

**BEFORE  
THE PUBLIC UTILITIES COMMISSION OF OHIO**

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In the matter of the Application of	)	
<b>OHIO POWER COMPANY</b>	)	
For authority to establish a Standard	)	
Service Offer Pursuant to Section	)	<b>Case No. 16-1852-EL-SSO</b>
4928.143, Ohio Revised Code, in	)	
the Form of an Electric Security Plan	)	
the generation and distribution of	)	
electricity and for other relief	)	

In the Matter of the Application of	)	
<b>OHIO POWER COMPANY</b>	)	<b>Case No. 16-1853-EL-AAM</b>
For approval of Certain Accounting	)	
Authority	)	

**DIRECT TESTIMONY  
OF  
DR. ABDELLAH CHERKAOUI  
ON BEHALF OF  
THE ELECTRIC VEHICLE CHARGING ASSOCIATION**

1           **I.       INTRODUCTION AND SUMMARY OF RECOMMENDATIONS**

2           **Q:     Please state your name and address.**

3           A:     My name is Dr. Abdellah Cherkaoui and I reside at 2638 Hyde Street, San  
4                    Francisco, California.

5           **Q:     Please describe your background, experience, and expertise.**

6           A:     I am currently the Senior Vice President of Government, OEMS (original  
7                    equipment manufacturers) & Utilities Market Development for Volta Charging,  
8                    LLC. In this role, I work directly with utilities, OEMs and federal, state and local  
9                    governments as well as relevant public agencies to support the broad and effective  
10                  development of electric vehicle charging infrastructure and accelerate the  
11                  adoption of electric transportation. I am also a founding Board member, and  
12                  former Policy Chair of the Electric Vehicle Charging Association (“EVCA” or  
13                  “the Association”), a not-for-profit organization that brings the collective  
14                  experience and expertise of leaders in the electric vehicle charging industry to  
15                  policymakers, stakeholders, and members of the public to promote the critical role  
16                  of electric vehicle (“EV”) technology, infrastructure, and services and to advocate  
17                  for policies that will expand clean transportation.

18                Prior to joining Volta, I provided independent advising and consultancy for the  
19                development of technology platforms for sustainable electric mobility and energy  
20                management in North America and Europe. From 2009 to 2012, I served on  
21                Chargepoint’s European management team as CIO and VP in charge of  
22                technology and operations, overseeing product management and technical

1 implementation of the ChargePoint network in Europe. I worked directly with  
2 municipalities and utilities to develop their strategies and implementation of EV  
3 charging solutions. Prior to this, I held applied research and academic positions at  
4 the University of California in Santa Cruz and at the University of Washington in  
5 Seattle.

6 I hold a Ph.D. degree from the University of Washington in Seattle and a Master's  
7 degree in engineering from the Rabat School of Mines in Morocco. I am also a  
8 Fulbright Doctoral Fellow and a NASA International Fellow.

9 **Q: On whose behalf are you testifying?**

10 A: I am testifying on behalf of the Electric Vehicle Charging Association. I am the  
11 Secretary/Treasurer of the EVCA Board of Directors.

12 **Q: Are you sponsoring any exhibits?**

13 A: Yes. Exhibit A (incorporated discovery responses from the Ohio Power  
14 Company) is attached.

15 **Q: What is the purpose of your testimony in this proceeding?**

16 A: The purpose of my testimony is to address the proposal from Ohio Power  
17 Company ("AEP Ohio" or "the Company"), as presented by witness Osterholt, to  
18 install electric vehicle charging infrastructure using ratepayer funding. Section II  
19 of my testimony will summarize the proposal from AEP Ohio. Section III of my  
20 testimony will detail EVCA's principles of utility investment in electric vehicle  
21 charging infrastructure, focused on the foundation of the competitive market for

1 charging equipment in Ohio. Section IV of my testimony will explore how AEP  
2 Ohio's proposed deployment of EV infrastructure contrasts with EVCA's  
3 principles for investment. It will show how AEP Ohio's proposal affects the  
4 competitive market for EV charging throughout the State. Finally, Section V will  
5 offer the Commission an alternative program design that fosters competitive  
6 market offerings and innovation, while enabling utility investment in the  
7 deployment of charging infrastructure.

8 **Q: Please summarize your recommendation for the Commission.**

9 A: I recommend that the Commission direct AEP Ohio to modify its proposal to own  
10 and operate public charging stations to align with charging industry principles  
11 detailed in Section III. Under those principles AEP Ohio would incent  
12 development of a smart charging network in a way that will stimulate innovation,  
13 competition, and customer choice in the market for EV charging equipment. This  
14 alternative proposal, in Section V of my testimony, involves utility investment in  
15 rebates for EV charging hardware, services, and installation, which may be  
16 recovered as a regulatory asset, and encourages customer investment in  
17 competitive charging technologies.

18 **Q: Please describe EVCA's membership and expertise in the EV charging**  
19 **market.**

20 A: The Electric Vehicle Charging Association is a not-for-profit organization  
21 comprised of member-companies representing a vast majority of the competitive  
22 electric vehicle charging infrastructure market. EVCA's mission is to educate

1           policymakers, stakeholders, and members of the public about the critical role of  
2           EV technology, infrastructure, and services. EVCA advocates for policies that  
3           will expand clean, electrified transportation.

4           EVCA's member organizations develop, manufacture, and deploy electric vehicle  
5           charging infrastructure and manage data networks to support EV supply  
6           equipment.

7           **Q:    What are examples of the products and services that EVCA's member-**  
8           **companies offer to the market?**

9           A:    EVCA's members offer product lines of home and commercial Level 2 ("L2")  
10          and DC Fast Charger ("DCFC" or "DC fast charger") stations and services, which  
11          are designed for different applications, depending on the segment of the market  
12          served. For example, companies may offer L2 dual-port stations for public and  
13          workplace charging, and may offer a more compact product for residential uses.

14          **Q:    What is networked charging?**

15          A:    Network charging infrastructure is defined by a communication channel that  
16          connects EV drivers and stations under a cohesive, information-enabled  
17          ecosystem. In commercial applications EV charging networks typically involve  
18          EV drivers holding a membership or account, which enables drivers to access and  
19          utilize stations within that system and see information associated with their  
20          charging. Similarly, in residential applications a networked charging station gives  
21          homeowners access to charging session information. Networked charging stations  
22          may also provide for additional, data-driven functionalities. For drivers, the

1 Association's members may offer mobile and web applications for all aspects of  
2 their public, workplace, and home EV charging. Drivers enrolled in a charging  
3 network have access to real-time information, payment, and support services.  
4 Station owners, known in industry terms as "site hosts", may have access to  
5 cloud-based platforms, which provide site hosts with tools for managing EV  
6 charging operations, including online management applications for data analysis,  
7 billing, and payment processing, and energy usage or load visibility. Networked  
8 charging also enables remote maintenance and management of EV charging  
9 assets.

10 **Q: Where do EVCA member-companies operate?**

11 A: EVCA's membership has operations worldwide, with some members currently  
12 serving charging stations in 48 out of 50 states in the US, including L2 and DC  
13 fast charging stations in Ohio.

14 **Q: Who are typical customers of EVCA's member-companies' charging**  
15 **stations?**

16 A: Customers include workplaces, governments, hotels, colleges and universities,  
17 hospitals, electric utilities and other energy companies, parking garages, airports,  
18 multifamily housing, auto dealerships, and other businesses. Examples of  
19 customers in AEP Ohio's service territory include The Ohio State University,  
20 Tanger, BMW, and Walgreens.

## **II. SUMMARY OF AEP OHIO'S PROPOSAL**

**Q: What does the Company propose to do in the EV charging station market?**

A: On November 23, 2016, AEP Ohio filed an application to extend and modify its Electric Security Plan ("ESP"). Contained in that application is a Distribution Technology Investment Plan detailing the deployment of various technologies, including charging stations to support electric vehicles. This investment plan includes the following deployments of EV charging stations in a four-year demonstration phase ("Phase I"):

- AEP Ohio owning and operating 250 L2 public smart charging stations and 25 public DC fast chargers at to-be-determined locations throughout its service territory;
- AEP Ohio developing 1,000 residential charging stations;
- AEP Ohio potentially seeking to double the amount of deployed EV charging stations proposed at a time as yet to be determined.

**Q: Does AEP Ohio's proposed Phase I deployment detail pricing for charging services?**

A: Yes. During the demonstration phase of the deployment, the Company will provide charging services at no charge.

**Q: Would EV charging site hosts have a choice of the charging stations installed on their premises under AEP Ohio's proposal?**

A: No. AEP Ohio's plan involves the Company's selection of one or more vendors for the deployment of charging stations.

1       **Q:     Would the EV charging site hosts have control over the charging stations**  
2       **installed on their premises under AEP Ohio's proposal?**

3       A:     AEP Ohio’s proposal does not indicate whether site hosts will be able to control  
4       pricing, access, and data as part of AEP Ohio’s proposal. Additionally, in  
5       response to interrogatory EVCA-INT-1-022, witness Osterholt states that there  
6       was no plan to engage site hosts in feedback associated with pricing for a specific  
7       site.

8       **Q:     Does AEP Ohio’s Phase I deployment require L2 and DC fast charging site**  
9       **host to contribute to the cost of the EV charging equipment?**

10      A:     No. Under the proposed plan, site hosts contribute to neither the equipment cost  
11      nor associated installation costs of L2 and DCFC infrastructure.

12      **Q:     Does AEP Ohio’s deployment include any requirements related to load**  
13      **management, demand response (“DR”), or vehicle-grid integration (“VGI”)?**

14      A:     Yes. Witness Osterholt mentions networking capabilities for Level 2 public  
15      charging stations, including data collection, network communications, and  
16      demand response (“DR”). The plan also mentions DR as a desired attribute of the  
17      Company’s deployment of residential charging stations.



### III. PRINCIPLES OF UTILITY INVESTMENT IN ELECTRIC VEHICLE CHARGING

**Q: Should utility commissions be considering utility investment in EV charging infrastructure?**

A: Yes. EVCA believes that there is a need for commissions to consider the full range of roles for a regulated monopoly that will help support and encourage the near-term accelerated deployment of smart EV chargers, both in Ohio and nationwide. Investments should be thoughtful, deliberate, and risk averse to help develop a robust and sustainable EV market that promotes grid benefits for all ratepayers. EVCA believes that through its consideration of the various models for EV charging station deployment that involve utility investment, commissions can support near- and longer-term goals for wider EV adoption.

**Q: Should the utilities be playing a role in the EV charging market?**

A: Yes. Utilities are well situated to help address some of the obstacles currently preventing wider deployment of networked EV charging equipment. The Commission should authorize strategic, risk averse activities and cost-effective ratepayer-funded infrastructure investments that will help accelerate expansion of EV charging and EV adoption. Critically, there are a number of successful market models to support a utility role in EV infrastructure investment that do not involve utility ownership of customer-side equipment.

1           **Q:     Can utility ownership and operation impede upon the competitive market?**

2           A:     Yes. Utilities should not be permitted to leverage ratepayer funds to compete with  
3                 businesses selling EV charging equipment and services. More specifically,  
4                 utilities should not be able to offer a fully-subsidized product in an existing  
5                 competitive market, as it may distort market forces. The competitive market for  
6                 charging solutions is impacted when utilities do not provide site hosts with a  
7                 choice of charging technologies most appropriate for their circumstances and/or  
8                 provide only one charging solution for a large deployment throughout its service  
9                 territory. This limits the ability for charging providers to compete and sell directly  
10                to utility customers, and additionally may result in a proprietary, closed network  
11                of stations.

12          **Q:     Would utility ownership and operation of charging stations result in an**  
13          **administrative burden for the utility that is unique to the charging market?**

14          A:     Yes. There are entire business lines and models in the competitive market to serve  
15                 EV charging site hosts and customers. In entering this competitive space, utility  
16                 companies would be required to go outside of their traditional roles, going  
17                 behind-the-meter to effectively sell hardware products to consumers. In cases  
18                 where utilities indicate that they will supply a networked solution, utilities may be  
19                 required to maintain data collection infrastructure a technical team to operate the  
20                 network. In addition, utilities would be required to service and maintain all  
21                 charging equipment over the life of the assets. Again, competitive EV charging  
22                 suppliers currently serve these roles in markets nationwide.

1       **Q:     Why do charging station site hosts invest in EV charging solutions available**  
2       **in the competitive market?**

3       A:     EV charging station site hosts choose to invest in EV charging for a wide range of  
4       reasons, and each site host has its own business model for providing charging  
5       services. For many employers, it may be a low-cost benefit provided to employees  
6       to encourage adoption of clean transportation technologies that support corporate  
7       sustainability. Apartment building owners may provide charging as an amenity  
8       and will typically charge for the service as they do for a coin-operated laundry.  
9       Cities and counties may deploy charging stations to encourage low-emission  
10      driving and support local air quality, and they may charge cost-recovery fees in  
11      order to avoid giving away charging services at taxpayer expense.

12      **Q:     Should a site host be required to actively manage on-site charging stations, or**  
13      **is a utility best equipped to operate charging stations on behalf of site hosts?**

14      A:     Potential EV charging station site hosts should have the ability to choose any EV  
15      charging solution and service that best fits their needs and desired level of  
16      management. Many site hosts prefer to leverage the range of tools offered by  
17      networked stations, but some site hosts do prefer to have minimal involvement  
18      with the charger or its management after installation. These site hosts typically  
19      have the choice to sign a preventative maintenance contract with third-party EV  
20      charging station vendors for the oversight and maintenance of the EV charging  
21      station and customer services. A utility program is not needed to meet these site  
22      hosts' needs.

1       **Q:     Why is it important for site hosts to have a choice in the type of EV charging**  
2       **equipment and services?**

3       A:     Site hosts have preferences regarding the hardware and services related to EV  
4       charging. The Yale Center for Business and the Environment reviewed a range of  
5       EV charging equipment and business models and concluded that “[n]o single  
6       technology or business model available today is exactly right for all charging  
7       scenarios. There are pros and cons to each alternative, depending on the location  
8       and the driver base that the charging station aims to serve.”<sup>1</sup> The range of choices  
9       in EV charging goods and services is a strength indicating that the quickly  
10      evolving market is meeting the varied needs of its wide range of consumers. Site  
11      hosts are able to tailor the particular options for station fees, driver authentication,  
12      accessibility, payment collection and other transaction capabilities, advertisement,  
13      and data management and output (e.g., energy, station usage, and environmental  
14      benefits). Site hosts are also the best suited to make choices about the number of  
15      charging stations needed on their site. This is especially true when site hosts  
16      participate in the purchase of the charging station, which will help ensure that  
17      charging stations are deployed efficiently and in places where they will get the  
18      most use.

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<sup>1</sup> Yale Center for Business and the Environment, 2015, “Financing Electric Vehicle Markets in New York and Other States” page 6, available at [http://cbey.yale.edu/files/YALE-CBEY-EVSE%20PAPER\\_FINAL.pdf](http://cbey.yale.edu/files/YALE-CBEY-EVSE%20PAPER_FINAL.pdf).

1       **Q:     Why should site hosts have the ability to control pricing for the EV charging**  
2       **stations installed on their premises?**

3       A:     EVCA strongly believes that EV charging station site hosts must be allowed to  
4       control pricing, as well as access, to ensure that charging stations meet the needs  
5       of both EV charging site hosts and drivers. Empowering businesses with the  
6       flexibility to provide charging services at variable pricing enables site hosts to  
7       incent EV drivers to utilize charging equipment in the most effective and efficient  
8       ways, depending on the conditions at that site. Pricing for charging services can  
9       impact driver behavior and effectively serve as a signal to EV drivers to stay at  
10      certain charging locations and leave those locations as a site host determines.  
11      With the ability to make decisions about EV charging stations and services, site  
12      hosts will be able to incorporate more efficient energy use on their property and  
13      thereby produce a beneficial load to the grid. Examples of site host pricing  
14      options may include: free charging sessions, fixed-rate per session, per kilowatt-  
15      hour pricing, fixed-rate by time, time-of-day pricing, and pricing with different  
16      policies by driver groups.

17      For example, retail site hosts may invest in charging stations and control pricing  
18      to attract new customers. Some retailers provide completely free charging at their  
19      own expense to attract customers for their core business. Other retailers will offer  
20      free charging for a set amount of time and charge a fee thereafter to ensure  
21      maximum utilization of the charging station, or offer free charging during certain  
22      hours to incent customers to come at those times. The site host is best suited to

1 take site specific actions to ensure optimal use of the charging assets affixed to  
2 their property.

3 **Q: Can Ohio site hosts currently use all of the pricing models listed above for**  
4 **EV charging services?**

5 A: No, site hosts in Ohio are not able to set the price of charging services by energy  
6 rate (kWh).

7 **Q: Is pricing by kWh currently permitted in other States?**

8 A: Yes, 19 states and the District of Columbia currently permit pricing for charging  
9 services by kWh. Each state takes its own approach to authorizing per kWh  
10 pricing of EV charging services. For example, Connecticut provides a blanket  
11 exemption for owners or operators of EV charging stations from falling under the  
12 state's definition of a public utility.<sup>2</sup> West Virginia takes a different approach by  
13 explicitly identifying that its public service commission has no jurisdiction over  
14 the sale by non-utilities of any alternate fuel used for motor vehicles.<sup>3</sup>

15 **Q: Does EVCA have a position on the choice between networked and non-**  
16 **networked charging stations in utility investments?**

17 A: Yes. EVCA believes it is essential that utility investments include only smart and  
18 connected charging infrastructure. Networked charging provides grid benefits  
19 over traditional load management, and valuable data can be collected to inform  
20 better utility planning decisions and help maintain reliability and affordability.

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<sup>2</sup> Connecticut Revised Code 16-1, amended by 2016 Public Act 16-135, available at [https://www.cga.ct.gov/current/pub/chap\\_277.htm#sec\\_16-1](https://www.cga.ct.gov/current/pub/chap_277.htm#sec_16-1).

<sup>3</sup> W.VA. Code § 24-2d-3, available at <http://www.legis.state.wv.us/WVcode/Code.cfm?chap=24&art=2D>.

1 Based on the data collected from smart charging stations, new processes can be  
2 created to better integrate electric vehicle charging with the increasing renewable  
3 generation interconnected the grid – helping balance intermittent loads and reduce  
4 costs of providing clean energy.

5 **Q: With services available in the competitive EV charging market, do utilities**  
6 **have to own and operate charging equipment to access data from smart**  
7 **charging stations?**

8 A: No. EVCA members currently offer networked stations that give access to critical  
9 data without the need for utilities to own stations. Member-companies may offer  
10 open application program interfaces (“APIs”), which allow for utilities to view  
11 and manage data from third-party owned charging stations in their service  
12 territories. This arrangement avoids the cost of ratepayer investment in hardware,  
13 and additionally avoids costs associated with administration and maintenance of a  
14 network, while providing all of the benefits of networked charging to utilities.

15 **Q: Does EVCA’s position on utility ownership of charging stations vary among**  
16 **different charging technologies (i.e. residential, public level 2, and DC Fast)?**

17 A: No. EVCA’s members believe that maintaining the competitive market and site  
18 host choice of technologies is critical to any utility investment in EV charging.  
19 This position applies to all levels of charging.

1       **Q:     Are there any potential exceptions to limiting utility investment for**  
2       **ownership and operation of EV charging stations?**

3       A:     Yes. Utilities may have a role in deploying charging infrastructure in segments of  
4       the market that may be underserved, specifically in disadvantaged communities.  
5       Those communities may benefit from utility investment in charging equipment,  
6       however, utility programs should maintain the core principle of site host choice in  
7       charging technology.

8       **IV.    PROGRAMATIC CONCERNS WITH AEP OHIO’S PHASE I DEPLOYMENT**

9       **Q:     Does EVCA have a position on the AEP Ohio’s Phase I deployment?**

10      A:     Yes. EVCA opposes aspects of the proposed EV charging deployment, as further  
11      discussed below. EVCA has identified several critical EV charging policy issues  
12      that AEP Ohio must clarify as part of its proposed PEV Program. EVCA opposes  
13      AEP Ohio’s proposal on the basis that it could significantly impact the  
14      competitive market and omits site host choice and control of charging stations  
15      deployed.

16      **Q:     Please explain why you oppose AEP Ohio’s proposed deployment of 250 L2**  
17      **charging stations and 25 DC fast chargers.**

18      A:     AEP Ohio’s proposal fails to satisfy the principles laid out in the previous section,  
19      specifically related to customer choice and competitive market preservation.  
20      Utility programs should not narrowly prescribe beyond-the-meter end-use  
21      technologies that interface with customers, as it significantly undermines  
22      competition in the market and increases investment risk. Alternatively, utility



1 programs should qualify and incentivize capabilities and characteristics of end-  
2 use technologies to accelerate access to tools that create grid benefits. Rather than  
3 accelerate the EV charging market, procuring and deploying 250 L2 stations and  
4 25 DC Fast Chargers that are owned and operated by AEP Ohio could lead to  
5 market stagnation in Ohio. A program of this magnitude will drive EV charging  
6 station vendors out of the Company's service territory, as competing with services  
7 and products that are free-of-charge violates market forces. The Phase I proposal  
8 would have a negative impact on competition, innovation, and customer choice  
9 and will not enable scale and build a sustainable EV market.

10 **Q: Do you have concerns about AEP Ohio's plan to offer a residential charging**  
11 **station program, deploying 1,000 home charging stations?**

12 A: Yes. Similar to the market for public charging stations, the market for residential  
13 charging is competitive, with a number of companies currently competing with a  
14 range of product offerings. The entry of fully subsidized products into the  
15 residential market would undermine competitive market forces that keep the  
16 sector innovating and cost-efficient. Furthermore, there are few examples of  
17 utility ownership of behind-the-meter charging stations at customer's residences.  
18 The preferred methodology of utilities in Georgia, Indiana, California, Maryland,  
19 Minnesota, Wisconsin, Texas, and Washington is to offer a rebate or incentive for  
20 homeowner purchase of qualifying EV charging equipment, usually in exchange  
21 for a utility benefit, such as data or demand response.

1           **Q: Will the Phase I Deployment have an impact only within AEP Ohio's service**  
2           **territory, or throughout Ohio?**

3           A: AEP Ohio's deployment will have a large impact throughout Ohio's competitive  
4           EV charging market. Ohio currently has about 276 public EV charging stations  
5           listed in the US Department of Energy's Alternative Fueling Station Locator. If  
6           AEP Ohio were to deploy public 275 charging stations, the EV charging market  
7           would experience 100% growth. The scale of this program would flood the  
8           competitive EV charging market, crowding out private investment, and causing  
9           impacts that extend beyond the borders of the Company's service territory.

10          **Q: Does the Phase I deployment plan acknowledge the role of site hosts in**  
11          **selecting technologies most appropriate for their properties?**

12          A: No. AEP Ohio's proposed deployment omits concepts of site host selection or  
13          customer choice. The Company will complete a vendor selection based on its own  
14          criteria. Testimony from witness Osterholt claims that utilities are best equipped  
15          to choose EV charging station locations, yet in the most robust EV markets, site  
16          hosts drive demand for charging stations, leading to the most efficient siting of  
17          charging infrastructure. By contrast, in response to discovery requests EVCA-  
18          INT-1-002 and EVCA-INT-1-020, witness Osterholt indicates that siting will be  
19          based upon the outcomes of a study, not yet initiated, as well as the inputs of an  
20          unidentified consultant.<sup>4</sup>

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<sup>4</sup> See AEP Response to EVCA's First Set of Combined Discovery Requests, relevant excerpts attached at Exhibit A.

1       **Q:     Under the Phase I deployment, can site hosts benefit from control,**  
2               **management, or data from assets located on their properties?**

3       A:     No. AEP Ohio's proposed deployment lacks details on site host access to data and  
4               management tools that could benefit site hosts and potentially all ratepayers.

5       **Q:     Please identify any issues with the Phase I deployment's pricing model,**  
6               **which provides services for free.**

7       A:     In offering charging services for free, AEP Ohio risks distorting the potential  
8               benefits of EV charging for site hosts. Furthermore, as a period of data collection  
9               and assessment, the Phase I deployment's plan to offer free charging diminishes  
10              the quality of data collected and limits the conclusions that could be applied to a  
11              charge-for-charging scenario.

12      **Q:     Do you support fully subsidizing EV charging equipment as proposed in the**  
13               **AEP Ohio application?**

14      A:     No, we do not support this aspect of the Phase I deployment for the following  
15               reasons:

16              First, covering all equipment and installation costs removes the site host from  
17              having an active role in the EV charging station transaction, which is taking place  
18              on their property. From EVCA member-companies' experience in deploying tens  
19              of thousands of charging spots, site hosts that make a financial contribution to  
20              acquiring a charging station are far more likely to actively support the successful  
21              installation and ongoing preventive maintenance of the charging station because  
22              they have a vested interest in the success and outcome of the deployment.

1 Second, fully absorbing all of the equipment and installation costs of a single  
2 product offering, sets technology capabilities in a quickly evolving market and is  
3 an inefficient use of ratepayer funding, as the same grid benefits can be created  
4 with reduced investment and risk. Historic and projected growth in the EV  
5 charging market show that private capital is increasingly flowing into the market.<sup>5</sup>  
6 Stanching the flow of private funds will force Ohio to lose the opportunity to  
7 leverage capital investment, reduce its risk of engagement, and extend the value  
8 of ratepayer dollars invested in an EV charging program.

9 **Q: How would the AEP Ohio’s Phase I deployment impact innovation in Ohio’s**  
10 **EV charging market?**

11 A: The entrance of a regulated monopoly into the EV charging market in the manner  
12 proposed in the Phase I deployment would have a chilling effect on innovation.  
13 Non-utility actors attempting to sell equipment and services for a market-based  
14 price would be unable to compete directly with AEP Ohio and its ratepayer-  
15 funded equipment, which will supply to the market at no cost. Non-utility actors  
16 would begin responding to utility-defined product specifications in the Phase I  
17 deployment, rather than from EV market signals. Instead of harnessing the  
18 innovative capacity of the competitive market, Ohio will be limited to the  
19 specifications of a single utility procurement process. Technology is advancing  
20 rapidly in the EV charging space, and utility procurement processes are less  
21 efficient than the active competitive marketplace. Technologies selected through a

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<sup>5</sup> “Electric Vehicle Market Forecasts: Global Forecasts for Light Duty Hybrid, Plug-In Hybrid, and Battery Electric Vehicle Sales and Vehicles in Use: 2015-2024” Navigant Research, 2015, *available at* <https://www.navigantresearch.com/newsroom/global-light-duty-electric-vehicle-sales-are-expected-to-exceed-six-million-in-2024>.

1 utility procurement process may lock in that technology for many years and  
2 prevent the introduction of new, more innovative products and solutions as they  
3 become available.

4 **Q: Will AEP Ohio’s proposed program result in charging sites that will be able**  
5 **to efficiently and effectively stimulate and respond to continued growth in**  
6 **the EV adoption?**

7 A: No. Today’s investments in EV charging infrastructure must take the continued  
8 electrification of transportation into consideration. Cumulative EV sales in the US  
9 have increased by over 400% between 2013 and 2016, and Navigant Research  
10 projects that there will be 5 million EVs on the road by 2024.<sup>6</sup> Many factors are  
11 contributing to the growth observed in the EV market, such as the projected parity  
12 in total cost of ownership of EVs and internal combustion engines by 2022.<sup>7</sup>  
13 According to a recently published report on the cost-benefit analysis of EV  
14 adoption in the Company’s service territory, ratepayer net benefits from PEV  
15 adoption over the next 20 years range from \$278 Million to \$351 Million in the  
16 Low and High PEV Adoption cases, respectively.<sup>8</sup>

17 AEP Ohio’s proposed deployment does not offer any particular details on the  
18 siting of projects, and so little analysis can be advanced on the impacts of the  
19 deployment on EV adoption. Other critical elements of the program are absent in

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<sup>6</sup> *Id.*

<sup>7</sup> “Electric vehicles to be 35% of global new car sales by 2040,” Bloomberg New Energy Finance, February 25, 2016, available at <https://about.bnef.com/blog/electric-vehicles-to-be-35-of-global-new-car-sales-by-2040/>.

<sup>8</sup> “Cost-Benefit Analysis of Plug-in Electric Vehicle Adoption in the AEP Ohio Service Territory”. Energy & Environmental Economics, Inc.. April 7, 2017 at 16 of 81 (“PEV adoption also benefits AEP Ohio’s customers. From the Ratepayer Perspective net benefits from PEV adoption range from \$351M to \$278M in the Base scenario.”).

1 the application and in responses to interrogatories: details on the number of sites,  
2 the number of charging stations located at each site, and the potential for  
3 additional stations to be installed at each site in subsequent investments.<sup>9</sup> These  
4 components are crucial to determining whether an EV program is a standalone  
5 investment, or whether it is designed to be scalable with additional installation.  
6 The costs of installation often outweigh the cost of the EV charging equipment  
7 itself, and Ohio is better served to embrace a more deliberate, detailed EV  
8 engagement and defined utility role.

9 **Q: Do you have any additional concerns specific to the DC Fast Charging**  
10 **portion of the Phase I deployment?**

11 A: Yes. The DCFC segment of the EV charging market faces an additional hurdle  
12 beyond those encountered in the L2 segment: demand charges.

13 Demand charges are billed for the highest average 15-minute or 30-minute  
14 demand during a billing period, and DCFC stations are characterized by having a  
15 low load factor (sporadic instances of very high energy use) due to a limited  
16 number of vehicles in the market that will use these stations in the near term.  
17 Until the EV market achieves scale, private site hosts could be required to pay  
18 hundreds of thousands of dollars annually to operate DCFC stations given the  
19 traditional demand charge cost recovery. This would give AEP Ohio an unfair  
20 advantage around the operational cost of its ratepayer funded DCFC network.

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<sup>9</sup> See AEP Response to EVCA's First Set of Combined Discovery Requests (relevant excerpts attached at Exhibit A) at EVCA-INT-1-003; EVCA-INT-1-017; EVCA-INT-1-028.

1 The proposed scope of 25 utility-owned DCFC stations in the Phase I deployment  
2 would significantly stifle the ability of private actors to compete with AEP Ohio.  
3 Any ratepayer investment in DCFC must, in addition to protecting innovation,  
4 competition, and customer choice, also level the playing field by reforming rates  
5 to remove demand charges and recover costs through volumetric options or other  
6 means while the EV market achieves scale.

7 **Q: In taking on the role of competitive market participants, would AEP Ohio**  
8 **assume administrative burdens specific to the charging industry?**

9 A: Yes. As noted above, the competitive market currently provides support for a  
10 variety of functions to maintain EV charging infrastructure. Most significantly, in  
11 owning and operating networked charging stations, AEP Ohio would require  
12 network maintenance capabilities, a sales force to drive deployment, trained  
13 customer service for troubleshooting, and a team of experts to keep equipment up  
14 to date and functioning. Such costs are evident from witness Osterholt's response  
15 to interrogatory EVCA-INT-1-027, which lists operations and maintenance costs  
16 for the deployment, including: data and analytics, network management expenses,  
17 connectivity, repairs, and maintenance costs.<sup>10</sup> This administrative burden may  
18 hamper the Company's ability to meet customer expectations for charging  
19 equipment.

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<sup>10</sup> See AEP Responses to EVCA's First Combined Discovery Requests at EVCA-INT-1-027 (attached at Exhibit A).

1       **Q:     Has sufficient market research, evaluation, and analysis been conducted to**  
2       **approve the Phase I deployment as proposed?**

3       A:     The omission by AEP Ohio of the above-listed features in the application  
4             proposal indicates that AEP Ohio did not conduct a thorough review of the EV  
5             charging market. This lack of due diligence in reviewing the EV charging market  
6             and the studies of how it functions was admitted by AEP Ohio in its discovery  
7             responses:

- 8             •       In response to interrogatory EVCA-INT-1-004, which asked for  
9                     clarification on the Company's evaluation of the EV charging marketplace  
10                    and its relative market share of its proposed deployment, witness Osterholt  
11                    admitted that AEP Ohio had not completed its own independent study of  
12                    the market.
- 13            •       In response to interrogatory EVCA-INT-1-001, which asked whether AEP  
14                     Ohio had performed an evaluation of the potential impact of its  
15                     deployment on the competitive marketplace for charging stations, witness  
16                     Osterholt stated that the Company had not performed a formal study of the  
17                     market, but that the Company does not believe there is or would be any  
18                     negative impact of the deployment on the competitive market.<sup>11</sup>

19       **Q:     Should the transportation electrification policy course for Ohio be set**  
20       **through a pilot program as part of the ESP?**

21       A:     No. On page 27 of my testimony, I recommend that the Commission separately  
22             consider a proceeding to address Ohio's transportation electrification policy.

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<sup>11</sup> See AEP Responses to EVCA's First Combined Discovery Requests at EVCA-INT-1-027 (attached at Exhibit A).



1           **V.     RECOMMENDATIONS FOR A MODIFIED PHASE I DEPLOYMENT**

2           **Q:     Do you recommend the Commission’s approval of the Phase I deployment as**  
3           **proposed?**

4           A:     No. EVCA recommends Commission approve a modified pilot program that  
5                   aligns with the core principles of preserving the active competitive market in  
6                   Ohio, supporting customer choice of charging solutions, and stimulating the EV  
7                   charging infrastructure deployment through programmatic utility incentives.

8           **Q:     Do you have any recommendations for modifying the Phase I deployment?**

9           A:     Yes. In keeping with the principles laid out in Section III above, I have  
10                  recommendations for AEP Ohio’s Phase I deployment. EVCA supports the Smart  
11                  Columbus effort and the transformation of the State’s transportation sector  
12                  through deployment of smart, connected technologies, including electric vehicles.  
13                  The Association agrees that it is in Ohio’s interest to accelerate the EV and EV  
14                  charging infrastructure markets, but it must be done in a way that results in  
15                  scalable and sustainable growth. I summarize an alternative proposal to AEP  
16                  Ohio’s Phase I deployment in the following points:

- 17           •       **Utility Ownership:** AEP Ohio should not be permitted to own and operate  
18                   1275 public charging stations, but may be permitted to own and operate  
19                   charging stations in disadvantaged communities.
- 20           •       **Utility Investment and Rate Recovery:** AEP Ohio should be permitted to  
21                   invest in rebate incentives for the hardware, services, and installation of  
22                   charging infrastructure at a customer’s site. The Commission should deem

rebates for smart EV charging infrastructure as regulatory assets and permit AEP Ohio to recover costs and earn a rate of return.

- **Hardware Ownership and Customer Choice:** Site hosts should be empowered to choose among appropriate charging technologies for their sites and control charging tools and data associated with each technology. This includes pricing and access controls.
- **Network Capabilities:** AEP Ohio should be permitted to require networking capabilities as a prerequisite of incentive funding, in order to gain access to network data and unlock potential DR capabilities. AEP Ohio should not be permitted to develop a closed network that is exclusive to charging station providers.
- **Ongoing Education:** AEP Ohio should engage education and outreach on electricity as a transportation fuel to help drive awareness of EV technologies and market acceptance.

**Q: Explain the rebate-based approach to utility investment in charging stations.**

A: In a rebate model, utility investment is directed toward the hardware, services, and installation of charging infrastructure. In incenting hardware, services, and installation, a utility can decrease barriers for private investment in EV charging. For rapid deployment, make-ready work can be performed by a licensed electrician, as scheduled by a site host, and the utility may offset the costs of that installation. The utility rebate is considered a regulatory asset, as it enables a utility to access valuable data regarding grid reliability, load growth, and offers the potential for demand response.

1       **Q:     Does the rebate model preserve customer choice and competition in EV**  
2       **charging markets?**

3       A:     Yes. In this program design, utilities provide a direct financial incentive to site  
4       hosts for the installation of the qualified EV charging equipment of their choice.  
5       Since utility investment is directed to offset the costs of charging stations to  
6       customers, site hosts can choose, purchase, own, and operate charging stations on  
7       their properties. This arrangement allows for competitive market participants to  
8       continue to meet customer demands and serve the market, while also allowing  
9       utilities to invest in charging deployments without the risks of large-scale  
10      ownership and operation. Additionally, rebate programs may allow utilities to  
11      gain insights into the grid from networked charging, without building and  
12      maintaining the complex networking capabilities already offered in the  
13      competitive market. Overall, this program design reduces the cost barrier to EV  
14      adoption, allows the charging station site host to determine which equipment and  
15      services best meet their needs, and builds a sustainable EVSE marketplace.

16      **Q:     Should the Commission take additional action to explore a longer-term**  
17      **vision for electric vehicle charging?**

18      A:     Yes. The Commission should a consider broader proceeding to fully examine and  
19      determine the most scalable and sustainable approach to growing the EV and EV  
20      charging markets in Ohio. Stakeholders for this process should include, at a  
21      minimum, a range of policymakers and industry representatives from across the  
22      EV and EV charging ecosystem. This forum should provide for the following  
23      objectives:

- Determine whether the Commission should regulate the competitive market for electric vehicle charging services, and more specifically regulate the sale of EV charging equipment or services by non-utility providers. Several states have examined and granted a regulatory exemption for charging services.<sup>12</sup>
- Implement EV-specific rate pilots to determine the applicability of innovative rate designs afforded by networked charging technologies, such as EV-only time-of-use rates;
- Engage in rate reform to lessen the barriers created by high operating costs of higher-powered charging equipment from demand charges through innovative cost recovery mechanisms;
- Expand development of equitable access to clean/electrified transportation; and,
- Prepare for higher rates of charging for the next generation vehicles by implementing new internal processes for longer-term planning to incorporate EVs in utility strategic roadmaps.

**Q: Does this conclude your testimony?**

**A: Yes.**

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<sup>12</sup> Cal. Pub. Util. Code, § 216(I); Colo. Rev. Stat. § 40-1-103.3(2); D.C. Code §§ 34-207, 34-214; Fla. Stat. § 366.94; Haw. Rev. Stat. § 261-1(2); Idaho Code § 61-119; 220 Ill. Comp. Stat. §§ 5/3-105(C), 5/16-102; Me. Rev. Stat. Ann. Tit. 35, §§ 313-A, 3201(5), 3201(8-B); Md. Code Pub. Utils. §§ 1-101(J)(3), 1-101(X)(2); Minn. Stat. § 216B.02 (Subd. 4); Or. Rev. Stat. § 757.005(1)(B)(G); Utah Code §§ 54-2-1(7)(C), 54-2-1(19)(J); Va. Code Ann. § 56-1.2:1; Wash. Rev. Code § 80.28.310; W. Va. Code § 24-2D-3.

## **CERTIFICATE OF SERVICE**

The undersigned hereby certifies that a copy of the Direct Testimony of Dr. Abdellah Cherkaoui has been served upon the following parties listed below by electronic mail, this 2<sup>nd</sup> day of May 2017.



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# EXHIBIT A

**OHIO POWER COMPANY'S RESPONSE TO  
ELECTRIC VEHICLE CHARGING ASSOCIATION  
DISCOVERY REQUEST  
PUCO CASE NO. 16-1852-EL-SSO et al.  
FIRST SET**

**INTERROGATORY**

EVCA-INT-1-001      If your response to Request for Admission No. 1 is anything other than an unqualified admission, identify and describe any and all analyses undertaken by AEP Ohio regarding the existing competitive market for electric vehicle charging stations in its service territory, including any potential negative impacts to that competitive market identified by AEP Ohio.

**RESPONSE**

AEP Ohio has evaluated other deployments and regulatory filing and while no formal study was conducted, the Company developed an opinion that a utility deployment would create no negative impacts on the competitive market for Electric Vehicle Charging Station deployments.

Prepared by:    Scott S. Osterholt

**OHIO POWER COMPANY'S RESPONSE TO  
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PUCO CASE NO. 16-1852-EL-SSO et al.  
FIRST SET**

**INTERROGATORY**

EVCA-INT-1-002      If your response to Request for Admission No. 2 is anything other than an unqualified admission, identify and describe any and all analyses undertaken by AEP Ohio regarding selection of appropriate charging locations proposed in this application, as referenced in Osterholt Testimony Page 15, Lines 14-16.

**RESPONSE**

The Company objects to the form of the question as this request is vague, overbroad and/or unduly burdensome. The Company also objects to a request to identify all supporting analyses, to the extent such analyses are not documented. The Company objects to this request seeking a narrative answer that includes an array of details or outlines of evidence, which can be more efficiently answered through production of documents or taking of depositions. Without waiving the foregoing objection(s) or any general objection the Company may have, the Company states as follows. AEP Ohio has not completed any specific study but inherent to owning and operating the electric distribution system, the Company is uniquely positioned as the only entity that would be aware of electric vehicle charging locations where the additional load could cause the need for costly system upgrades.

A utility will have direct knowledge of the design of the distribution system under its control and the need for investments necessary to support added load that may be incurred through the placement of charging stations. Additionally, the Company is currently in the process of initiating a study on electric vehicle charging station siting to complement the Company's existing knowledge of where charging infrastructure could be located.

Prepared by:    Counsel  
                     Scott S. Osterholt



**OHIO POWER COMPANY'S RESPONSE TO  
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FIRST SET**

**INTERROGATORY**

EVCA-INT-1-003      Additionally, if your response to Request for Admission No. 2 is anything other than an unqualified admission, does the Company assert that it will deploy charging stations at sites of its choosing, rather than an approach that considers demand from potential site hosts and residents?

**RESPONSE**

The Company objects to the form of the question as this request is vague, overbroad and/or unduly burdensome. The Company also objects to a request to identify all supporting analyses, to the extent such analyses are not documented. The Company objects to this request seeking a narrative answer that includes an array of details or outlines of evidence, which can be more efficiently answered through production of documents or taking of depositions. Without waiving the foregoing objection(s) or any general objection the Company may have, the Company states as follows. As referenced in Osterholt testimony on page 16, lines 14-18 "AEP Ohio will seek input from Smart Columbus representatives about charging station location in order to best complement Smart Columbus programs designed to promote PEV use." In addition, AEP Ohio will consult the planned DOE NREL transportation corridor analysis of Central Ohio as a guide to best position charging stations. Furthermore, the Company is currently in the process of initiating a study for assistance with additional siting parameters which include PEV owner locations and high adoption rate areas in the communities. Site host and resident feedback would be other factors in the utility Electric Vehicle charging station placement locations and our process will consider customer feedback on siting input.

Prepared by:    Counsel  
                     Scott S. Osterholt

**OHIO POWER COMPANY'S RESPONSE TO  
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PUCO CASE NO. 16-1852-EL-SSO et al.  
FIRST SET**

**INTERROGATORY**

EVCA-INT-1-004      If your response to Request for Admission No. 3 is anything other than an unqualified admission, identify and describe any and all evaluations undertaken by AEP Ohio regarding the total number of charging stations currently available in its service territory, as well as any evaluations undertaken regarding AEP Ohio's relative market share of its proposed charging stations.

**RESPONSE**

While AEP Ohio has not completed its own independent study, through its involvement with the City of Columbus and the Smart Columbus project, we have been privy to data that has shown the number of existing Electric Vehicle Charging Stations in the area.

The locations of the current Electric Vehicle Charging Stations are publically available. One good source of these Electric Vehicle Charging Stations locations is Plugshare ([www.plugshare.com](http://www.plugshare.com)).

Prepared by:    Scott S. Osterholt

**OHIO POWER COMPANY'S RESPONSE TO  
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DISCOVERY REQUEST  
PUCO CASE NO. 16-1852-EL-SSO et al.  
FIRST SET**

**INTERROGATORY**

EVCA-INT-1-017      Referring to Osterholt Testimony at Page 16, Lines 11 through 18, which answers the question, "Where does AEP Ohio intend to install the proposed charging stations?" Identify and describe any and all analyses performed by AEP Ohio regarding potential sites in the Columbus area for deployment of the proposed charging infrastructure.

**RESPONSE**

The Company objects to the form of the question as this request is vague, overbroad and/or unduly burdensome. Without waiving the foregoing objection(s) or any general objection the Company may have, the Company responds as follows. As stated in testimony on page 16, lines 13-14, "AEP Ohio intends to develop a plan for charging station installations to best promote PEV adoption." Those internal plans are ongoing and intend to incorporate external parties, such as Smart Columbus, etc. While the initial AEP Ohio Electric Vehicle Charging Station deployment focus will be in the Smart Columbus region, the Company has not limited its deployment and could envision other statewide deployment areas. The USDOE NREL study on Electric Vehicle Charging Station deployment area target locations will be factored into the Company's deployment plan.

Prepared by:    Scott S. Osterholt

**OHIO POWER COMPANY'S RESPONSE TO  
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PUCO CASE NO. 16-1852-EL-SSO et al.  
FIRST SET**

**INTERROGATORY**

EVCA-INT-1-020      Referring to Osterholt Testimony at Page 15, Lines 4 through 8, identify how AEP Ohio will deploy charging stations to “all segments of the population”, including low-income or underserved communities. In your response, identify how AEP Ohio will decide to locate charging stations based on “all segments of the population” and whether or not you intend to site a specific number of charging stations in low-income or underserved communities.

**RESPONSE**

The AEP Ohio Electric Vehicle Charging Station deployment locations have not yet been selected. The Company is working to select a consultant and the parameters to develop this selection process. While there are likely many factors in the Electric Vehicle Charging Station deployment location selection, we generally expect a relatively uniform deployment of these chargers where low-income or underserved communities are not excluded for this reason. AEP Ohio also envisions working with various groups to focus on and target opportunities for PEV adoption in low-income or underserved communities that will lead to opportunities for associated Electric Vehicle Charging Station deployments.

Prepared by:    Scott S. Osterholt

**OHIO POWER COMPANY'S RESPONSE TO  
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FIRST SET**

**INTERROGATORY**

EVCA-INT-1-022      At sites where AEP Ohio intends to locate charging stations:

- a. Will site hosts have control over setting any pricing for charging services?
- b. If not, describe in detail the process by which you decided against allowing site hosts to participate in setting price signals for the utilization of charging stations located on their property.

**RESPONSE**

AEP Ohio's proposal was based on a plan to offer the PEV drivers free use of the AEP Ohio Electric Vehicle Charging Stations for a limited time. During this period, the Company planned to gather data that would support the best pricing options for future Electric Vehicle Charging Station use. During this initial period, there was no plan to engage site hosts in feedback associated with pricing for the specific site.

Prepared by:    Scott S. Osterholt

**OHIO POWER COMPANY'S RESPONSE TO  
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FIRST SET**

**INTERROGATORY**

- EVCA-INT-1-027      Referring to Osterholt Testimony at Page 19, Lines 1 through 3, and Table 3, which answer the question of, "What are the costs of AEP Ohio's proposed charging station deployment?"
- a. Describe the decision to deploy the quantity of each charging station type in each year of the demonstration phase.
  - b. Regarding the same testimony, describe in narrative form the factors AEP Ohio considered when calculating the cost of ongoing operations and maintenance for electric vehicle charging stations?
  - c. State whether or not AEP Ohio considered the cost of providing remote support for networked charging stations, and if not, why was it not considered.

**RESPONSE**

- a. AEP Ohio has not developed a final schedule for the proposed Electric Vehicle Charging Station deployment. The proposed schedule reflects a "ramping up" period for the public chargers where learning from early deployments we allow the Company to become more efficient in the later periods of the proposed four-year deployment. For the residential Electric Vehicle Charging Stations, the deployment rate is dependent on customer interest and for simplicity purposes is noted as a flat 250 per year.
- b. AEP Ohio based its estimates for ongoing maintenance from a multitude of different inputs including but not limited to: gridSMART Phase 1, other utilities and filings, some vendor insight or discussions, and consultant guidance.
- c. O&M expenses included in the calculation of Electric Vehicle Charging Station O&M costs included: software vendor costs, other IT costs, Company overheads, inspection, testing, data and analytics, connectivity, network management expenses, repairs and maintenance costs.

Prepared by:    Scott S. Osterholt

**OHIO POWER COMPANY'S RESPONSE TO  
ELECTRIC VEHICLE CHARGING ASSOCIATION  
DISCOVERY REQUEST  
PUCO CASE NO. 16-1852-EL-SSO et al.  
FIRST SET**

**INTERROGATORY**

- EVCA-INT-1-028      Referring to Osterholt Testimony at Page 19, Lines 7 through 8, in which AEP Ohio states, "[...] AEP Ohio is requesting the ability to deploy twice the number of charging stations during this initial phase."
- a. State the factors that will determine whether the demonstration phase will involve the deployment of twice the number of chargers listed in the proposal.
  - b. State whether or not AEP Ohio will deploy additional charging stations in the same manner and proportion as is detailed in the proposal.

**RESPONSE**

- a. The factors will be determined at a future date/time.
- b. The Company will determine the manner and proportion of additional charging stations at a future date/time.

Prepared by:    Scott S. Osterholt

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Summary: Testimony of Dr. Abdellah Cherkaoui on Behalf of The Electric Vehicle Charging Association electronically filed by Teresa Orahoud on behalf of Dylan F. Borchers and Elyse Akhbari