Exhibit No.:	
Issues:	Electric Vehicle and Electric Vehicle Charging Station Market Development; Internal Combustion Engine Refueling Market History; Utility Involvement with Electric Vehicle Charging Station Deployment
Witness:	Parker Tinsley
Sponsoring Party:	Missouri Department of Economic Development – Division of Energy
Type of Exhibit:	Rebuttal Testimony
Case No.:	ET-2016-0246

MISSOURI PUBLIC SERVICE COMMISSION

UNION ELECTRIC COMPANY d/b/a AMEREN MISSOURI

CASE NO. ET-2016-0246

REBUTTAL TESTIMONY

OF

PARKER J. TINSLEY

ON

BEHALF OF

MISSOURI DEPARTMENT OF ECONOMIC DEVELOPMENT

DIVISION OF ENERGY

Jefferson City, Missouri
November 29th, 2016

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Union Electric Company d/b/a Ameren Missouri for Approval of a Tariff Setting a Rate for Electric Vehicle Charging Stations	)))))	Case No. ET-2016-0246

AFFIDAVIT OF PARKER TINSLEY

STATE OF MISSOURI)
) **ss**
COUNTY OF COLE)

Parker J. Tinsley, of lawful age, being duly sworn on his oath, deposes and states:

1. My name is Parker J Tinsley. I work in the City of Jefferson, Missouri, and I am employed by the Missouri Department of Economic Development as a Planner II, Division of Energy.
2. Attached hereto and made a part hereof for all purposes is my Rebuttal Testimony on behalf of the Missouri Department of Economic Development – Division of Energy.
3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge.

Parker J. Tinsley

Subscribed and sworn to before me this 29th day of November, 2016.

LAURIE ANN ARNOLD
Notary Public - Notary Seal
State of Missouri
Commissioned for Callaway County
My Commission Expires: April 26, 2020
Commission Number: 16808714

Notary Public

My commission expires: 4/26/20

TABLE OF CONTENTS

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Parker J Tinsley. My business address is 301 West High Street, Suite 720, PO Box 1766, Jefferson City, Missouri 65102.

Q. Please describe your educational background and employment experience.

A. In 2016, I graduated from the Truman School of Public Affairs at the University of Missouri in Columbia with a Master of Public Affairs and a Graduate Certificate in the Study of Organizational Change. While there, I was a graduate assistant for the Office of the Vice Provost of Undergraduate Studies. In my role as a graduate assistant, I was part of a small team of professionals in charge of a campus-wide initiative to adopt, develop, and refine a comprehensive educational technology suite in order to improve student success and retention for the University. Prior to my graduate studies and graduate assistant appointment, I was employed by the University Of Missouri School Of Health Professions, Office of Student Services, where I served in an administrative capacity as well as a department liaison.

As a Planner II with the Division of Energy, I have worked on and participated in discussions regarding various energy-related matters, including national and regional energy stakeholder meetings, program collaboratives, legislative proposals, State Senate Committee hearings, Federal Fixing America's Surface Transportation ("FAST") Act register nominations, ongoing Volkswagen settlement discussions, and numerous electric vehicle and charging station webinars.

Q. Have you previously filed testimony before the Missouri Public Service Commission ("PSC" or "Commission") on behalf of DE or any other party?

A. No.

Q. What materials have you reviewed prior to submitting this testimony?

A. I have reviewed Ameren Missouri's filings for case ET-2016-0246, including the initial and revised Electric Vehicle Charging Pilot tariff and Application for Approval. I have also reviewed comments from parties to the case, data requests covering topics such as marketing and customer safety, as well as direct testimony from the case. Participation in the National Association of Stage Energy Officials Transportation Committee's various webinars and discussions have also provided insight into the topic into electrifying transportation. Additionally, as has been cited throughout this document, I have reviewed numerous reports that have examined electric vehicle ("EV") charging station ("EVCS") development in multiple regions across the U.S.

II. PURPOSE AND SUMMARY OF TESTIMONY

Q. What is the purpose of your Rebuttal Testimony in this proceeding?

A. The purpose of my testimony is to provide an overview of the electric vehicle ("EV") market, describe the current landscape of Electric Vehicle Charging Station ("EVCS") infrastructure, examine utility involvement in infrastructure development and deployment, and a review of internal combustion engine ("ICE") refueling market development to highlight avoidable issues such as market delay. My testimony also serves to complement the filings of Martin Hyman ("Mr. Hyman"), wherein public policy considerations are addressed.

III. ELECTRIC VEHICLE MARKET DEVELOPMENT

A. INFRASTRUCTURE NECESSITIES

Q. What indicators suggest that EV and EVCS infrastructure development should be supported?

A. EVs are not a fad; since 2008, cumulative sales of EVs and plug-in hybrid electric vehicles ("PHEVs") in the United States have exceeded 530,000 vehicles with almost 120,000 being purchased between January 2016 and October 2016 alone.[1] With over half a million EVs on the road, it would be easy to assume that there are numerous charging stations to allow EV owners to charge anywhere. However, this is not the case: throughout the U.S., there are fewer than 15,000 charging stations[2], primarily located within city-centers. This lack of availability can be a highly limiting factor for any EV driver planning on long distance travel.

Increased support of EVCS development and EV adoption could save Missouri drivers money: the 14 year-compound annual growth rate ("CAGR") for gasoline and diesel fuel prices is 7.5%, while the price of electricity has risen at only 2.5% over the same period,[3] thus limiting EV drivers' exposure to price volatility. In addition, there are fewer parts to service on an EV, and vehicle service intervals are longer because of a lack of combustion related components such as oil, an alternator, engine belts, and engine coolant.

As evidenced by the passage of Missouri's Alternative Fuel Infrastructure Tax Credit, which aids in increasing availability of EVCS by decreasing the cost of

[1] Jeff Cobb, *California Celebrates One Quarter Million Plug-in Cars Sold*, HybridCars, http://www.hybridcars.com/california-celebrates-one-quarter-million-plug-in-cars-sold/
[2] Alternative Fuels Data Center, *Electric Vehicle Charging Station Locations*, U.S. Department of Energy, http://www.afdc.energy.gov/fuels/electricity_locations.html
[3] Edison Electric Institute, *Transportation Electrification" Utility Fleets Leading the Charge*, June 2014, http://www.eei.org/issuesandpolicy/electrictransportation/fleetvehicles/documents/eei_utilityfleetsleadingthecharge.pdf

infrastructure investments through January 1, 2018, [4] it is state policy to encourage EVCS development and EV adoption. Based upon the previous and following information, encouraging utility involvement in the development of EVCSs addresses the immediate need for assuring EVCS availability to EV drivers over long distances, as well as preparing for a future grid that recognizes the growing market share of EVs. Furthermore, reliance on the private market to develop EVCSs has proven to be a slower and riskier endeavor[5], much like the initial development of the internal combustion engine ("ICE") refueling market.

Q. Is EVCS availability a limiting factor?

A. No matter the fuel source, the unavailability of refueling stations can shift the market away from adopting new vehicle technologies. While the differences between private fueling stations and private charging stations are abundant, there is an important parallel between the two: gasoline and ICE vehicle innovations made these "conventional" vehicles cheaper to own and operate, but range and refueling gaps limited their early adoption; similarly, EVs are becoming more affordable while also achieving greater ranges, but the lack of charging infrastructure is a barrier to adoption[6]. Modern EVs have moved past their prototype stages during the early 2000s, sparking a new market of automobile vehicle sales that demands refueling infrastructure much different than traditional gas stations can offer. Early adopters of EVs, whether purely electric or plug-

[4] Missouri Division of Energy, *Missouri Alternative Fuel Infrastructure Tax Credit*, Missouri Department of Economic Development, https://energy.mo.gov/energy/communities/assistance-programs/missouri-alternative-fuel-infrastructure-tax-credit

[5] Center for Climate and Energy Solutions, *The Role of Clean Energy Banks in Increasing Private Investment in Electric Vehicle Charging Infrastructure*, November 2014, http://www.c2es.org/docUploads/cebs-and-ev-charging-december-2014.pdf

[6] Dr. Matthew Slavin, *Drivers and Barriers to Electric Vehicle Adoption*, EVWorld, http://evworld.com/article.cfm?storyid=2076

in hybrids, have to carefully plan out any long-distance travels around where EVCSs are available, much like the early adopters of ICE vehicles searching for gasoline.

Q. Do you see parallels between the fueling barriers faced by internal combustion engines and EVs?

A. Yes. The history of ICE development is evidence of the delay in EV development that may result from limited availability of fueling stations.

During the late 1800s, the U.S. began to experience a technological boom that resulted in the ICE experiencing many engineering refinements, leading to a model of vehicle that could be driven by any person. By 1896, the Duryea Moto Wagon Company began selling standardized ICE vehicles to the American masses[7], with other companies following suit shortly thereafter. During the late 1890s, as ICE vehicle adoption increased, the need for easily attainable fuels also increased. Much like today's EVs, early adopters of ICE vehicles needed to plan their travels with great care, as finding gasoline was not guaranteed. Some pharmacies would have a side-business selling gasoline where the shopkeeper would fill a bucket and then funnel it into a vehicle, some large cities would have a gasoline depot which would be reserved for wholesalers, and some distributors simply had horse-drawn fuel tanks that sold gasoline to commercial customers.[8] These methods of providing fuel to customers were not reliable, safe, or efficient.

It was not until the St. Louis World's Fair in 1905 that the modern idea of a filling station became national news, followed closely by another filling station in Seattle in

[7] National Association of Convenience Stores, *The History of Fuels Retailing*, 2013 NACS Retail Fuels Report, http://www.nacsonline.com/yourbusiness/fuelsreports/gasprices_2013/pages/100plusyearsgasolineretailing.aspx
[8] Dr. Martin Melosi, *The Automobile Shapes the City*, Automobile in American Life and Society, http://www.autolife.umd.umich.edu/Environment/E_Casestudy/E_casestudy8.htm

1907;[9] however, these first "stations" still necessitated that shopkeepers fill a multi-gallon canister to then fill a customer's tank. By 1908, when Ford's Model T was introduced, there were already over 300,000 vehicles on the road in the U.S. [10] with relatively little infrastructure development. It was not until 1913, five years after the Model T caused ICE vehicle adoption to increase dramatically, that the first proper drive-up filling station (Gulf Refining Company) opened in Pittsburgh, Pennsylvania; [11] Standard Oil of California followed in 1914 by opening over 30 franchised filling stations. It took the market nearly two decades to settle on a recognizable, standardized form of gasoline stations.

Q. Where does the private market tend to install new infrastructure?

A. Typically, the private market pushes services towards the highest utilization centers, such as densely populated city centers and metropolises, leaving the more suburban and rural populations to wait years, if not decades, before those same services, such as rural electrification, cell phone towers, and DSL internet, come to their town. Instead of waiting years for an unregulated market to answer the needs of growing EV automobile market share, investor-owned utilities ("IOUs") are poised to provide EVCSs to urban, suburban, and rural markets in a way that best assures that consumers' needs are met in a responsive, reliable, and safe fashion. Market uncertainty, access to low-risk capital, and understanding of the changing grid are all factors that suggest that regulated utilities would be one of the prime actors in developing EVCS infrastructure.

B. UTILITY INVOLVEMENT

[9] National Association of Convenience Stores, *The History of Fuels Retailing*, 2013 NACS Retail Fuels Report, http://www.nacsonline.com/yourbusiness/fuelsreports/gasprices_2013/pages/100plusyearsgasolineretailing.aspx
[10] *Ibid.*
[11] *Ibid.*

Q. Why should utilities be involved with EVCS development?

A. While development of a widespread third-party private market for developing EVCS and selling electricity to EV drivers is not impossible, such development will face the barrier of large upfront capital requirements and will not provide certainty that infrastructure will be deployed in all areas where there is a need for it.

The Center for Strategic and International Studies states that IOUs have a strong case for involvement in EVCS deployment, as IOUs have access to low-cost capital (typically backed by ratepayers), and the development of EVCS infrastructure can help assure investors that there is a current and future demand for electricity services. Additionally, these capital investments are regulated by state commissions, which can help guide deployment and make sure that these deployments are in the best interest of the public.[12]

Q. How can short-term deployment of EVCS be managed for long-term growth?

A. Some argue that IOUs are the only players that can develop EVCS infrastructure at, "… a scale necessary for meaningful deployment on an immediate time scale,"[13] suggesting that IOUs are integral in bridging the infrastructural gaps during the early stages of EVCS deployment. Utilities also have the greatest knowledge as to what demands EV charging would place on the grid (including supply requirements and load), and early utility involvement would bring expertise as to how the grid can be optimized for EV drivers and other customers.[14]

[12] Michelle Melton, *Utility Involvement in Electric Vehicle Charging Infrastructure: California at the Vanguard*, Center for Strategic and International Studies, https://www.csis.org/analysis/utility-involvement-electric-vehicle-charging-infrastructure-california-vanguard
[13] *Ibid.*
[14] *Ibid.*

Another case for IOU involvement with EVCS development relates to the recovery of system costs. A study conducted by the Center for Strategic and International Studies has found that under multiple scenarios, increases in revenue from EV charging, "… exceed marginal costs to deliver electricity to the customer…."[15] As examined in greater detail in Mr. Hyman's testimony, greater EV adoption will bring about a large, long-term opportunity for load-growth which has the potential to result in downward pressure on rates for all customers[16].

IOUs are uniquely qualified to evaluate how the addition of hundreds, if not thousands, of EVs to a service area would impact peak demand and system costs. They also have the ability to send price signals to customers to charge or use electricity for other purposes at preferred times with time-of-use ("TOU") rates. Getting EV drivers to charge their cars and use electricity for other purposes during off-peak times can benefit the utility and its customers, allowing customers to charge at lower rates during off-peak periods and enhancing cost recovery for IOUs while avoiding additional investment in new grid or generation capacity.[17] Additionally, EVs assist with grid modernization and adding renewables to a generation portfolio: EVCSs can be programmed to change price points when there is excess generation for the grid from wind or solar sources, effectively directing it to where it is useable.[18]

VI. CONCLUSIONS

Q. Please summarize your conclusions and the positions of DE.

[15] *Ibid.*
[16] *Ibid.*
[17] Patty Monahan, Dan Adler, *The Transportation Grid: How Utilities can Drive the Future of Transport*, UtilityDive, July 20, 2015, http://www.utilitydive.com/news/the-transportation-grid-how-utilities-can-drive-the-future-of-transport/402562/
[18] *Ibid.*

A. The EV and EVCS market, seemingly still in its infancy, is gaining ground in the U.S. As metropolitan areas appear to be the EV and EVCS testing grounds for the private market, suburban, rural, and long-distance travel areas are not being addressed. IOUs have a prime opportunity and the necessary strength to provide EVCS services in a meaningful, strategic method that can ameliorate short-term anxieties while paving a way for future private deployment. Unlike the ICE refueling market that took almost two decades to develop, utility involvement can accelerate EVCS development and deployment to bridge the gaps between our current landscape and the future of EV charging.

Q. Does this conclude your Rebuttal Testimony in this case?

A. Yes.