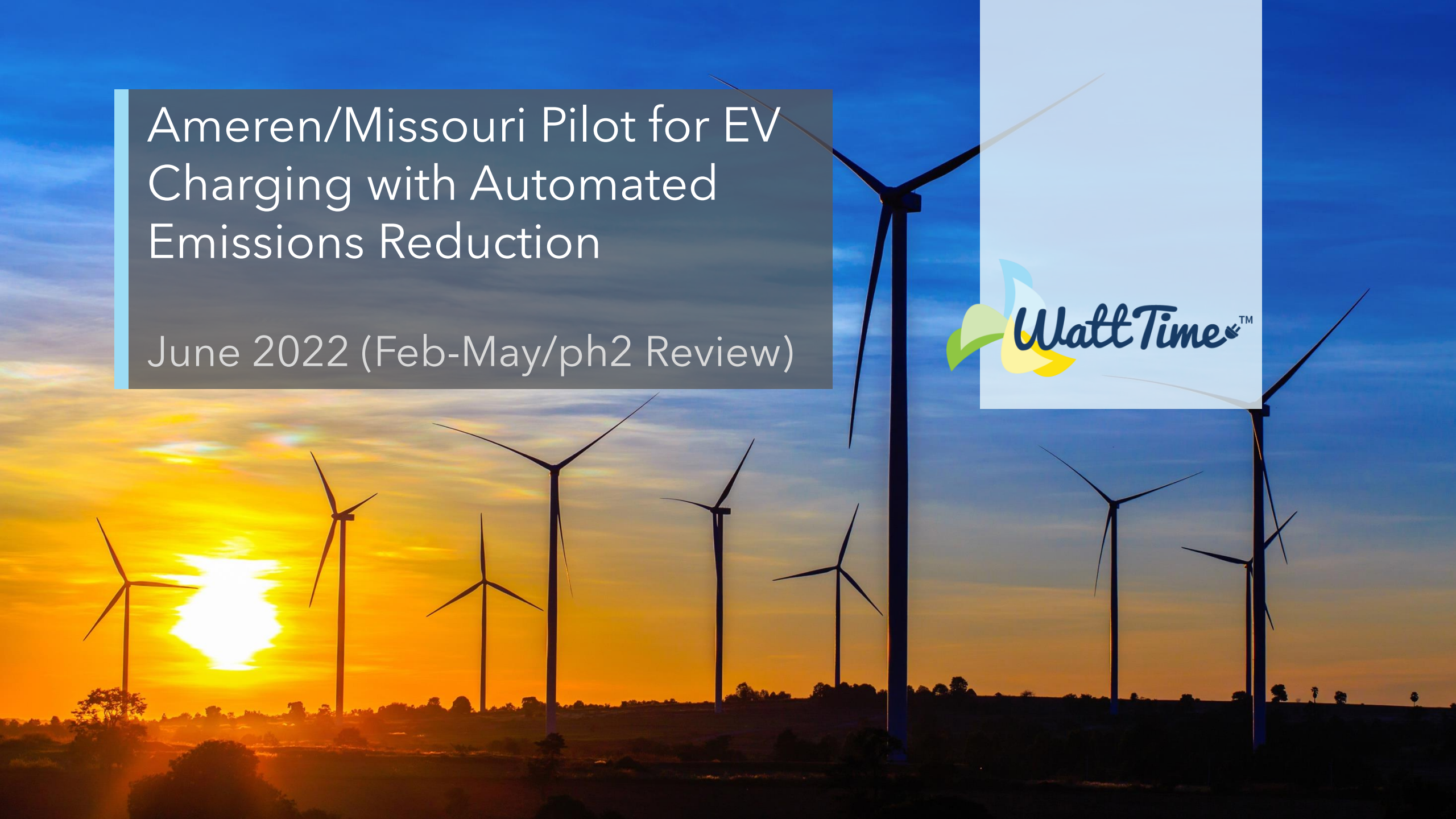
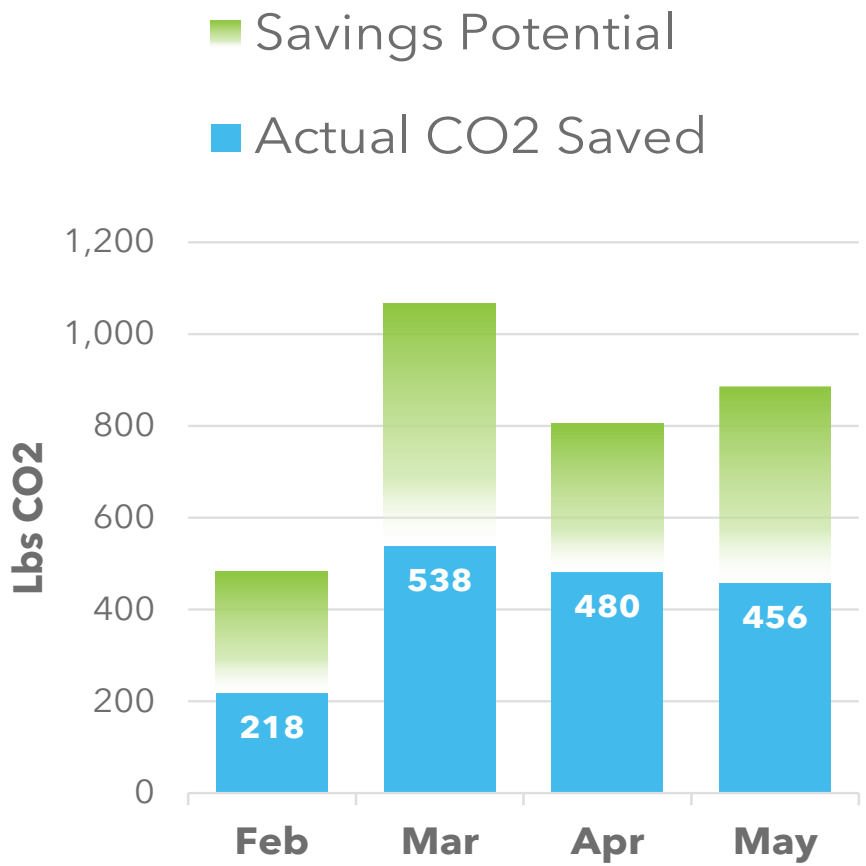
Ameren/Missouri Pilot for EV Charging with Automated Emissions Reduction

June 2022 (Feb-May/ph2 Review)



Pilot Update: Phase 2 Preliminary Results

Monthly Savings Summary



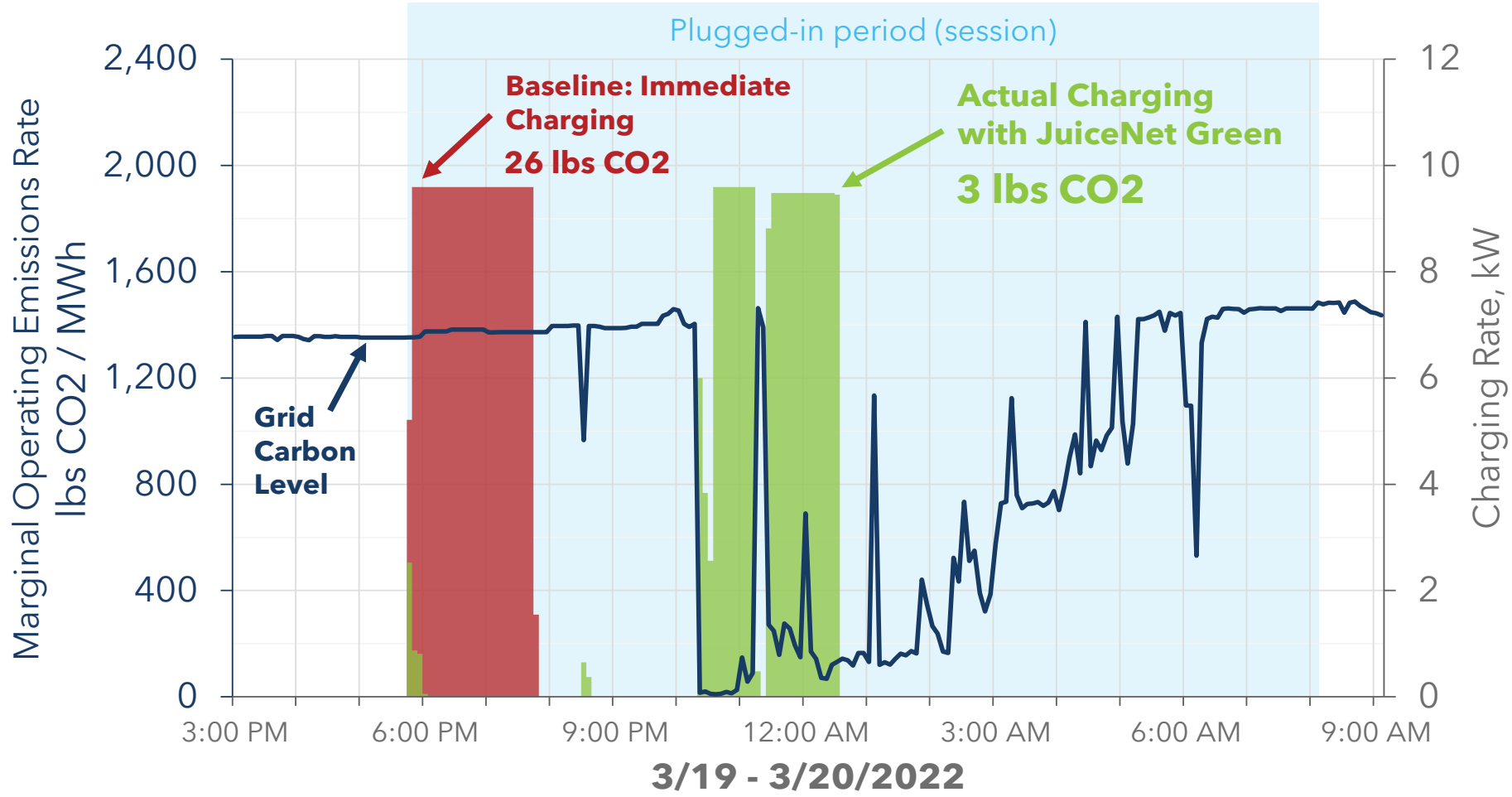
Key Results from Phase 2

Metric	Value
# of Active Users	38
# of Sessions	2,393
Total CO2 avoided	1,692 lbs
…equivalent to:	1,905 miles driven by a gas-powered car
Total CO2 avoided	3.7%
CO2 avoided in the Best Individual Session	87.2%

"Savings Potential" means the performance that could have been achieved under the encountered circumstances and constraints (extrapolates the normalized performance of the highest performing users in the population). This accounts for the degradations from optimal performance which include: WattTime emissions forecast performance, JuiceNet Green algorithm/constraints.

Best Individual Session in Phase 2

23 lbs CO2 avoided (87%)



'Actual charging' data from an EV & Juicebox owner using JuiceNet Green (AER) in Kansas City, MO
'Baseline' is a simulation of immediate, full-rate charging

WattTime™

Final Leaderboard

Ranked by normalized CO2 impact per kWh charged, for users that saved more than 10 pounds of carbon.

11 users opted out

JBID ending	kWh charged	CO2 impact from charging [lbs CO2 CAUSED]	CO2 impact, normalized [lbs CAUSED per kWh]	JuiceNet Green Savings [lbs CO2 SAVED]	CO2 Savings Opportunity Converted	Grid Region
...33019243112	1,038	1,038	1.000	187	34%	SPP_KC
...21121623127	1,304	1,480	1.135	189	47%	SPP_KC
...41216017780	581	665	1.145	91	41%	SPP_KC
...37121625227	624	825	1.323	47	59%	SPP_SPRINGFIELD
...01218242603	234	317	1.353	16	22%	SPP_KC
...91120628319	796	1,091	1.370	46	27%	SPP_KC
...00119244704	1,092	1,568	1.437	73	66%	MISO_SAINT_LOUIS
...27217013303	694	997	1.437	52	45%	MISO_SAINT_LOUIS
...18018241197	346	498	1.440	30	44%	MISO_SAINT_LOUIS
...82118247603	779	1,122	1.441	55	58%	MISO_SAINT_LOUIS
...66119246103	489	706	1.442	43	47%	MISO_SAINT_LOUIS
...98320622824	906	1,308	1.444	69	52%	MISO_SAINT_LOUIS
...65021620927	815	1,184	1.452	65	65%	MISO_SAINT_LOUIS
...07320625731	717	1,041	1.452	64	59%	MISO_SAINT_LOUIS
...14320625724	1,083	1,583	1.462	63	50%	MISO_SAINT_LOUIS
...62320625323	758	1,108	1.463	36	40%	MISO_SAINT_LOUIS
...58317246203	980	1,437	1.467	33	43%	MISO_SAINT_LOUIS
...28318246703	1,147	1,684	1.468	72	43%	MISO_SAINT_LOUIS
...63021620624	983	1,444	1.470	55	52%	MISO_SAINT_LOUIS
...67217010803	855	1,257	1.471	53	43%	MISO_SAINT_LOUIS
...13118243297	1,581	2,328	1.473	67	47%	MISO_SAINT_LOUIS
...46021620523	1,668	2,458	1.474	52	28%	MISO_SAINT_LOUIS
...49219246404	1,058	1,568	1.482	40	34%	MISO_SAINT_LOUIS
...96121691127	515	771	1.499	14	28%	MISO_SAINT_LOUIS
...55121699427	1,219	1,850	1.517	18	13%	MISO_SAINT_LOUIS
...06120628019	1,007	1,528	1.518	15	9%	MISO_SAINT_LOUIS
...15019245103	1,077	1,503	1.395	6	4%	SPP_SPRINGFIELD
...07120693825	106	156	1.472	6	28%	MISO_SAINT_LOUIS
...13317241703	305	458	1.501	5	33%	MISO_SAINT_LOUIS
...41616015510	788	1,255	1.593	4	23%	MISO_SAINT_LOUIS
...30017017902	198	301	1.520	4	14%	MISO_SAINT_LOUIS
...54121625227	684	1,021	1.493	3	5%	MISO_SAINT_LOUIS
...22117123602	141	211	1.501	2	58%	MISO_SAINT_LOUIS
...46020625524	240	372	1.553	0	2%	MISO_SAINT_LOUIS
...25019242204	178	272	1.529	0	0%	MISO_SAINT_LOUIS
...65120628324	65	102	1.557	0	1%	MISO_SAINT_LOUIS
...35019242912	62	96	1.531	0	0%	SPP_KC
...28018244304	938	1,408	1.502	0	0%	MISO_SAINT_LOUIS
...23019245712	21	32	1.491	0	-9%	SPP_KC
...40317243203	803	1,208	1.504	0	0%	MISO_SAINT_LOUIS
...97019246612	587	860	1.466	0	-2%	MISO_SAINT_LOUIS
...34317245303	1,306	1,942	1.487	-4	-8%	MISO_SAINT_LOUIS

SPP drivers have lowest normalized impact CO2/kWh

Some MISO drivers converted a higher fraction of a smaller opportunity

38% of users had limited engagement and/or poor performance

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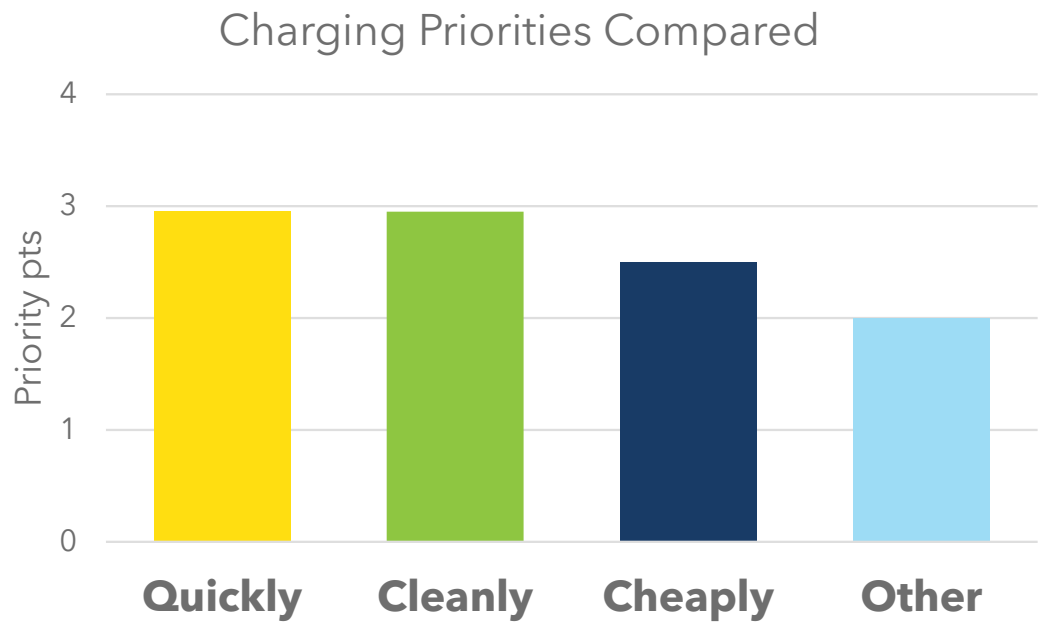
Initial Survey Results

10 respondents so far

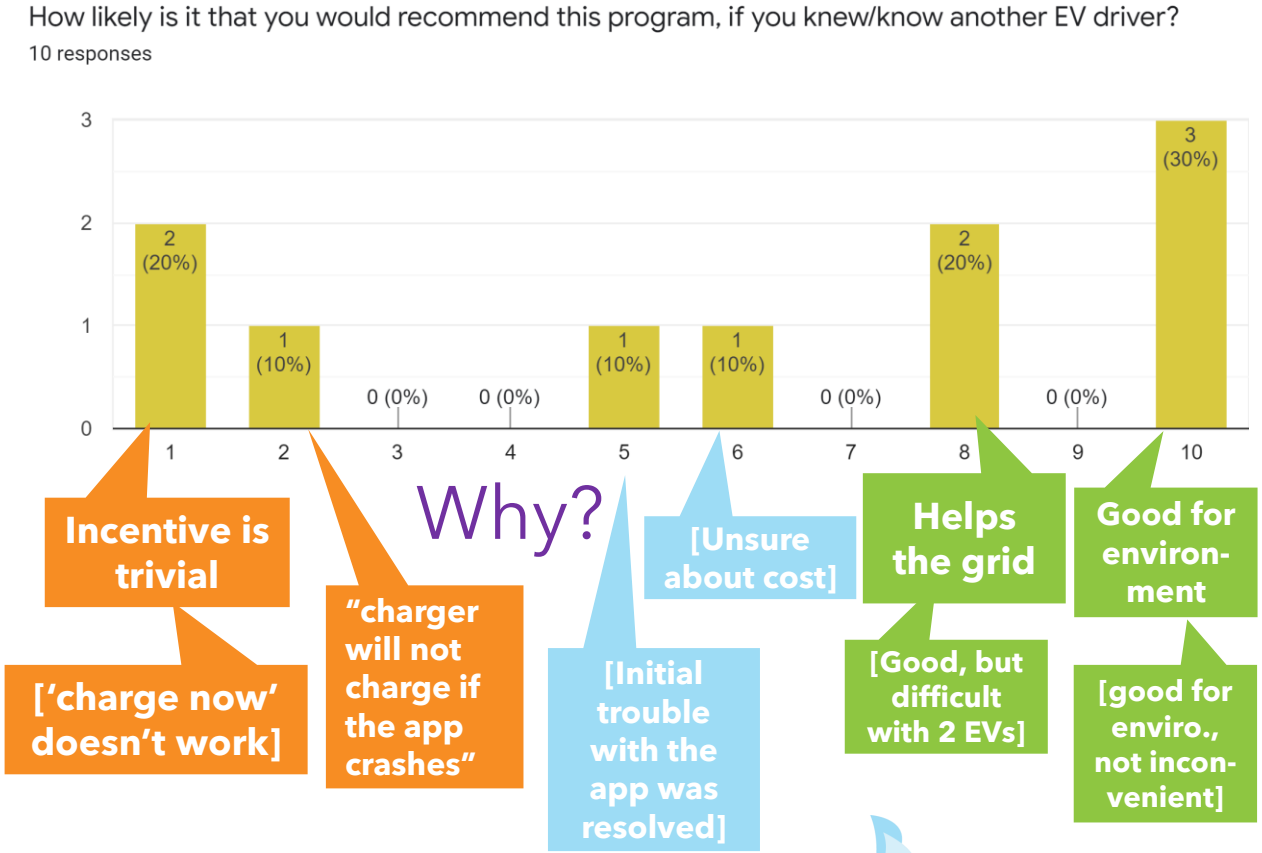
Priorities for EV Charging



Average rating with 4 pts for 1st priority, 3 pts for 2nd priority, etc…

Recommend this program?

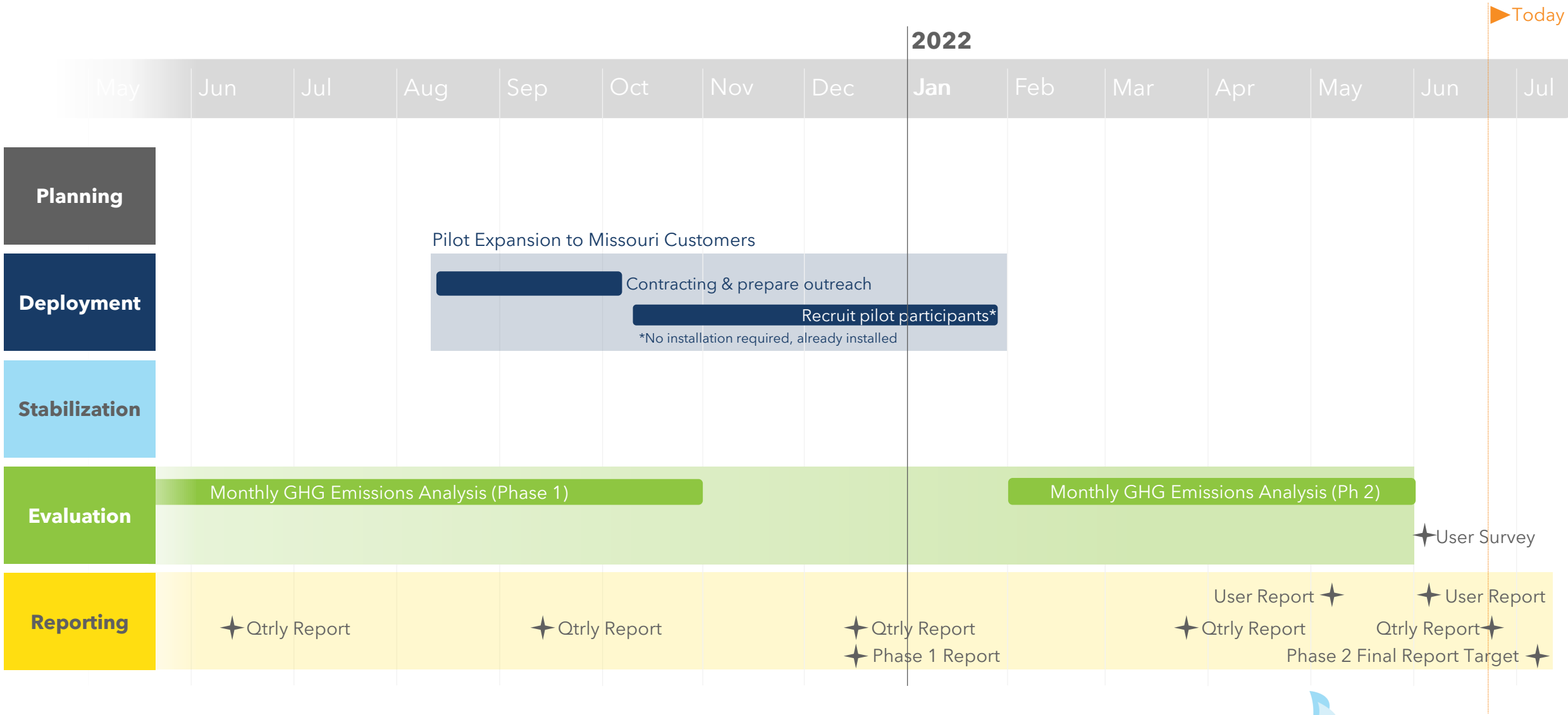
Very Unlikely **Avg = 6.1** **Very Likely**



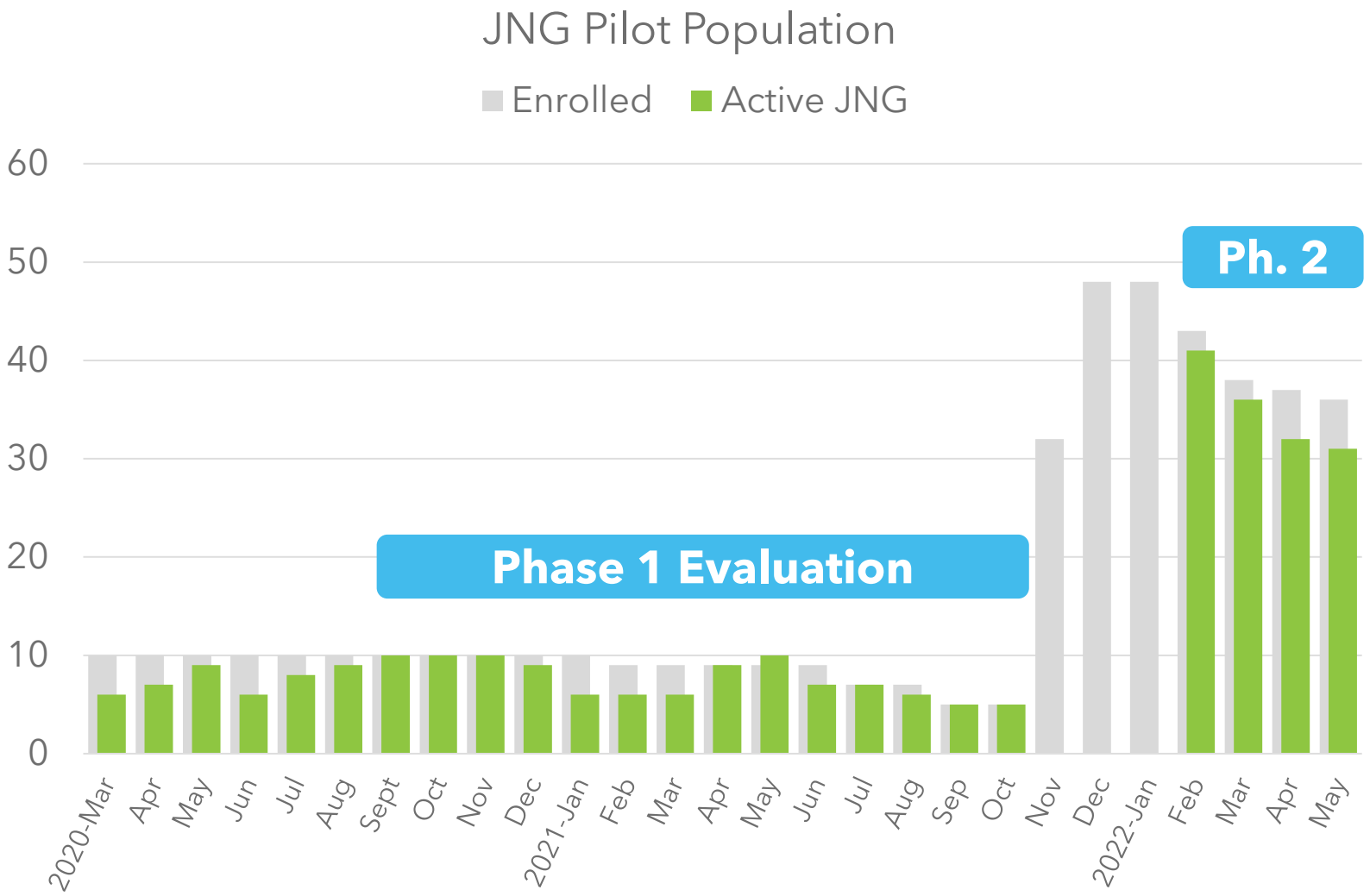
Enel X Response: aware of "charge now" bug, will fix in new app: "JuicePass" available this Summer.

[] brackets indicate a longer response was paraphrased

JuiceNet Green Pilot Timeline



User Population for JuiceNet Green Pilot



Summary For Annual Report

Program Update

1. Phase 1 of the pilot demonstrated/confirmed that Enel X had developed a product, JuiceNet Green, that could functionally perform Automated Emissions Reduction (AER), based on WattTime's marginal emissions data.
2. Phase 2 expanded the pilot to a wider group (37 active users) and wider geography (all of Missouri) to evaluate the carbon avoidance performance of JuiceNet Green.
3. **If this program was expanded to 10,000 EV drivers in Missouri, WattTime estimates that it would save between 1,096 – 2,385 metric tonnes of CO2 per year.**

Estimated Impact	MISO Regions	SPP Regions
Ph2 Pilot # of Drivers	29	8
CO2 lbs saved per driver per mo.	9.2	42.8
CO2 saved % (user avg)	2.8%	8.7%
CO2 saved best % (monthly avg)	6.9%	19.2%
Expanded to # drivers:	10,000	10,000
CO2 savings, estimated %	3.8%	11.3%
CO2 tonnes saved per year	**1,096**	**2,385**

Ameren Missouri's territory is primarily in MISO

Assumes 13,000 miles per year per driver

Assumes modest performance improvement (better engagement, app updates)

The savings opportunity will grow over time as more renewable energy is built (not factored in).

Thank You

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