Moving Targets

Methods for evaluating evolving EV managed charging programs

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Agenda

The Why and What of managed charging

Program background

Trial design

Trial results overview

Flexible Scheduling results

Personal Scheduling results

Takeaways

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Why managed charging?

- Massachusetts landscape of EVs
  - 140,000 EVs on the road in 2024
  - Goal of 900,000 EVs on the road by 2030

What is managed charging?

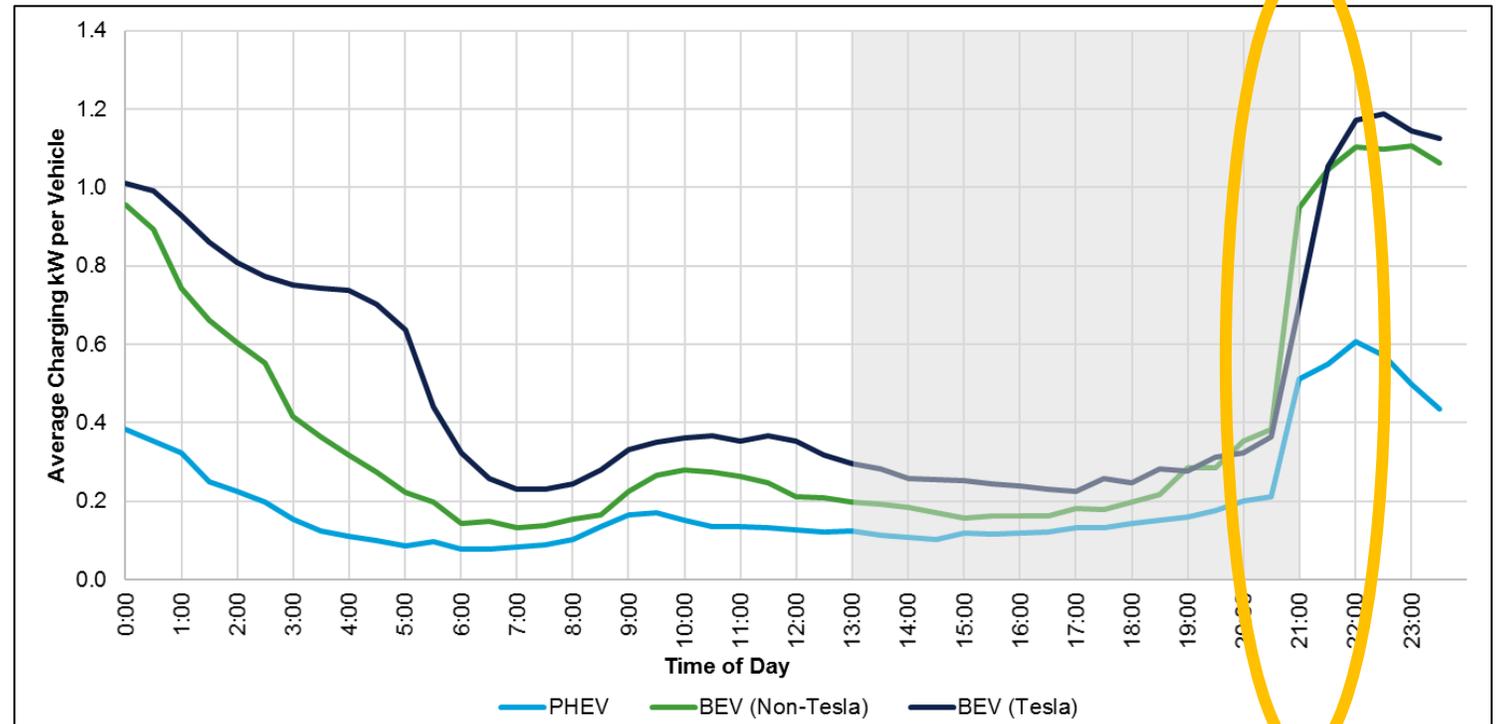- EV-managed charging is any effort or program that influences or regulates the timing and/or quantity of EV charging

Program Background

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National Grid Massachusetts
Residential Off-Peak Charging Rebate Program

- Began in 2020
- Provides per-kWh rebates for charging off-peak
- On-peak period is 1 p.m. – 9 p.m. on weekdays

Trial Design

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nationalgrid

Trial ran from August 1, 2024 – September 30, 2024

Flexible Scheduling (FS)	Personal Scheduling (PS)
Active managed charging	Passive managed charging
Teslas	Non-Teslas
Program implementor actively controlled when charging occurred overnight, based on driver's desired departure time and SOC	Drivers set their own charging schedules for 10PM, 11PM, 12AM, 1AM, or 2AM
2,279 vehicles	993 vehicles

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Randomized Encouragement Design (RED)

Randomized Encouragement Design (RED)

After choosing the RED approach, National Grid:

• Identified eligible customers

• Randomly assigned treatment and control groups *prior to recruitment*

• Reached out to customers in the treatment groups to encourage enrollment
  • This ensures that control groups had *no awareness* of the program

Vehicle group		Vehicles assigned	Vehicles opted in	Opt-in rate
Flexible Scheduling (FS)	FS, Treatment	2,279	770	34%
Personal Scheduling (PS)	PS, Treatment, 10 p.m.	197	66	34%
	PS, Treatment, 11 p.m.	187	62	33%
	PS, Treatment, 12 a.m.	192	68	35%
	PS, Treatment, 1 a.m.	214	59	28%
	PS, Treatment, 2 a.m.	203	61	30%
	Total PS	**993**	**316**	**32%**
Total		3,272	1,086	33%

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Trial Results Overview

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Participant off-peak charging percentages

| Group	Subgroup	Vehicle count	Percent of kWh charged off-peak (Home)
Flexible Scheduling (FS)	Control	838	90.6%
	Treatment, not opted-in	1,301	89.1%
	Treatment, opted-in, did not smart charge	344	90.4%
	Treatment, opted-in, smart charged	328	95.9%
Personal Scheduling (PS)	Control	375	88.1%
	Treatment, not opted-in	565	83.9%
	Treatment, opted-in	285	92.7%

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Flexible Scheduling Results

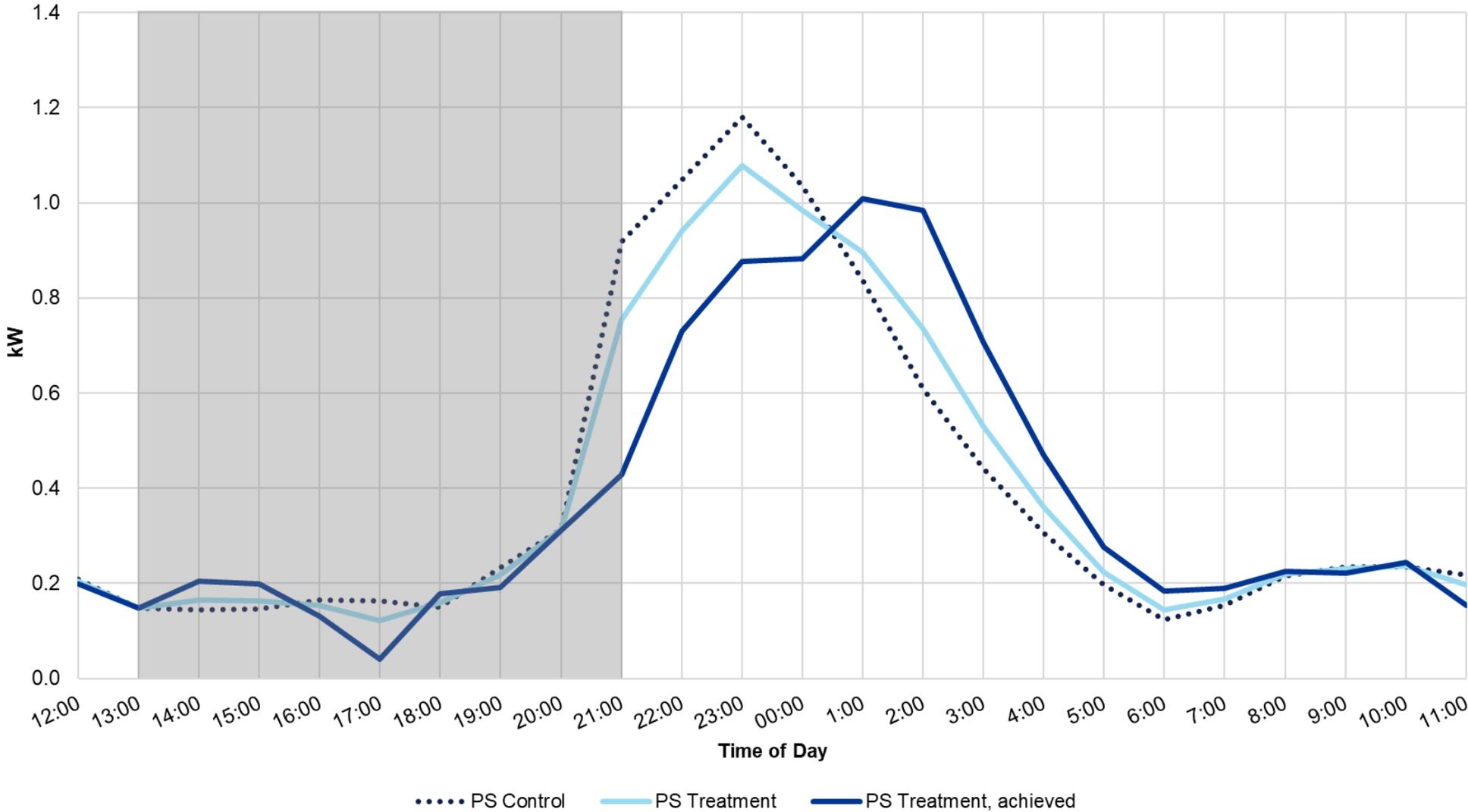DNV

Flexible Scheduling
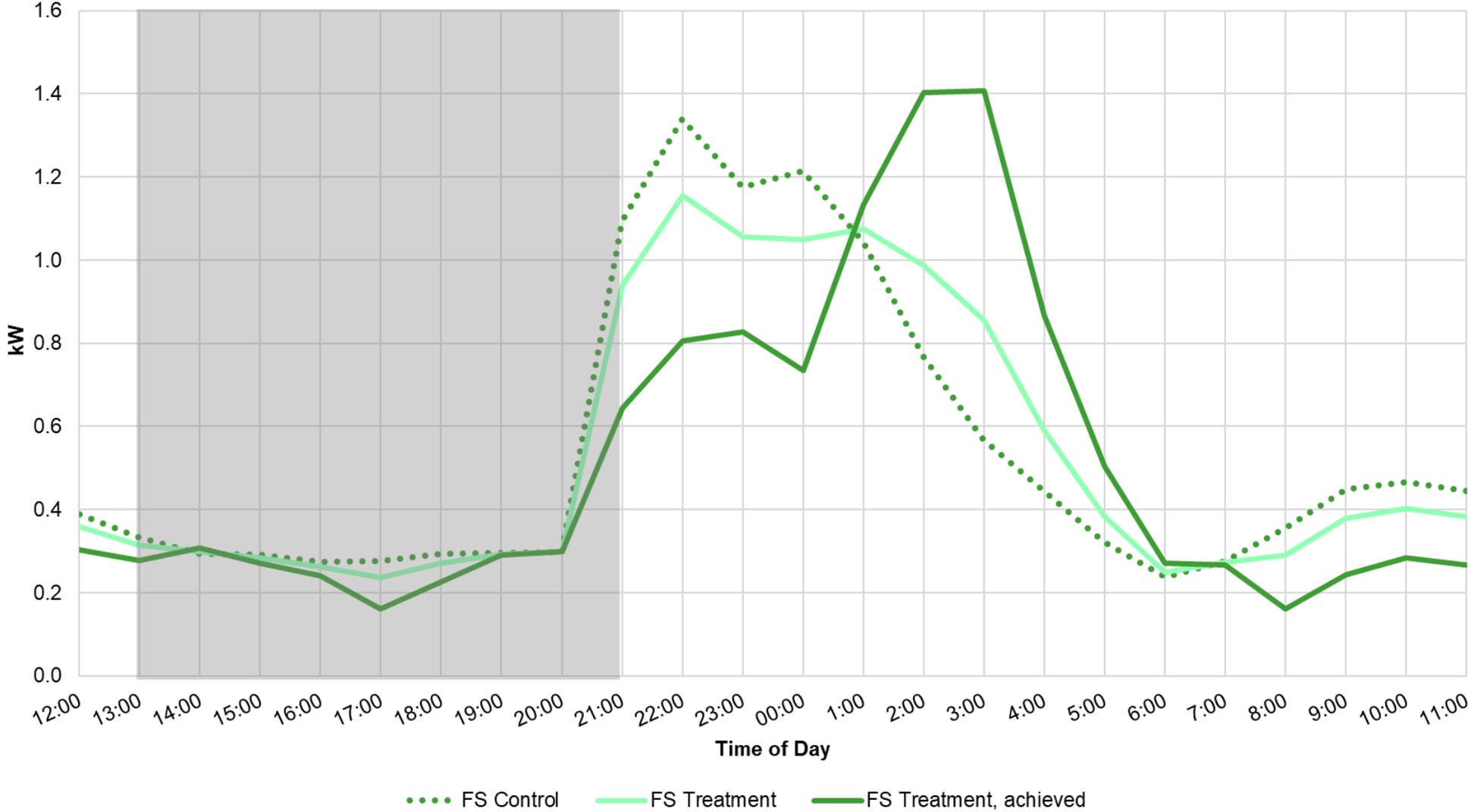
Flexible Scheduling

- Statistically significant decrease of 0.15 kW from 9 p.m. to 12 a.m.

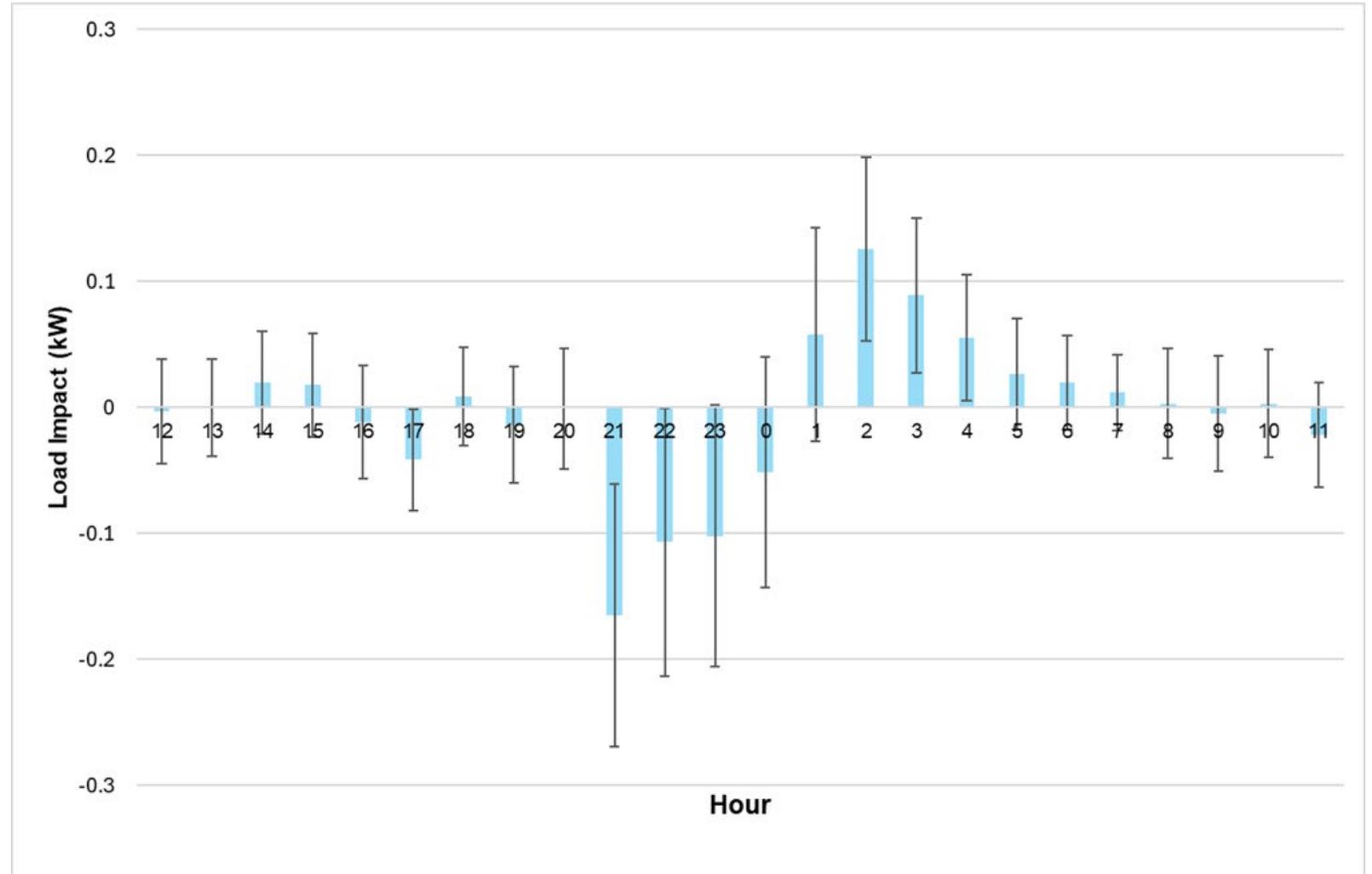- Statistically significant increase of 0.15–0.29 kW from 2 to 5 a.m.

Personal Scheduling Results

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Personal Scheduling

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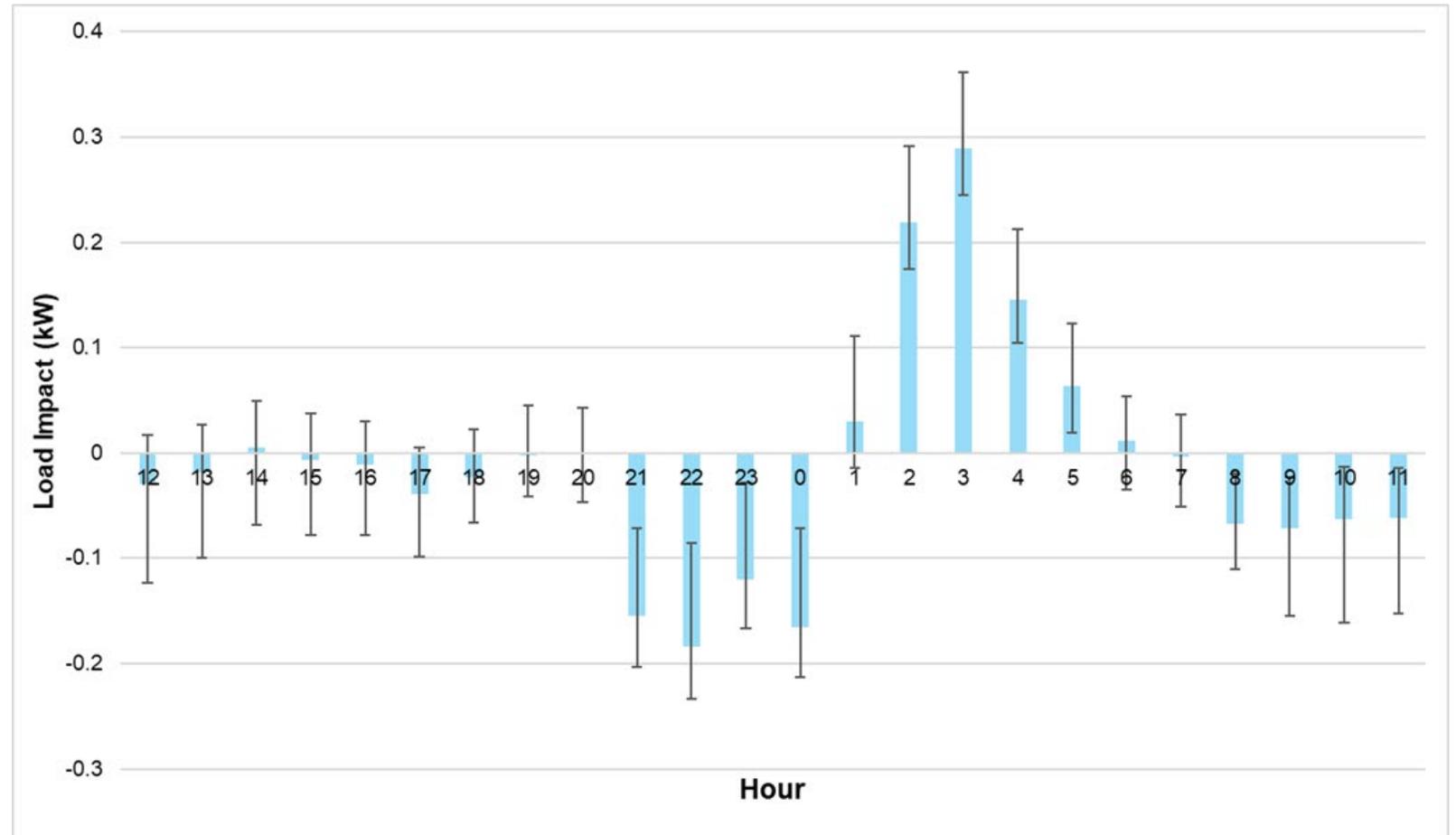
Personal Scheduling

- Statistically significant decrease of 0.16 kW at 9 p.m.

- Statistically significant increase of 0.06–0.13 kW from 2 to 4 a.m.

Takeaways

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Takeaways from the Trial

- Both intervention approaches mitigated the 9 p.m. timer peak and shifted charging to the early morning hours

- PS resulted in a slightly larger 9 p.m. reduction than FS, on a percentage point basis
  - In future programs, utilities should consider either intervention option given that they both performed effectively and resulted in distinct overnight charging load shapes

- Future programs should identify ways to streamline smart charging enablement and clearly communicate the required steps to program participants
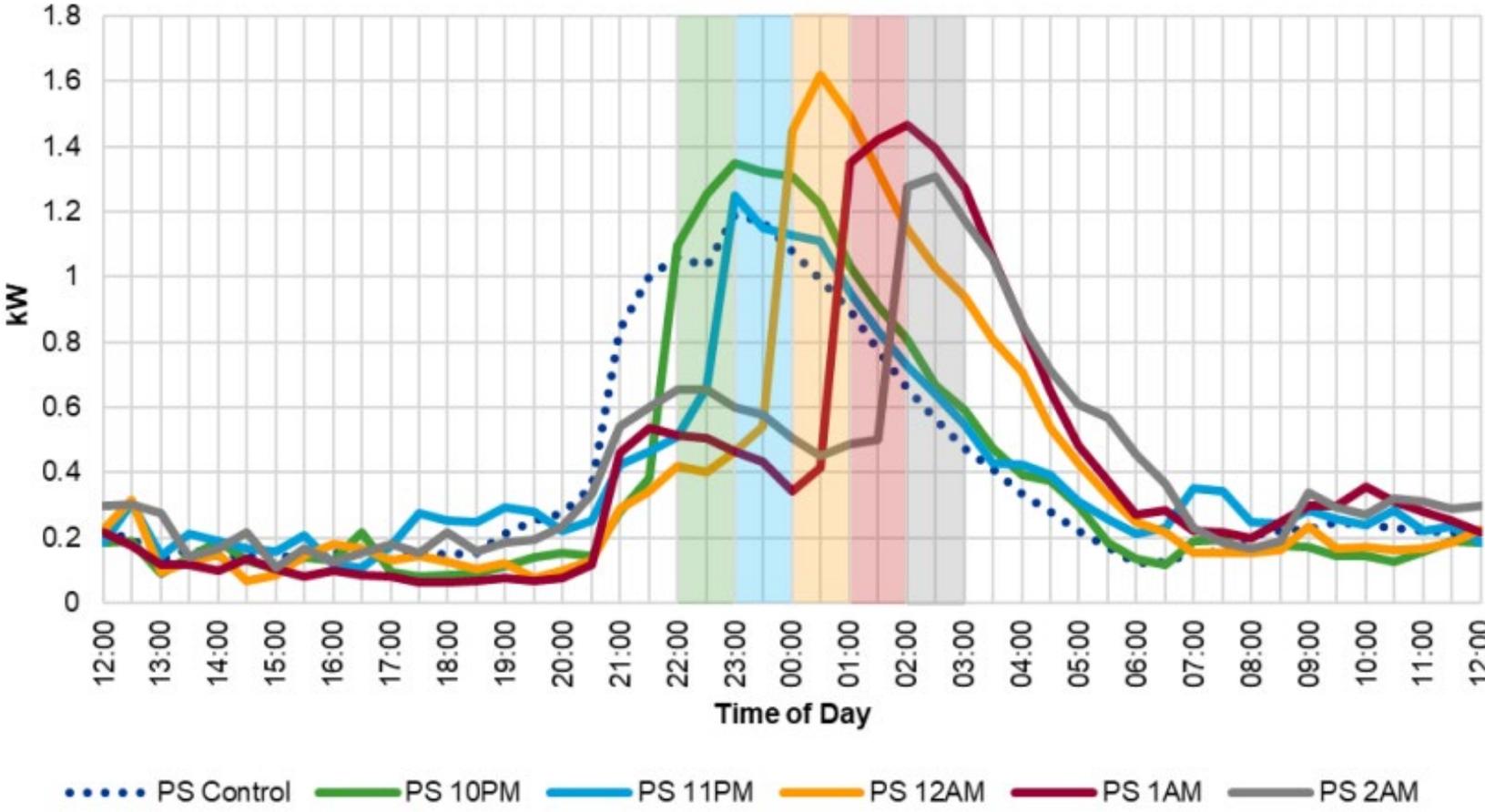
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Thank you

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Bonus slides

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