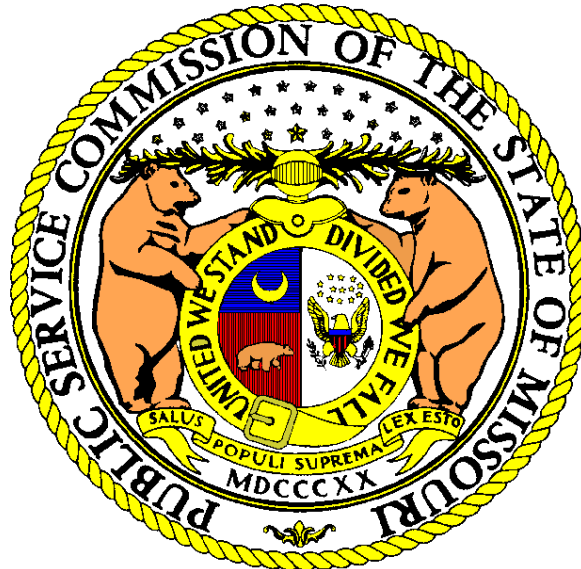


MISSOURI PUBLIC SERVICE COMMISSION

STAFF REPORT ON THE ESTIMATED COSTS AND BENEFITS

OF A MAKE READY TARIFF

FOR SEPARATELY-METERED EV CHARGING



UNION ELECTRIC COMPANY,
d/b/a AMEREN MISSOURI

CASE NO. ET-2018-0132

OCTOBER 1, 2018

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In its May 30, 2018 Order Directing Filing, the Commission stated its direction to Staff to “analyze and report the benefits or detriments of Ameren Missouri instituting a line extension policy designed specifically to incentivize construction of EMV charging stations, such as allowing the utility to rate base line extension costs regardless of the amount of marginal sales resulting from the line extension.”¹

Specifically, the Commission ordered Staff to “analyze and report the benefits or detriments of Union Electric Company d/b/a Ameren Missouri instituting a line extension policy designed specifically to incentivize construction of electric motor vehicle charging stations and shall propose tariffs designed to support such policy.”²

Proposed Make Ready Tariff

Ameren Missouri’s line extension tariff sheets are subject to revision in this case. For this reason, Staff’s proposal, below, provides language to be incorporated into a tariff, but is not in the form of tariff sheets. Also, because Ameren Missouri has requested significant changes to its line extension tariff provisions, for purposes of this analysis Staff will assume that the general conversion of Ameren Missouri’s gross revenue approach to a net revenue approach is adopted.

Staff recommends that Ameren Missouri not require line extension charges from a customer seeking a line extension for separately metered electric vehicle charging, up to the length of extension identified below, and subject to the general provisions identified below.

Make Ready EV Definitions and Terms of Service:

1. Publicly available means parking areas available to the general public with the indicated number of minimum parking spaces available, without permit, for example, parking areas at Parks, Commuter Parking Lots, Public Transportation parking areas, Public Parking Lots and Garages, Shopping Centers, and Retail facilities.
2. Employee parking and residential parking may qualify if parking spots are not assigned, and the indicated minimum parking spaces available requirements are met.
3. Where indicated, the Applicant shall ensure that sufficient measures are in place to reasonably cause EVs to vacate the charging location to enable other EVs to access the charging location.
4. EV charging under this program shall be separately metered from any other customer uses on the premises.
5. The length of extension assumed to be offset for each configuration is provided below:

¹ Order Directing Filing, Page 1.

² Order Directing Filing, Page 2.

	Length of Extension (in feet)	Maximum Demand	# of Level 2 Ports	Public Accessibility Minimum Size	Alternative Employee/Residential Minimum Size	Overstay Requirement	Available Extensions
1000	7	3	75	100	4 Hours	50	
50	7	1	15	30	4 Hours	50	
1000	34	5	100	150	2 Hours	25	
1000	69	10	200	300	2 Hours	25	

Estimated Benefits

Applicable Rate

Ameren Missouri's tariff sheet 54.3 includes provision 5 of the 1(M) residential rate schedule, which defines uses to which the residential service rate is inapplicable.³ Due to this limitation, Staff is unaware of a scenario under which separately metered electric vehicle charging would occur on Ameren Missouri's residential rate schedule.⁴

Ameren Missouri's 2(M) small general service rate schedule would likely be the rate applicable to most electric vehicle charging enabled by a make ready model. A Time-of-Day service option is available under this schedule, with a fairly aggressive pricing schedule. For purposes of this analysis, the non-Time of Day rates will be assumed.

³ 5. RESIDENTIAL SERVICE RATE NOT APPLICABLE TO:

a. Service supplied through one meter (or more than one meter if the readings thereof are cumulated for billing purposes) to:

(1) Premises which consist of one or more dwelling units and a commercial unit or

(2) A residence or dwelling unit when any portion of such service is used in a commercial venture.

As used herein, the term "dwelling unit" shall mean that portion of a building which by appearance, design or arrangement is normally used for residential purposes by a single family, whether or not actually occupied, and the term "commercial unit" shall mean that portion of a building or premises which by appearance, design or arrangement is normally used for commercial purposes, whether or not actually so used.

b. Establishments in farming areas processing, distributing or selling farm or other products which do not originate through production on the premises served.

c. Separate buildings or other structures intended and/or used for recreational or group activities.

d. Nursing homes and/or retirement facilities licensed by the State of Missouri Department of Social Services Division of Aging.

e. Single-metered service supplied to multiple occupancy buildings for which a Commission variance, from the separate metering requirement contained in Section V.L. Rent Inclusion of the Company's rules and regulations, has been granted.

⁴ While an existing residential structure could install an electric vehicle charger, such existing structure would not implicate Ameren Missouri's line extension policy, which was the subject of the Commission's order.

Ameren Missouri’s 3(M) large general service rate schedule would likely be the rate applicable to installation of faster charging enabled by a make ready model. It is generally cost-prohibitive for a customer with a low load factor (such as EV charging at anticipated levels) to take service on the LGS rate schedule, however, for customers with a non-coincident peak in excess of 100kW, this would be the required rate schedule.

Estimated Usages, Bills, and Revenues in Excess of System Costs.

For purposes of this analysis, an average of 15 kWh per charge is assumed. This provides approximately 45-50 miles of travel. A range of charging utilization was modeled.

While bills for customers with separately-metered EV charging will be calculated with a monthly customer charge and applicable demand and energy charges, to facilitate comparisons for purposes of this Report Staff has provided below the estimated customer bills as an average cost per kWh.

Level 2 Charging Average Customer Experienced \$/kWh

	A	B	C	D	E	F	G	H
Level 2 Charges/Day	1	2	4	6	8	12	16	24
Level 3 Charges/Day	0	0	0	0	0	0	0	0
# of Level 2 Ports	2	2	2	2	4	4	8	8
# of Level 3 Ports	0	0	0	0	0	0	0	0
\$/kWh SGS 2019	\$ 0.118	\$ 0.106	\$ 0.099	\$ 0.097	\$ 0.096	\$ 0.095	\$ 0.095	\$ 0.094
\$/kWh Half Utilization SGS 2019	\$ 0.843	\$ 0.468	\$ 0.281	\$ 0.218	\$ 0.187	\$ 0.156	\$ 0.140	\$ 0.124
\$/kWh Upper kW SGS 2019	\$ 0.118	\$ 0.106	\$ 0.099	\$ 0.097	\$ 0.096	\$ 0.095		
\$/kwh Upper kW LGS 2019							\$ 0.212	\$ 0.168

Level 3 Charging Average Customer Experienced \$/kWh

	I	J	K	L	M	N	O	P
Level 2 Charges/Day	0	0	0	0	0	0	0	0
Level 3 Charges/Day	1	2	4	6	8	12	16	24
# of Level 2 Ports	0	0	0	0	0	0	0	0
# of Level 3 Ports	2	2	2	2	4	4	8	8
\$/kWh SGS 2019	\$ 0.118	\$ 0.106	\$ 0.099	\$ 0.097	\$ 0.096	\$ 0.095		
\$/kWh Half Utilization SGS 2019	\$ 0.843	\$ 0.468	\$ 0.281	\$ 0.218	\$ 0.187	\$ 0.156		
\$/kWh Upper kW SGS 2019								
\$/kwh Upper kW LGS 2019	\$ 1.717	\$ 0.898	\$ 0.489	\$ 0.353	\$ 0.463	\$ 0.335	\$ 0.450	\$ 0.326

Based on the values provided in Ameren Missouri’s 2019 MEEIA Application for avoided costs projected in Ameren Missouri’s 2017 IRP, the annual revenues in excess of system costs estimated to be produced from these customer bills are provided below.⁵

⁵ Staff’s reference to these values in this case is not intended to reflect a position on the reasonableness of the values and methods Ameren Missouri relied on in Ameren Missouri’s MEEIA application.

**Level 2 Charging Average Revenue in Excess of System Costs
Assumes No Additional Distribution Costs**

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>
Level 2 Charges/Day	1	2	4	6	8	12	16	24
Level 3 Charges/Day	0	0	0	0	0	0	0	0
# of Level 2 Ports	2	2	2	2	4	4	8	8
# of Level 3 Ports	0	0	0	0	0	0	0	0
Charging at SGS	\$ 235	\$ 590	\$ 1,105	\$ 1,815	\$ 2,525	\$ 3,554	\$ 4,974	\$ 7,034
One Half Utilization Charging at SGS	\$ (108)	\$ (97)	\$ (268)	\$ (244)	\$ (221)	\$ (564)	\$ (516)	\$ (1,202)
Upper Range kW Charging at SGS	\$ (156)	\$ 199	\$ 324	\$ 1,034	\$ 1,744	\$ 1,993		
Upper Range kW Charging at LGS							\$ 13,537	\$ 13,462

**Level 3 Charging Average Revenue in Excess of System Costs
Assumes No Additional Distribution Costs**

	<u>I</u>	<u>J</u>	<u>K</u>	<u>L</u>	<u>M</u>	<u>N</u>	<u>O</u>	<u>P</u>
Level 2 Charges/Day	0	0	0	0	0	0	0	0
Level 3 Charges/Day	1	2	4	6	8	12	16	24
# of Level 2 Ports	0	0	0	0	0	0	0	0
# of Level 3 Ports	2	2	2	2	4	4	8	8
Charging at SGS	\$ (156)	\$ 199	\$ 324	\$ 1,034	\$ 1,744	\$ 1,993		
One Half Utilization Charging at SGS	\$ (499)	\$ (487)	\$ (1,049)	\$ (1,025)	\$ (1,001)	\$ (2,125)		
Upper Range kW Charging at SGS								
Upper Range kW Charging at LGS	\$ 7,306	\$ 7,589	\$ 6,400	\$ 6,967	\$ 15,232	\$ 12,852	\$ 29,382	\$ 24,624

**Level 2 Charging Average Revenue in Excess of System Costs
Assumes MEEIA-Consistent Additional Distribution Costs**

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>
Level 2 Charges/Day	1	2	4	6	8	12	16	24
Level 3 Charges/Day	0	0	0	0	0	0	0	0
# of Level 2 Ports	2	2	2	2	4	4	8	8
# of Level 3 Ports	0	0	0	0	0	0	0	0
# of Level 3+ Ports	0	0	0	0	0	0	0	0
Charging at SGS	\$ 116	\$ 471	\$ 868	\$ 1,578	\$ 2,288	\$ 3,081	\$ 4,501	\$ 6,087
One Half Utilization Charging at SGS	\$ (227)	\$ (215)	\$ (505)	\$ (481)	\$ (457)	\$ (1,037)	\$ (990)	\$ (2,149)
Upper Range kW Charging at SGS	\$ (511)	\$ (156)	\$ (386)	\$ 324	\$ 1,034	\$ 573		
Upper Range kW Charging at LGS							\$ 12,117	\$ 10,622

**Level 3 Charging Average Revenue in Excess of System Costs
Assumes MEEIA-Consistent Additional Distribution Costs**

	<u>I</u>	<u>J</u>	<u>K</u>	<u>L</u>	<u>M</u>	<u>N</u>	<u>O</u>	<u>P</u>
Level 2 Charges/Day	0	0	0	0	0	0	0	0
Level 3 Charges/Day	1	2	4	6	8	12	16	24
# of Level 2 Ports	0	0	0	0	0	0	0	0
# of Level 3 Ports	2	2	2	2	4	4	8	8
# of Level 3+ Ports	0	0	0	0	0	0	0	0
Charging at SGS	\$ (511)	\$ (156)	\$ (386)	\$ 324	\$ 1,034	\$ 573		
One Half Utilization Charging at SGS	\$ (854)	\$ (842)	\$ (1,759)	\$ (1,735)	\$ (1,711)	\$ (3,545)		
Upper Range kW Charging at SGS								
Upper Range kW Charging at LGS	\$ 6,241	\$ 6,524	\$ 4,269	\$ 4,836	\$ 13,101	\$ 8,591	\$ 25,121	\$ 16,102

Analysis

Direct-Enabled Charging

Summarizing the figures provided above, relatively “high” average costs are shaded in red, relatively “low” average costs are shaded in green.

<u>Average \$/kWh Paid</u>	Low Utilization	Medium Utilization	High Utilization
Charging speed 6.6 kW	\$ 0.530	\$ 0.124	\$ 0.096
Charging speed 20 kW	\$ 0.319	\$ 0.387	\$ 0.181
Charging speed 59 kW	\$ 0.569	\$ 0.580	\$ 0.399

Annual Net Revenue if No Additional Distribution Costs

<u>Revenue in Excess of System Costs</u>	Low Utilization	Medium Utilization	High Utilization
Charging speed 6.6 kW	\$ (316)	\$ (453)	\$ 3,507
Charging speed 20 kW	\$ (751)	\$ (1,468)	\$ 4,370
Charging speed 59 kW	\$ (188)	\$ 5,210	\$ 10,846

Annual Net Revenue if Distribution Costs incurred Consistent with 2019 MEEIA Application

<u>Revenue in Excess of System Costs</u>	Low Utilization	Medium Utilization	High Utilization
Charging speed 6.6 kW	\$ (158)	\$ (59)	\$ 3,980
Charging speed 20 kW	\$ (278)	\$ (852)	\$ 5,968
Charging speed 59 kW	\$ 789	\$ 6,985	\$ 14,042

While the 6.6 kW medium utilization scenarios provide excess costs that are modest, it is Staff’s understanding that the line extension costs associated with these installations are also modest. Conversely, while the 59 kW revenues in excess of system costs are quite high, the customer bills associated with the higher level of demand could be prohibitive to utilization and result in stranded investment.

Based on this analysis, considering only Direct-Enabled charging, Staff recommends that at this time a “make ready” model of subsidized line extensions for separately-metered electric vehicle charging be limited to relatively low charging speed applications, in publicly accessible areas that would tend to increase the utilization of the equipment and potentially enable charging in addition to the direct-enabled revenues estimated above.

In reviewing information provided by Ameren Missouri, the costs associated with transformers for demands in excess of approximately 50 kW are significant, in the tens of thousands of dollars and beyond for DC fast charge systems. At this time, it does not appear the charging revenues associated with such a system could sustainably produce a benefit to meet or exceed such costs.

Other Considerations

Accretive Charging

Facilitation of publicly accessible EV charging could potentially enable charging in addition to the direct-enabled revenues estimated above. For example, if someone who lives in an apartment is comfortable that they can charge an EV at a nearby park, they may move forward with an EV purchase, which ultimately is charged at both the park and the customer's workplace. Similarly, the availability of workplace charging may result in charging occurring at both the workplace, and at the customer's home. To facilitate this analysis, Staff estimated the accretive revenue in excess of system costs that would be associated with non-separately metered EV charging on both the LGS (workplace) and Residential rate schedules.

LGS Accretive A-H with no Additional Distribution Costs

Charging Scenario	A	B	C	D	E	F	G	H
Level 2 Charges/Day	1	2	4	6	8	12	16	24
Level 3 Charges/Day								
# of Level 2 Ports	2	2	2	2	4	4	8	8
# of Level 3 Ports								
Incremental Estimated Average Bill (Secondary)	\$ 59	\$ 82	\$ 165	\$ 211	\$ 258	\$ 422	\$ 516	\$ 845
Estimated \$/kWh (Annual Average @ Secondary)	\$ 0.1310	\$ 0.0914	\$ 0.0914	\$ 0.0782	\$ 0.0716	\$ 0.0782	\$ 0.0716	\$ 0.0782
\$/ Approx. 100 Mile Charge	\$ 1.9653	\$ 1.3713	\$ 1.3713	\$ 1.1733	\$ 1.0743	\$ 1.1733	\$ 1.0743	\$ 1.1733
\$/Mile (.3 kWh/Mile)	\$ 0.0393	\$ 0.0274	\$ 0.0274	\$ 0.0235	\$ 0.0215	\$ 0.0235	\$ 0.0215	\$ 0.0235
Annual Energy Cost	\$ 148	\$ 296	\$ 592	\$ 889	\$ 1,185	\$ 1,777	\$ 2,370	\$ 3,555
Annual Capacity & T&D Cost	\$ 195.14	\$ 195.14	\$ 390.29	\$ 390.29	\$ 390.29	\$ 780.57	\$ 780.57	\$ 1,561.15
Billing and Other Incremental Costs								
Margin:	\$ 364	\$ 496	\$ 992	\$ 1,255	\$ 1,519	\$ 2,511	\$ 3,037	\$ 5,021
Margin / Port:	\$ 182	\$ 248	\$ 496	\$ 628	\$ 380	\$ 628	\$ 380	\$ 628

LGS Accretive I-P with no Additional Distribution Costs

Charging Scenario	I	J	K	L	M	N	O	P
Level 2 Charges/Day								
Level 3 Charges/Day	1	2	4	6	8	12	16	24
# of Level 2 Ports								
# of Level 3 Ports	2	2	2	2	4	4	8	8
Incremental Estimated Average Bill (Secondary)	\$ 130	\$ 154	\$ 307	\$ 354	\$ 400	\$ 707	\$ 801	\$ 1,415
Estimated \$/kWh (Annual Average @ Secondary)	\$ 0.2894	\$ 0.1706	\$ 0.1706	\$ 0.1310	\$ 0.1112	\$ 0.1310	\$ 0.1112	\$ 0.1310
\$/ Approx. 100 Mile Charge	\$ 4.3413	\$ 2.5593	\$ 2.5593	\$ 1.9653	\$ 1.6683	\$ 1.9653	\$ 1.6683	\$ 1.9653
\$/Mile (.3 kWh/Mile)	\$ 0.0868	\$ 0.0512	\$ 0.0512	\$ 0.0393	\$ 0.0334	\$ 0.0393	\$ 0.0334	\$ 0.0393
Annual Energy Cost	\$ 148	\$ 296	\$ 592	\$ 889	\$ 1,185	\$ 1,777	\$ 2,370	\$ 3,555
Annual Capacity & T&D Cost	\$ 585.43	\$ 585.43	\$ 1,170.86	\$ 1,170.86	\$ 1,170.86	\$ 2,341.72	\$ 2,341.72	\$ 4,683.44
Billing and Other Incremental Costs								
Margin:	\$ 829	\$ 961	\$ 1,922	\$ 2,185	\$ 2,449	\$ 4,371	\$ 4,898	\$ 8,742
Margin / Port:	\$ 415	\$ 481	\$ 961	\$ 1,093	\$ 612	\$ 1,093	\$ 612	\$ 1,093

Residential Accretive Single Charger with no Additional Distribution Costs

Charging Scenario	Q	R	S	T	U	V	W	X
Level 2 Charges/Day	0.5	1	2	3				
Level 3 Charges/Day					0.5	1	2	3
# of Level 2 Ports	1	1	1	1				
# of Level 3 Ports					1	1	1	1
Incremental Average Bill (Secondary)	\$ 18.49	\$ 36.98	\$ 73.95	\$ 110.93	\$ 18.49	\$ 36.98	\$ 73.95	\$ 110.93
Estimated \$/kWh (Annual Average @ Secondary)	\$ 0.0822	\$ 0.0822	\$ 0.0822	\$ 0.0822	\$ 0.0822	\$ 0.0822	\$ 0.0822	\$ 0.0822
\$/ Approx. 100 Mile Charge	\$ 1.2325	\$ 1.2325	\$ 1.2325	\$ 1.2325	\$ 1.2325	\$ 1.2325	\$ 1.2325	\$ 1.2325
\$/Mile (.3 kWh/Mile)	\$ 0.0247	\$ 0.0247	\$ 0.0247	\$ 0.0247	\$ 0.0247	\$ 0.0247	\$ 0.0247	\$ 0.0247
Annual Energy Cost	\$ 74.05	\$ 148.11	\$ 296.22	\$ 444.32	\$ 74.05	\$ 148.11	\$ 296.22	\$ 444.32
Annual Capacity & T&D Cost	\$ 97.57	\$ 97.57	\$ 195.14	\$ 195.14	\$ 97.57	\$ 97.57	\$ 195.14	\$ 195.14
Billing and Other Incremental Costs								
Margin:	\$ 50.22	\$ 198.02	\$ 396.04	\$ 691.63	\$ 50.22	\$ 198.02	\$ 396.04	\$ 691.63

While Staff cannot recommend sizing of a make-ready model subsidy relying on the assumption that accretive charging will occur, the revenues in excess of system costs that could result from accretive charging are consistent with a public policy favoring subsidization of separately-metered EV charging in areas that are publicly accessible.

Alternative Recommendations

Because a cost benefit analysis has been ordered, Staff assumes that it was not the Commission’s intent to entirely ignore net revenues as it applies to the line extension policy, as net revenues are the “benefit” to be weighed against the cost of nonparticipating ratepayers absorbing the cost of a new customer connecting to the system in excess of the Construction Allowance. As an alternative to the tariff described above, intended to comply as literally as possible with the Commission’s order, Staff suggests that one of the following approaches be adopted:

- (1) For line extensions or service upgrades to serve publicly accessible charging, the net margin analysis of the construction allowance calculation be based on the relationship of 10 years’ of projected net margins to 10 years’ projected revenue requirement impact. This would allow incorporation of higher assumed utilization in later years, while retaining a measure of ratepayer protection against, for example, the installation of a mile of distribution line to serve a Level 2 Charger accessible to only a single customer.
- (2) For line extensions or service upgrades to serve publicly accessible charging, the net margin analysis of the construction allowance calculation include a reasonable estimate of additional net revenues associated with accretive charging reasonably enabled by the line extension sought. For example, if a line extension is sought to a public commuter lot, the calculation for that line would reflect an assumption that for each EV charger, additional charging occurs within Ameren Missouri territory at a residential or SGS rate to power half of the enabled EV vehicle’s travel.

