Exhibit No.:	_____
Issue(s):	EV Charging Station Policy
Witness/Type of Exhibit:	Marke/Surrebuttal
Sponsoring Party:	Public Counsel
File No.:	ET-2016-0246

SURREBUTTAL TESTIMONY

OF

GEOFF MARKE

Submitted on Behalf of
the Office of the Public Counsel

**UNION ELECTRIC COMPANY D/B/A
AMEREN MISSOURI'S**

File No. ET-2016-0246

December 19, 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.	))))	File No. ET-2016-0246

AFFIDAVIT OF GEOFF MARKE

STATE OF MISSOURI)
) ss
COUNTY OF COLE)

Geoff Marke, of lawful age and being first duly sworn, deposes and states:

1. My name is Geoff Marke. I am a Regulatory Economist for the Office of the Public Counsel.

2. Attached hereto and made a part hereof for all purposes is my surrebuttal testimony.

3. I hereby swear and affirm that my statements contained in the attached testimony are true and correct to the best of my knowledge and belief.

Geoff Marke
Regulatory Economist

Subscribed and sworn to me this 19th day of December 2016.

NOTARY PUBLIC NOTARY SEAL STATE OF MISSOURI

JERENE A. BUCKMAN
My Commission Expires
August 23, 2017
Cole County
Commission #13754037

Jerene A. Buckman
Notary Public

My Commission expires August 23, 2017.

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SURREBUTTAL TESTIMONY

OF

GEOFF MARKE

UNION ELECTRIC COMPANY

d/b/a Ameren Missouri

CASE NO. ET-2016-0246

I. INTRODUCTION

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

A. Geoff Marke, PhD, Economist, Office of the Public Counsel (OPC or Public Counsel), P.O. Box 2230, Jefferson City, Missouri 65102.

Q. Are you the same Dr. Marke that filed rebuttal testimony in ET-2016-0246?

A. Yes.

Q. What is the purpose of your surrebuttal testimony?

A. The purpose of this rebuttal testimony is to respond to the surrebuttal testimony of Sierra Club witness Douglas Jester regarding:

- Misuse and omission of the National Academy of Science Report;
- Impact on "Missouri" electric rates; and
- Missouri's economic-fuel dependence argument.

Q. Has OPC's position changed since rebuttal testimony?

A. It has not. OPC continues to recommend the Commission reject Ameren Missouri's request and states that both ratepayers and drivers are best served by a competitive market for EV charging services rather than by a regulated monopoly. There is no reason why a *non-regulated* affiliate of Ameren Missouri could be created to provide this nonessential service.

OPC believes that Ameren Missouri's *regulated* services can best enable the promotion of EV adoption by emphasizing its essential services, primarily through offering time-of-use ("TOU") rates on an opt-in basis that encourages charging during low-cost, off-peak hours. At this initial stage, this can best be promoted by educating customers and vehicle dealers on the value proposition of off-peak charging rates.

Ameren Missouri's proposal to recover EV charging station costs "above the line" is not prudent or justified. This is especially true when Ameren Missouri's entry will create barriers to entry from competition to provide a non-essential service. The Commission should leave deployment of EV charging infrastructure non-regulated services and importantly, to existing and future free-market competition.

II. RESPONSE TO SIERRA CLUB

Q. Please summarize the Sierra Club's position in this filing?

A. The Sierra Club is in support of Ameren Missouri's pilot project. Sierra Club witness Douglas Jester believes that ratepayer subsidies are warranted in the short-run but that at some unspecified time in the future, costs of charging should be borne solely by EV drivers. Mr. Jester also makes the recommendation the Commission clarify that non-utility owners and operators of EV charging stations who would offer the same service, are not public utilities subject to the Commission's oversight.

The latter recommendation is a curious position given that one page earlier, Mr. Jester suggests the Commission oversee pricing on utility-invested-charging infrastructure for fear of price gorging:

> At the same time, during market development most charging stations will be local monopolies in which the unregulated pricing could be excessive, risking electricity prices that eliminate fuel cost savings and may likely exceed gasoline prices, so the Commission should ensure that pricing is

> appropriate for use of charging stations in which Ameren Missouri invests, regardless of whether those stations are owned and operated by the utility or a third party.[1]

Mr. Jester apparently has no concerns regarding excessive pricing for charging stations not owned by public utilities.

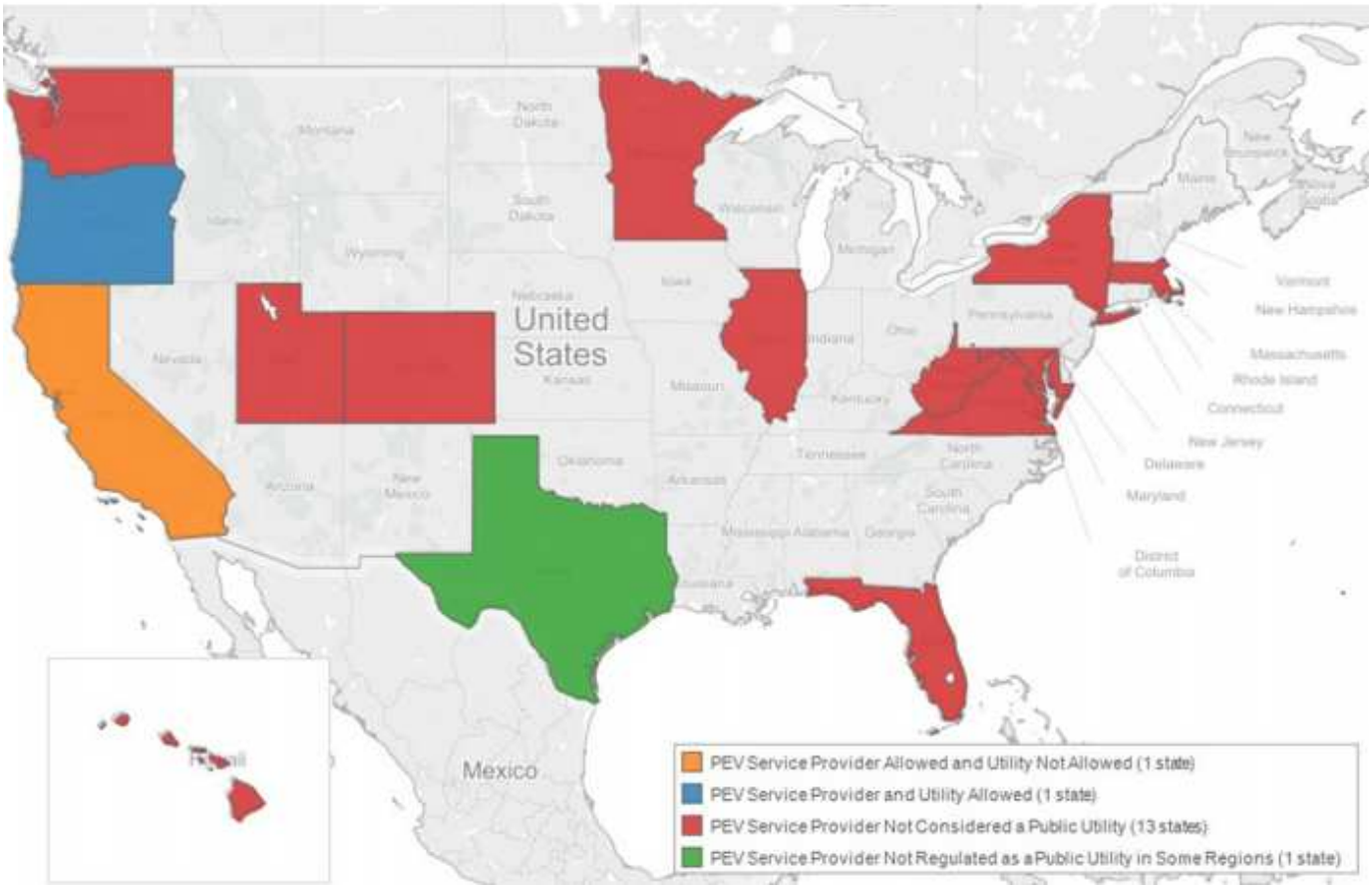
Q. Do you agree with Mr. Jester's conclusions?

A. No, from an economic perspective, the argument is wrong. The price of any product is simply the market price, or the price people are prepared to pay. It is simply an automatic function of supply and demand. Imposing governmental restrictions on pricing for *nonessential electric services* can produce unintended consequences that distort the market and the "real" cost of the service. There may be situations where inefficient markets require government intervention but these situations should be handled with the utmost care. Centralized, command-and-control planning has historically not been a viable economic model in which to operate.

OPC's position remains that if Ameren Missouri wants to install EV charging infrastructure, it should be done as a non-regulated service. Further, third party providers should not be regulated as public utilities. This position is also consistent with the majority of states that have formally taken a position on the regulatory treatment of EV charging stations. Figure 1, taken from the National Academies of Science Report and referenced in Mr. Jester's rebuttal testimony, is reprinted below.

[1] ET-2016-0246 Rebuttal Testimony of Douglas Jester p. 30, 4-9.

Figure 1: States that have regulations regarding who can own or operate charging stations[2]



Misuse and Omission of the National Academies of Science Report

Q. What is the National Academies of Science?

A. The National Academies of Sciences, Engineering, and Medicine are private, nonprofit institutions that provide independent, expert advice on scientific matters. Their charter was formed in 1863 by President Lincoln to "investigate, examine, experiment, and report upon any subject of science." The National Academy of Sciences eventually expanded to include

[2] The National Academies Press (2015) Overcoming barriers to deployment of plug-in electric vehicles. https://www.nap.edu/catalog/21725/overcoming-barriers-to-deployment-of-plug-in-electric-vehicles

the National Research Council in 1916 and later the National Academy of Engineering (1964) and Medicine (1970).[3]

Q. What National Academies of Science report did Mr. Jester reference in his testimony?

A. The National Academies of Science's subcommittee, the National Research Council, authored a report entitled *Overcoming Barriers to Deployment of Plug-In Electric Vehicles*. Excerpts from this report were cited in Mr. Jester's testimony and the entire 150 page document was included as an attachment.

Q. What conclusions does Mr. Jester draw from this report?

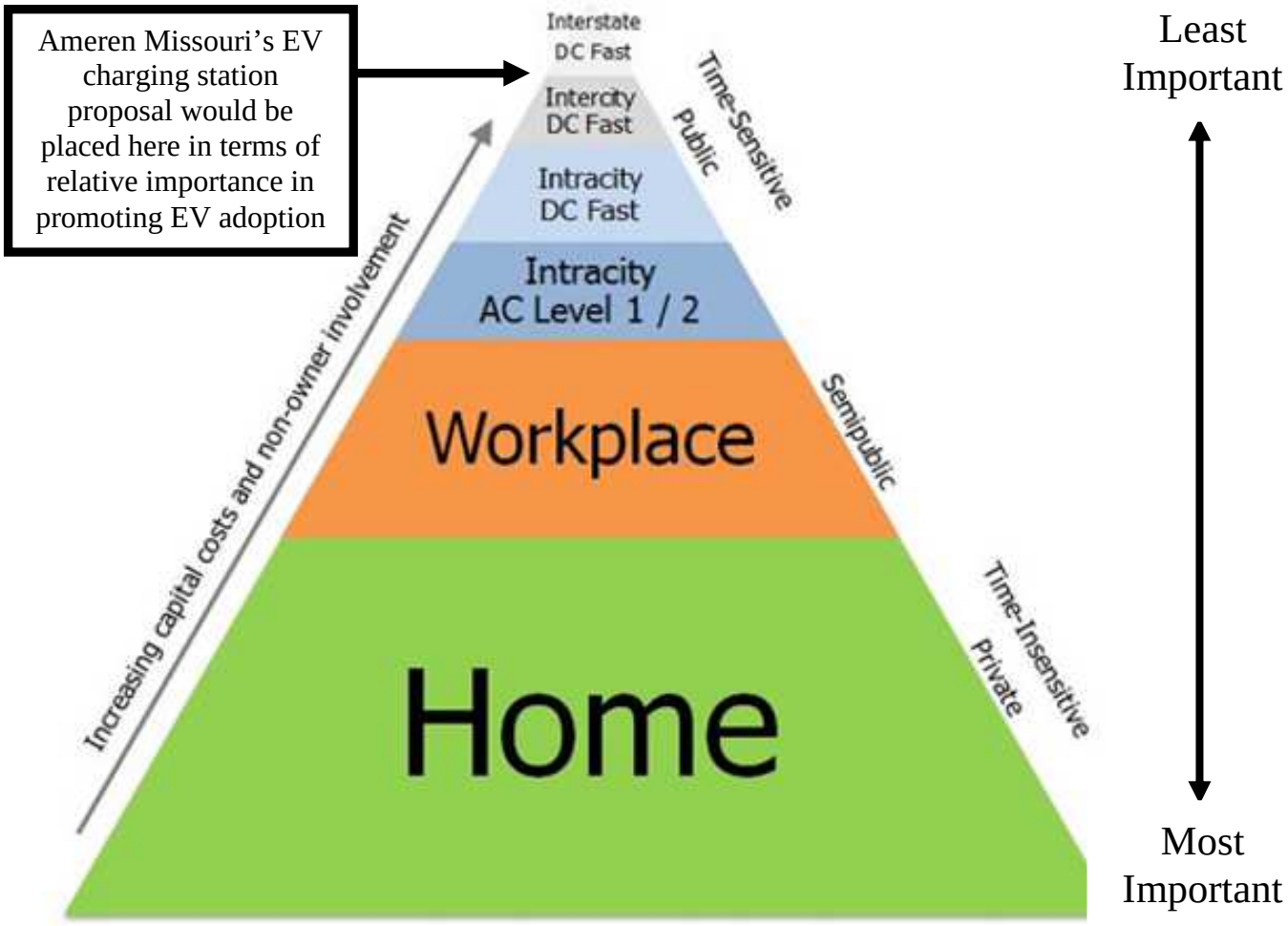
A. Mr. Jester implies that the National Research Council endorses rate base treatment of EV charging stations by investor owned electric utilities.

Q. Did your review of the report lead you to this conclusion?

A. No. The report places an unequivocal emphasis on the promotion of home charging followed by workplace charging. The report does not explicitly opine on interstate or intercity EV charging stations, and it is all together silent on rate base treatment by investor-owned electric utilities. There is a table in the report, reprinted in Figure 2 below, that includes the type of project Ameren Missouri is proposing and places it in terms of relative funding importance compared to other EV charging locations.

[3] National Academies of Sciences. (2016) Who we are. http://www.nationalacademies.org/about/whoweare/index.html?_ga=1.36472800.1708491510.1480620147

Figure 2: Reprint of EV charging infrastructure ranked by importance by committee members[4]



Q. What was the National Research Council's explicitly stated concerns' regarding EV deployment as it pertains to the electricity sector?

A. The report states:

> Potential impediments to PEV adoption include (1) high electricity costs that reduce the financial benefit of PEV ownership, (2) regional differences in

[4] The National Academies Press (2015) Overcoming barriers to deployment of plug-in electric vehicles. https://www.nap.edu/catalog/21725/overcoming-barriers-to-deployment-of-plug-in-electric-vehicles

> electricity costs that add confusion and prevent a uniform explanation of the economic benefits of PEV ownership, (3) residential electric rate structures that provide no incentive to charge the vehicle at the optimal time for the utility, and (4) high costs for commercial and industrial customers if demand charges are incurred as noted above. The committee notes that state jurisdiction over retail electricity rates constrains the federal role in directing the electricity sector to foster PEV growth.[5]

The report places its emphasis and guidance for utilities clearly on the importance of pricing and consumer education. The report does not make any recommendations regarding utility-sponsored rate based treatment of EV charging stations.

Q. What was the National Research Council's recommendation regarding EV deployment as it pertains to the electricity sector?

A. The report states:

> **Recommendation**: To ensure that adopters of PEVs have incentives to charge vehicles at times when the costs of supplying energy is low, the federal government should propose that state regulatory commissions offer PEV owners the option of purchasing electricity under the time-of-use or real-time pricing.[6]

Q. Is this recommendation consistent with OPC's recommendation in this case?

A. Yes. The National Research Council's recommendation is consistent with OPC's recommendations in rebuttal testimony.

[5] Ibid.
[6] Ibid.

Q. What specific "non-recommendation" did the National Research Council make in its concluding remarks?

A. The report states:

> Equally important to recognize is a recommendation that the committee does not make. **The committee does not at this point recommend additional direct federal investment in the installation of public charging infrastructure until the relationship between infrastructure availability and PEV adoption and use is assessed (emphasis added).**[7]

Q. What implications do you draw from this conclusion?

A. This conclusion raises the question why it makes sense for Ameren Missouri's ratepayers to be charged for public EV charging infrastructure if the National Research Council no longer supports investment at the federal level. This further places the Sierra Club's endorsement in doubt.

Q. What empirical evidence been produced since publication of the National Research Council's report to substantiate a link between EV promotion and EV charging stations?

A. As stated in my rebuttal testimony, the Idaho National Laboratory released the results of a three-year study which captured the profiles for 125 million miles of driving and 6 million charging events through partnerships with states, electric utilities, and other stakeholders across 22 regions in the United States. The study reached the following conclusions:

> **The answer is clear: despite installation of extensive public charging infrastructure, in most of the project areas, the vast majority of charging was done at home and work.** About half the EV Project participants charged at home almost exclusively. Of those who charged

[7] Ibid.

> away from home, the vast majority favored three or fewer away-from-home charging locations, with one or more of these locations being at work for some drivers. . . . In the end, it was apparent that exact factors that determine what makes a public charging station popular are predominantly community specific. More research is needed to pinpoint these local factors. Nevertheless, **the projects demonstrated that a ubiquitous charging network is not needed to support PEV driving**. Instead, charging infrastructure should be focused at home, workplaces, and in public "hot spots," where demand for AC Level 2 EVSE or DCFC stations is high (emphasis added).[8]

Impact on "Missouri" Electric Rates

Q. Please summarize Mr. Jester's fixed cost calculation of a fully electrified Missouri transportation sector.

A. Mr. Jester argues Missouri's entire electric utility revenue cost recovery can be generally broken down as 70% for generation and 30% for transmission, distribution, and other costs. Mr. Jester then posits that, if every vehicle mile traveled in Missouri were electrified, Missouri, as a whole, would produce an additional 28.364 terawatt hour ("TWh") of energy. If transmission, distribution, and other costs (30% total) were to remain static and generation (70%) remain unchanged (regardless of the increased load), then average rates across Missouri would collectively decrease by 8%. Note that Mr. Jester speaks for the entire state and not the area proposed by Ameren Missouri.

Q. How did Mr. Jester support his calculation?

A. There are no work papers accompanying Mr. Jester's testimony or any explanation provided otherwise on which utilities or what point in time he considered in making these assertions.

[8] Idaho National Laboratory (2016). Plug-in electric vehicle and infrastructure analysis. https://avt.inl.gov/default/files/pdf/arra/ARRAPEVnInfastructureFinalReportHqltySept2015.pdf

Q. Do you agree?

A. No. Mr. Jester's conclusions have no basis in reality. There are entirely too many variables involved in his hypothesis for it to be taken seriously. The simple fact that this calculation is Missouri-specific as opposed to Ameren Missouri-specific should give readers pause. The Commission should not be distracted by sweeping proclamations void of data and substance and should dismiss such cavalier conjectures in total.

Q. Does Mr. Jester opine on any Ameren Missouri specific inputs?

A. He does. As referenced earlier in my testimony, Mr. Jester claims that:

> Ameren Missouri's 2013 Demand-Side Management Potential Study estimated economic potential electricity efficiency as 22.9% of baseline 2030 sales absent energy efficiency programs.[9]

According to Mr. Jester, such energy savings could mitigate two-thirds of the increased load from fully electrifying transportation in Ameren Missouri's service territory.

Q. Do you agree?

A. No. There are many things wrong with this conclusion. Chief among them is the omission of any consideration of costs needed to achieve a 22.9% reduction in energy use from ratepayer-funded energy efficiency programs.

Based on my professional experience, such energy savings would: (1) require billions of dollars in ratepayer expenditures, (2) be burdened with many potential unintended consequences (e.g., pronounced cost shifting and equity issues) (3) become increasingly more expensive as energy savings returns diminished, and (4) be subject to the whims of individual market adoption rates. These expected savings (and associated costs) would also have to

[9] ET-2016-0246 Rebuttal Testimony of Douglas Jester p. 15, 17-19.

adjust to changes in socio-economic patterns in the overall population as well as any pronounced temperature variation (e.g., increase in cooling degree days means more hours of an air conditioner) or other confounding variables (emergence of new technology).

I am unaware of any utility, anywhere, claiming such savings solely from ratepayer-funded energy efficiency investments.

It is "inappropriate" to assert that the "average" ratepayer would see an 8% reduction in their bill from an electrified transportation system.

Q. Mr. Jester justifies Ameren Missouri's proposal, in part, because it is "limited" and small in scale. Do you agree?

A. No. OPC does not support this proposal, regardless of the size, for the reasons articulated in OPC's previous testimony. The scale of this project is irrelevant to the question of whether this project is a regulated service. Even though Ameren Missouri is describing this as a pilot project, Commission approval of the proposal would ignore Ameren's plans outlined publically in EW-2016-0313, "The Working Case to Consider Policies to Improve Electric Utility Regulation." In that filing, the Company outlined plans that include putting $43 million in rates over a five-year period to fund vehicle/equipment electrification. See Figure 3 below:

Figure 3: Excerpt from Ameren Missouri's "Building a Smarter Energy Grid for the Future"[10]

Sustainable Energy, Micro-Grid & Vehicle/Equipment Electrification[1,2]:

$43 million allocated for 2018-2022

Solar Partnerships	$ 10	$ 10	$ 10	$ 10	-	
Micro-Grid Projects	$ 10	-	$ 10	-	$ 10	
EV Charging, Metro Link EV, Industrial Equip. Electrification	$ 5	$ 8	$ 10	$ 10	$ 10	
Universal Solar (Montgomery)	-	-	-	-	$ 30	
Total	$ 25	$ 18	$ 30	$ 20	$ 50	

	Years					
	2018	2019	2020	2021	2022	Years 1-5 Total
Investment Supportive Regulatory Framework Incremental $s (M) - TOTAL:	$160	$188	$215	$210	$245	$1,018

[10] EW-2016-0313. Ameren Missouri. Item no. 58. "The critical need to replace aging electric infrastructure and build a smarter and more efficient grid to meet customer's needs and expectations.", Attachment A, Infrastructure Plan, p. 5.

Missouri's Economic-Fuel Dependence Argument

Q. Mr. Jester argues that Missouri is not a major oil producer or refiner and therefore local economies will benefit from electrifying the State's transportation. Do you agree?

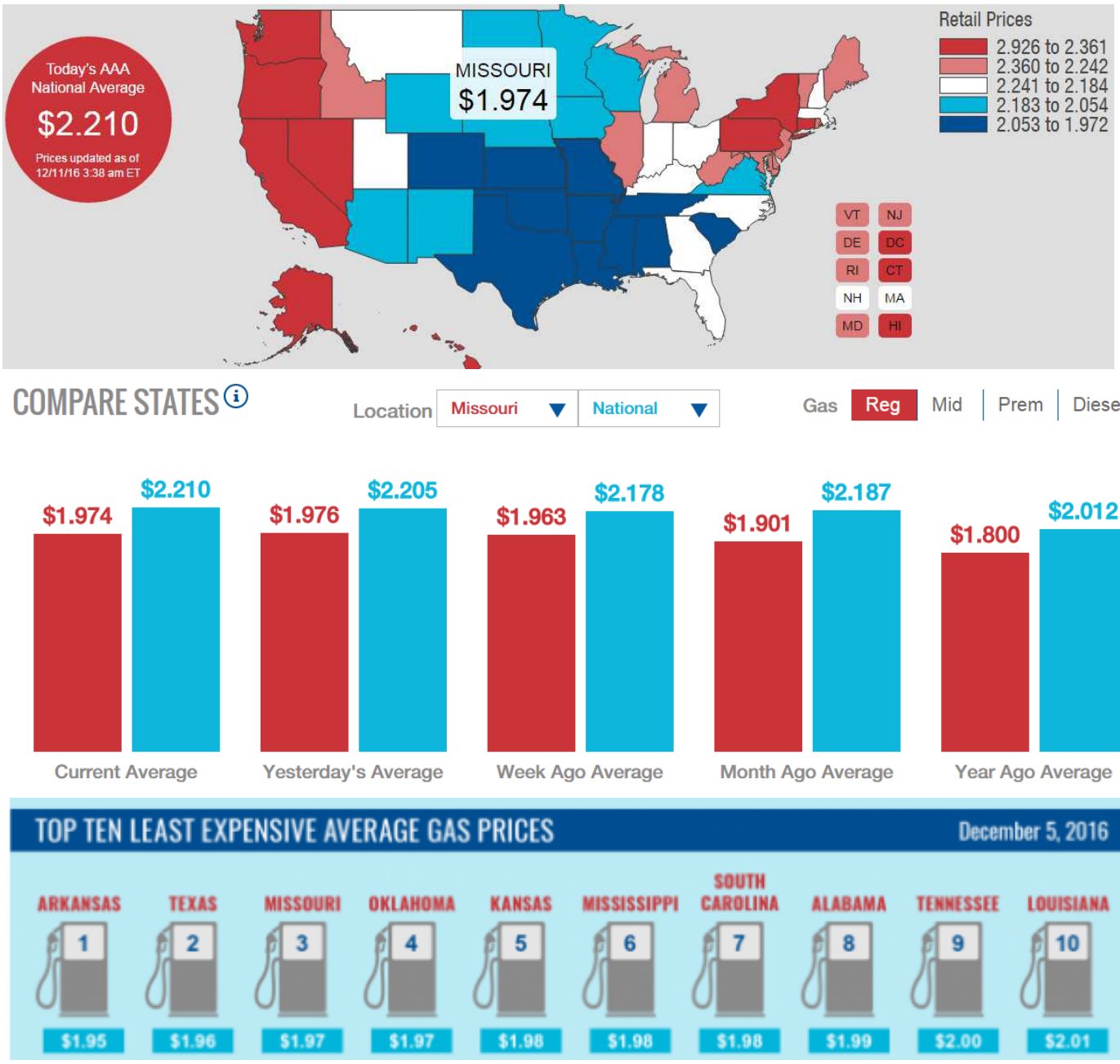
A. No. It is true that Missouri is not a major oil producer or refiner. However, Missouri is also not a major coal or natural gas producer or refiner. Missouri largely imports both its power generation and transportation fuel. Mr. Jester's unstated inference is that coal and natural gas imports could be supplanted by locally produced solar or wind energy investments.

There are many flaws with that inference, not least of which is the intermediate nature of solar and wind generation. Putting aside the very real substantive issue of reliability for a moment, if Ameren Missouri's power generation were to fundamentally change in total it would further call into question Mr. Jester's cost savings calculations referenced earlier.

Q. Is Missouri uniquely at risk from future fuel shocks?

A. No more than the rest of the country currently enjoying pronounced levels of extraction from improved fracking technology. Missouri also enjoys some of the least expensive gasoline prices in the United States as seen from in Figure 4 with data produced from the American Automobile Association ("AAA"):

Figure 4: AAA Missouri and National Gas Prices first week of December 2016[11]



[11] AAA(2016) Gas Prices, State Gas Prices. http://gasprices.aaa.com/ & http://gasprices.aaa.com/?state=MO

Missouri's central location means that it is crisscrossed with both crude oil and gasoline pipelines linked to refineries throughout the US allowing it easy access to more affordable fossil fuels. Moreover, Missouri has some of the lowest gasoline taxes in the United States allowing prices at the gasoline pump to be some of the most competitive in the nation.[12]

Such low gasoline prices combined with a pronounced carbon intensive power generation fuel mix, suggests Missouri is not an attractive location to promote "first-mover" EV policy either from an economic or environmental perspective.

Q. Does this conclude your testimony?

A. Yes.

[12] Altman, M. (2014) St. Louis Public Radio. Why does Missouri have the lowest gas prices in the country? http://news.stlpublicradio.org/post/why-does-missouri-have-lowest-gas-prices-country#stream/0