals. At a minimum, this section of the portfolio status report shall include each of the following:

- i. A comparison of actual annualized energy savings and peak-demand reductions achieved against plan goal.
- ii. A description of each energy efficiency or peak-demand reduction program implemented in the previous calendar year.
- iii. The key activities undertaken in each program, the number and type of participants, a comparison of the forecasted savings to the verified savings achieved by such program.
- iv. An evaluation, measurement, and verification report that documents the energy savings and peak-demand reduction values and the cost effectiveness of the energy efficiency and demand-side management portfolio to be filed every year.

AEP Ohio DSM Plan Appendices

6/15/2020

VI. Avoided Costs

For the purposes of cost tests, Avoided Costs refers to the costs of the electricity resources that are avoided by the DSM resources. AEP Ohio has defined these values in JFW-1 DSM Plan, and their use in the cost effectiveness tests. **These forecasted generation costs come from the AEP Fundamentals team.** The values used are most recent available titled "2019H1_LTF_FT_Base_2019-04-23." Please see below for the total quantified values table.

Figure 9. Avoided Cost values

Avoided Costs		The calculations are first year + NPV(remaining years)							
Discount Rate		A+B	C+D	E	A	B	C	D	E
7.83%		Year	On-Peak	Off-Peak	On-Peak	On-Peak	Off-Peak	Off-Peak	Avoided Capacity
			\$/Annual kWh	\$/Annual kWh	\$/KW	\$/Annual Energy	\$/Annual Energy	\$/DRIPE	\$/KW
		2020	\$0.03128	\$0.02544	\$31.50	\$30.97000	\$25.42917	\$0.25	\$31.50
		2021	\$0.03144	\$0.02571	\$41.45	\$31.12750	\$25.70417	\$0.26	\$41.45
		2022	\$0.03257	\$0.02679	\$31.91	\$32.25083	\$26.78417	\$0.27	\$31.91
		2023	\$0.03393	\$0.02795	\$29.86	\$33.59583	\$27.93500	\$0.28	\$29.86
		2024	\$0.03537	\$0.02922	\$28.07	\$35.02333	\$29.20583	\$0.29	\$28.07
		2025	\$0.03653	\$0.03015	\$26.53	\$36.16917	\$30.14333	\$0.30	\$26.53
		2026	\$0.03762	\$0.03108	\$25.27	\$37.24583	\$31.06583	\$0.31	\$25.27
		2027	\$0.03909	\$0.03228	\$24.31	\$38.69917	\$32.27417	\$0.32	\$24.31
		2028	\$0.04805	\$0.04104	\$23.67	\$47.57000	\$41.02750	\$0.41	\$23.67
		2029	\$0.04832	\$0.04112	\$23.37	\$47.84250	\$41.10833	\$0.41	\$23.37
		2030	\$0.04937	\$0.04192	\$23.43	\$48.88583	\$41.91167	\$0.42	\$23.43
		2031	\$0.05023	\$0.04239	\$23.85	\$49.72917	\$42.37667	\$0.42	\$23.85
		2032	\$0.05181	\$0.04318	\$24.67	\$51.29417	\$43.17333	\$0.43	\$24.67
		2033	\$0.05291	\$0.04390	\$25.91	\$52.38917	\$43.88833	\$0.44	\$25.91
		2034	\$0.05411	\$0.04516	\$27.58	\$53.57417	\$45.14583	\$0.45	\$27.58
		2035	\$0.05616	\$0.04660	\$29.72	\$55.60333	\$46.59167	\$0.47	\$29.72
		2036	\$0.05641	\$0.04696	\$32.34	\$55.85583	\$46.94583	\$0.47	\$32.34
		2037	\$0.05790	\$0.04834	\$35.47	\$57.32667	\$48.32833	\$0.48	\$35.47
		2038	\$0.05999	\$0.04980	\$39.14	\$59.40000	\$49.78917	\$0.50	\$39.14
		2039	\$0.06156	\$0.05090	\$43.35	\$60.94583	\$50.88583	\$0.51	\$43.35
		2040	\$0.06236	\$0.05195	\$48.13	\$61.74083	\$51.94000	\$0.52	\$48.13
		2041	\$0.06295	\$0.05302	\$53.52	\$62.32833	\$53.01417	\$0.53	\$53.52
		2042	\$0.06440	\$0.05462	\$59.51	\$63.76250	\$54.60917	\$0.55	\$59.51
		2043	\$0.06494	\$0.05586	\$66.13	\$64.30000	\$55.84667	\$0.56	\$66.13
		2044	\$0.06723	\$0.05809	\$73.40	\$66.56333	\$58.08000	\$0.58	\$73.40

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

5/27/2021 12:55:20 PM

in

Case No(s). 20-0585-EL-AIR, 20-0586-EL-ATA, 20-0587-EL-AAM

Summary: Attorney Examiner Entry ordering that consistent with the attorney examiner's ruling during the evidentiary hearing, AEP Ohio Ex. 15 be admitted into the record, as filed on May 21, 2021 and ordering that consistent with the attorney examiner's ruling during the evidentiary hearing, ELPC Ex. 2 be admitted into the record and the highlighted sections of the document, as attached hereto, may be cited by the parties in their briefs, in accordance with this Entry electronically filed by Heather A Chilcote on behalf of Greta See, Attorney Examiner, Public Utilities Commission