



Partnering with EV Customers For Deeper Understanding of Driving and Changing Behaviors

Kathy Knoop, Salt River Project

Salt River Project

We are delivering today

More than 2 million people living in central Arizona receive water and power from us.

We are shaping tomorrow

As a community-based not-for-profit company, SRP acts in the best interests of the people it serves.

- One of the nation's largest public power utilities 1 M customers
- Vertically integrated utility
- 9,580 megawatts available to serve customers
- 31,000 GWh retail sales FY19



SRP's Water Business

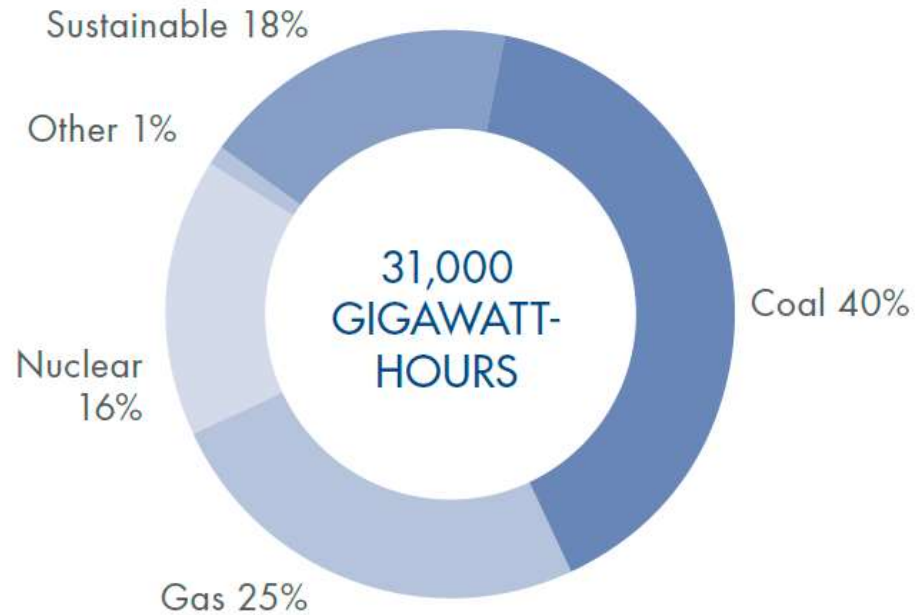


- **8** dams and reservoirs
- **1,300** miles of canals and laterals
- **800,000** acre-feet of water delivered annually
- 13,000 sq. mile watershed

Generation mix

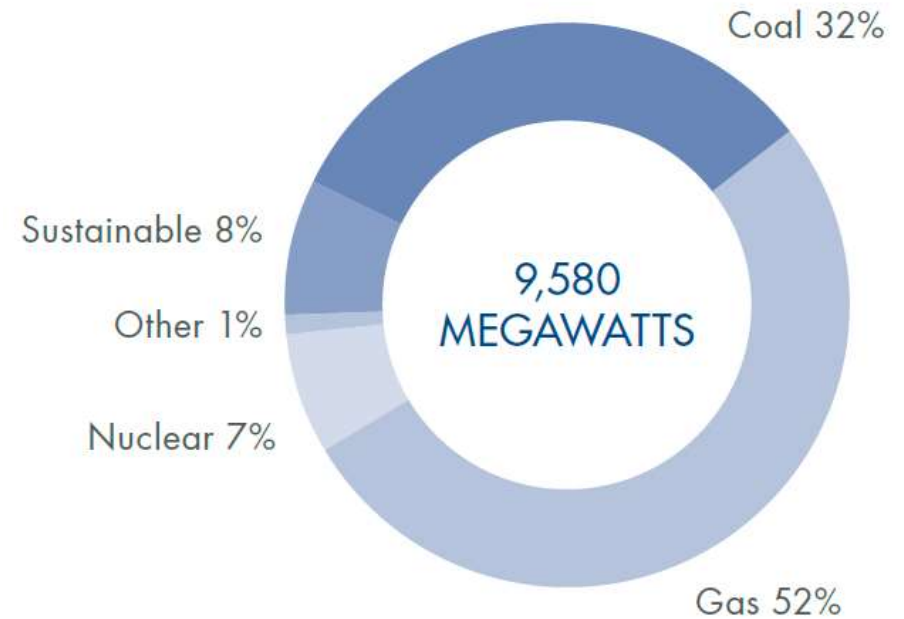
PERFORMANCE

Planned Energy Generation in FY19 to Support 31,000 Gigawatt-Hours of Retail Sales

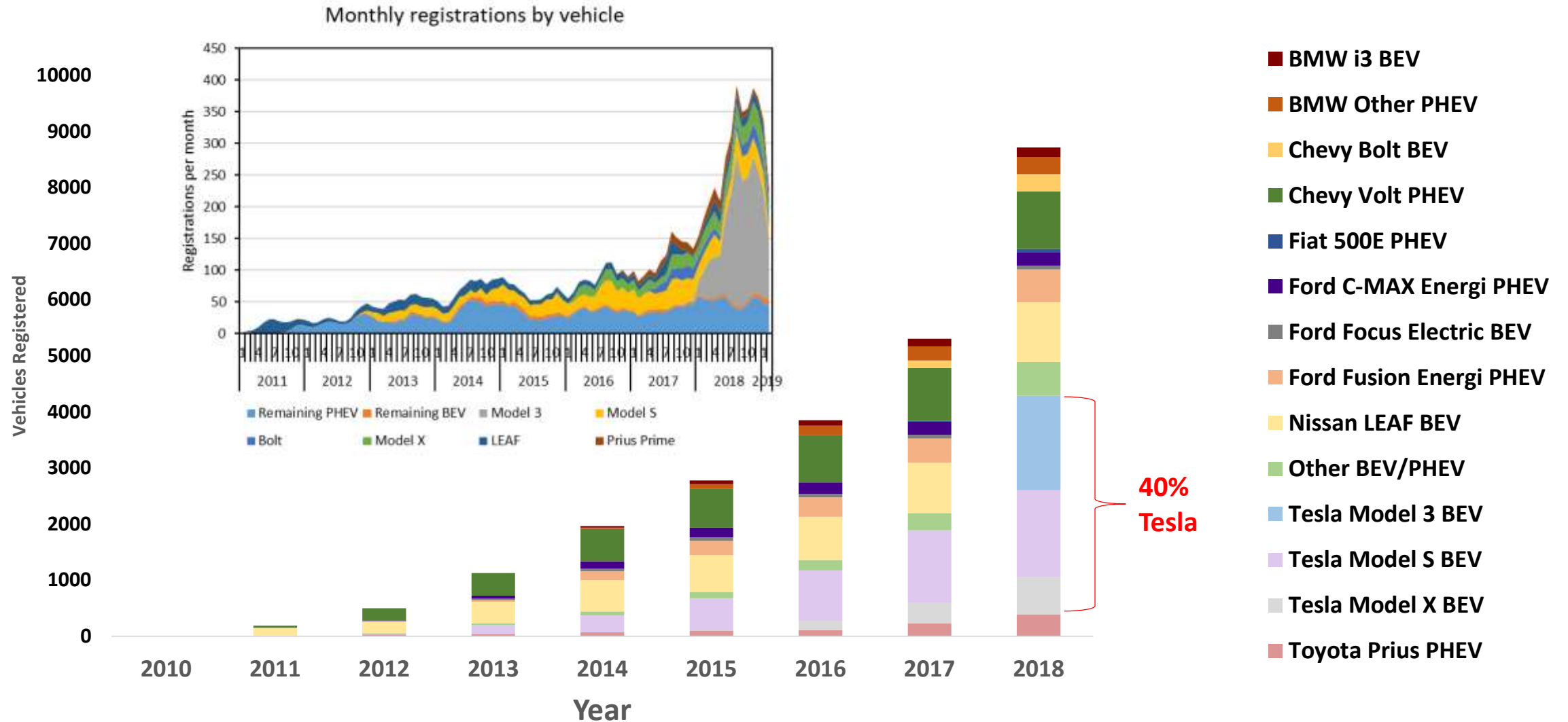


RESOURCES

Generation Capacity Mix in FY19



SRP service territory EV registrations



The EV Community

EV owners, sign up and pocket \$50

Join SRP's electric vehicle (EV) community to connect with fellow EV enthusiasts, help drive the use of electric vehicles, and be on the list for future focus groups, surveys and more. Sign up below; upon approval, you'll receive a gift card to Amazon.com within 20 business days.

To join, you must:

- Reside in a SRP residential account household.
- Own or lease a qualified electric vehicle (as listed in form). Only electric vehicles that can travel on the freeway at highway speeds are eligible. Licensed or unlicensed vehicles such as electric golf carts and neighborhood electric vehicles such as the GEM, Columbia, E-Z-Go, Peapod, etc. are not eligible for the gift card.
- Complete the online form. NOTE: SRP customers are eligible to receive one gift card, per vehicle. A form must be completed for each electric vehicle. SRP employees are not eligible for the gift card offer.
- Submit a scanned PDF or photo of your Arizona automobile registration.

Sign up today

All fields are required

Full name

Phone

Email

SRP account number

Questions?

Call us at (602) 236-8888 for more information.

RELATED

- SRP Drive Electric
- Savings calculator
- Prep for at-home charging
- Join SRP EV community
- For existing EV owners

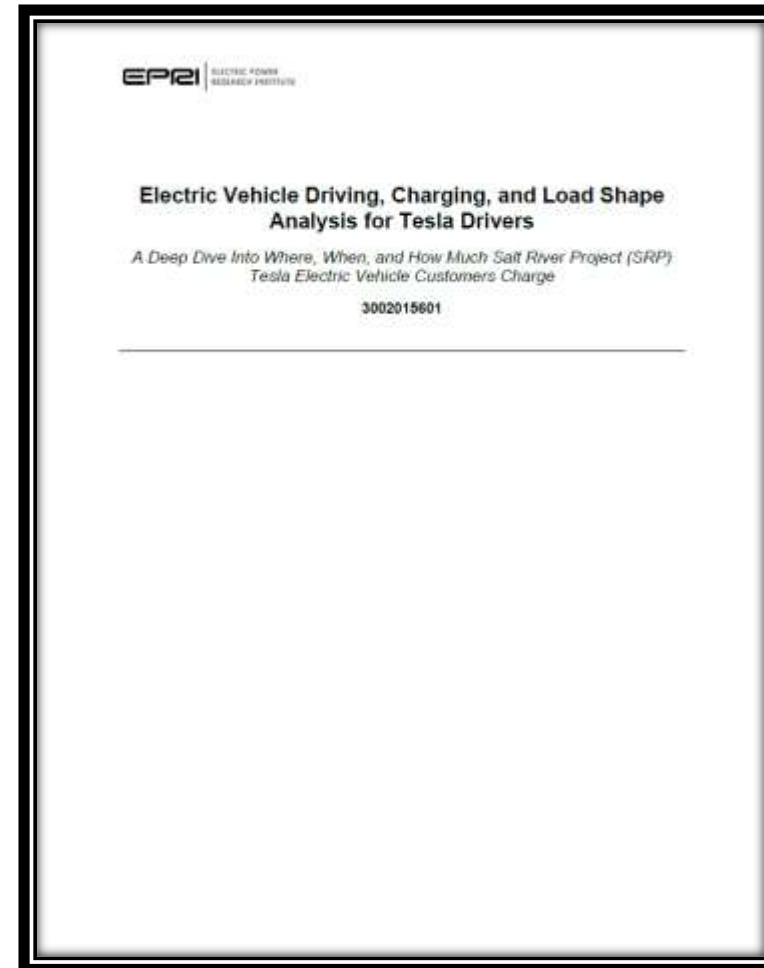
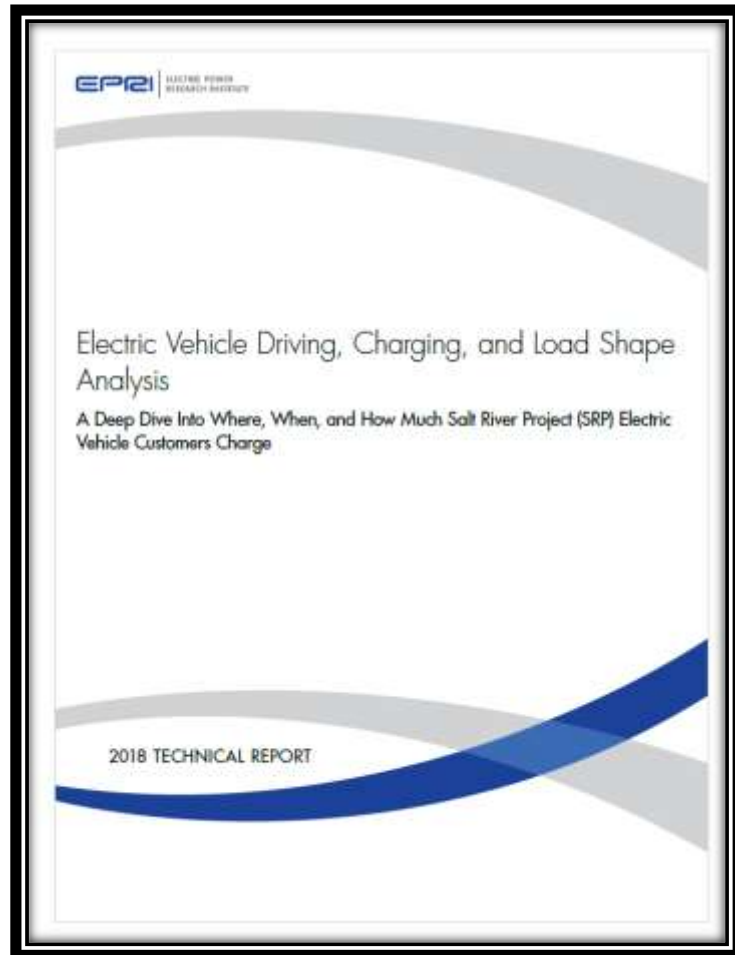
Community member benefits

- Receive a \$50 Amazon gift card when you sign-up.
- Exclusive invitations to participate in surveys, discussions, forums and research projects.

Join today

- Annual surveys
- EV density maps
- Household load comparison
- Predictive transformer modeling
- Charging rate
- 1 or 2 EV household
- Workplace charging
- Price plan distribution
- Demographics/segmentation
- **EV load research projects**

Understanding EV Driving and Charging Behavior



<https://www.epri.com/#/pages/product/3002013754/>

<https://www.epri.com/#/pages/product/3002015601/>

EV drivers do charge according to price plan

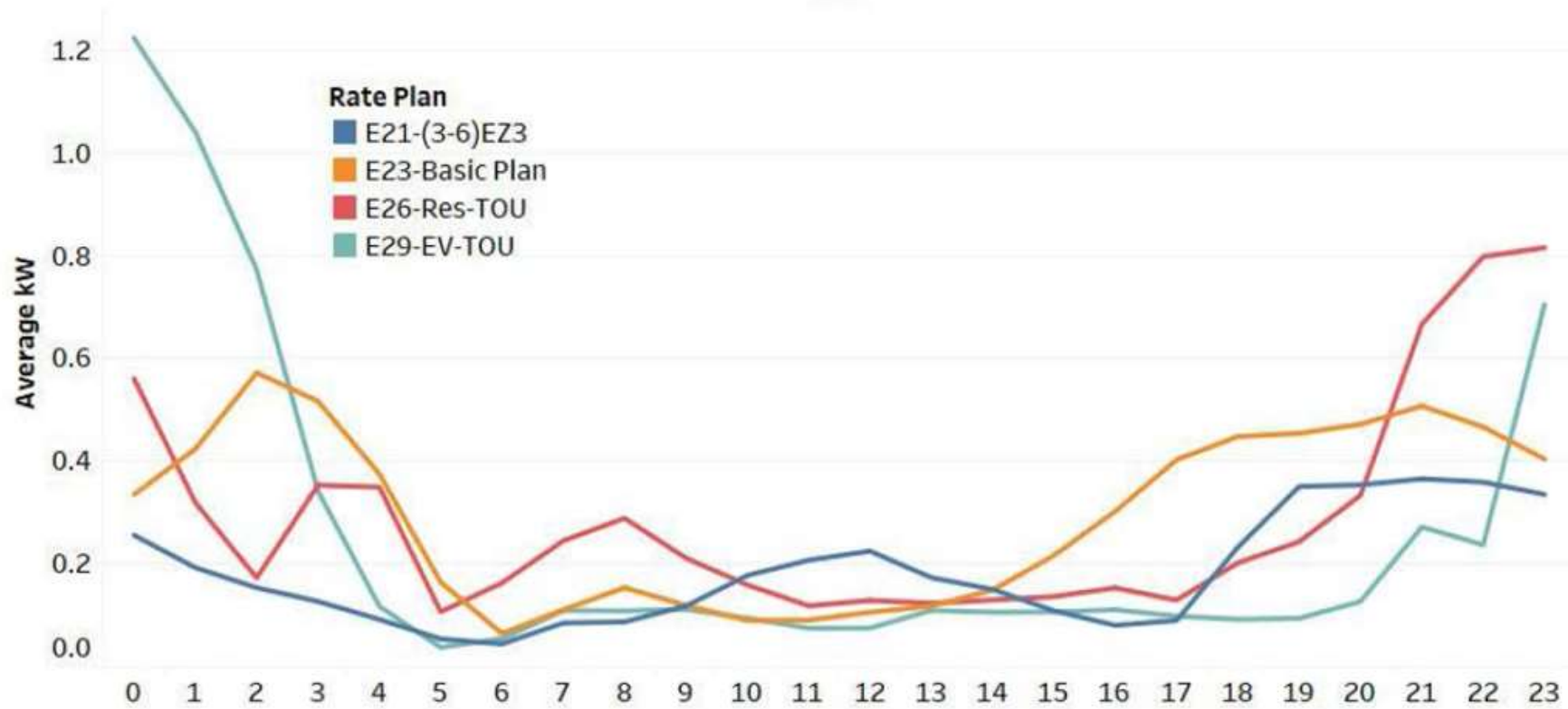
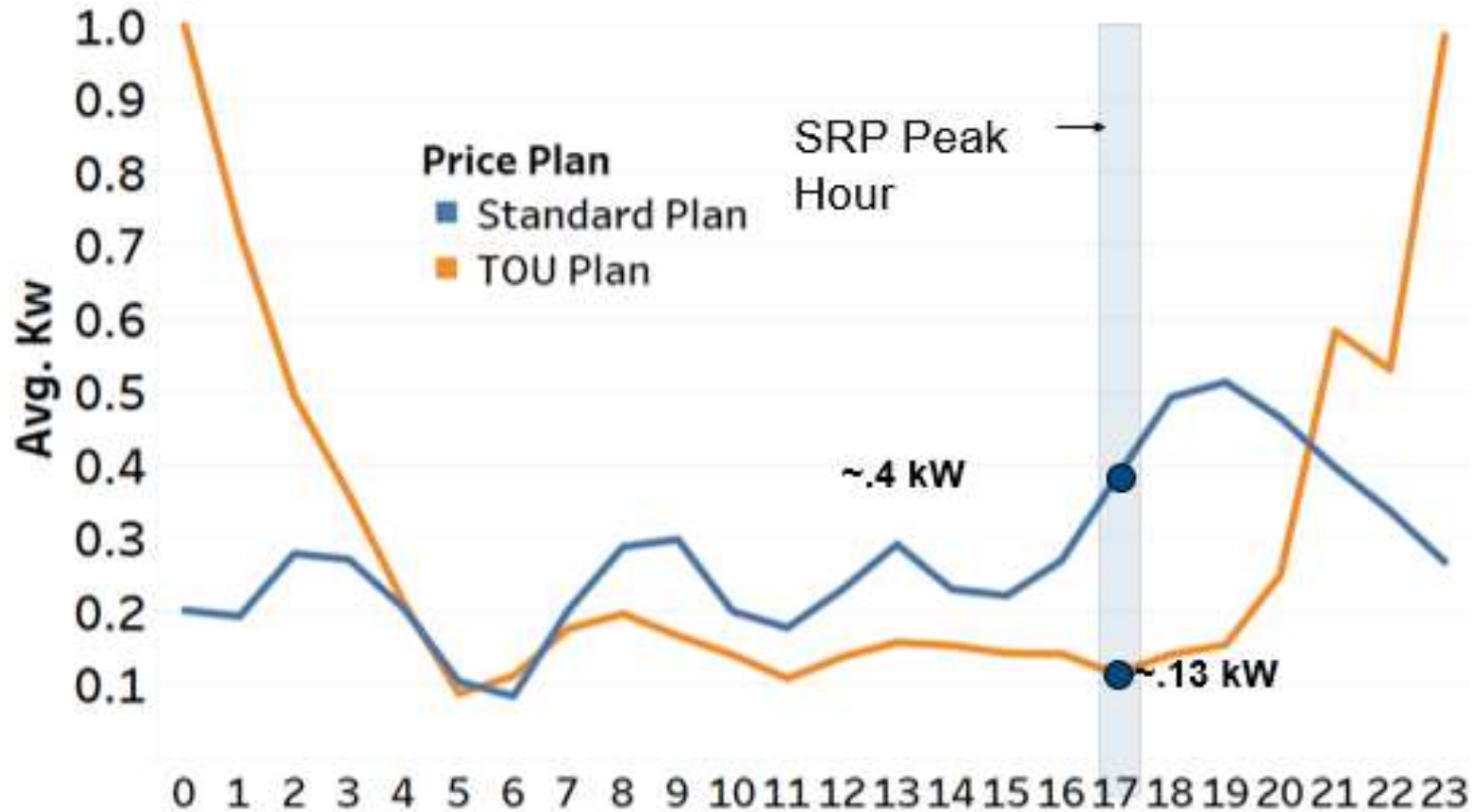


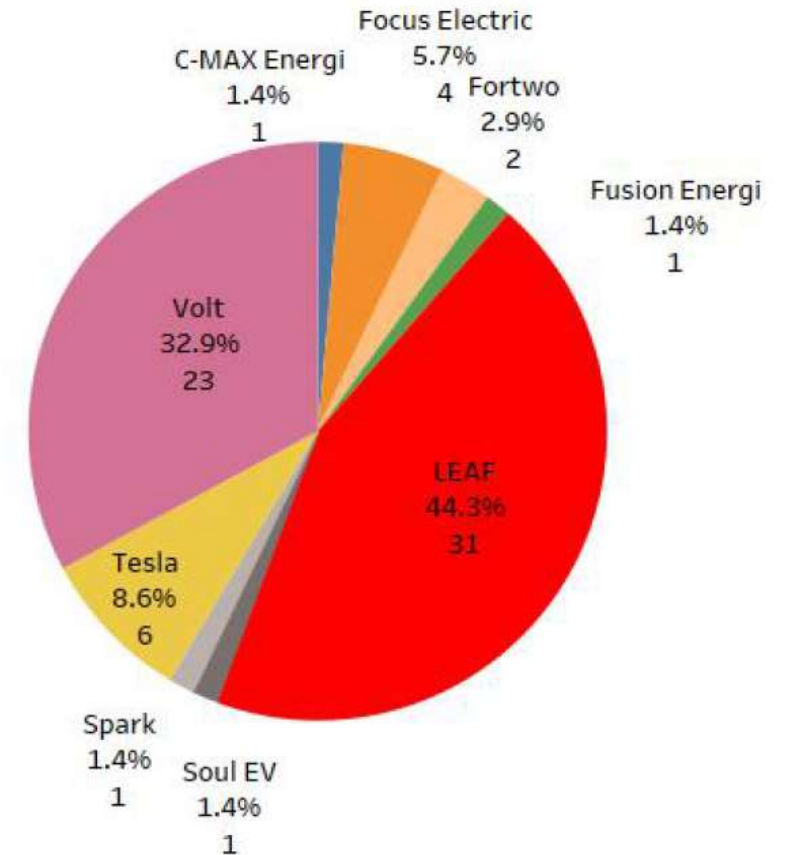
Figure 6-20
Weekday average load shape colored by four rate plans

Off peak EV charging will have a significant peak shaving impact



Key Findings

- PEVs in this study used approximately 2,700 – 3,300 kWh per year.
- Public/workplace charging accounted for 19% of the total charging, 3% of that public charging was at DC Fast chargers
- Approximately 81% of charging occurred at home
- Home charging was 74% level 2, 23% level 1
- Utility TOU rates are very effective in shifting peak loads.



The Basics

- Phase II of System Impact Study
- Fleet Carma C2 Data loggers
- 9 Tesla's
- 400+ days (July 2017 – September 2018)



Small sample, results the same.....

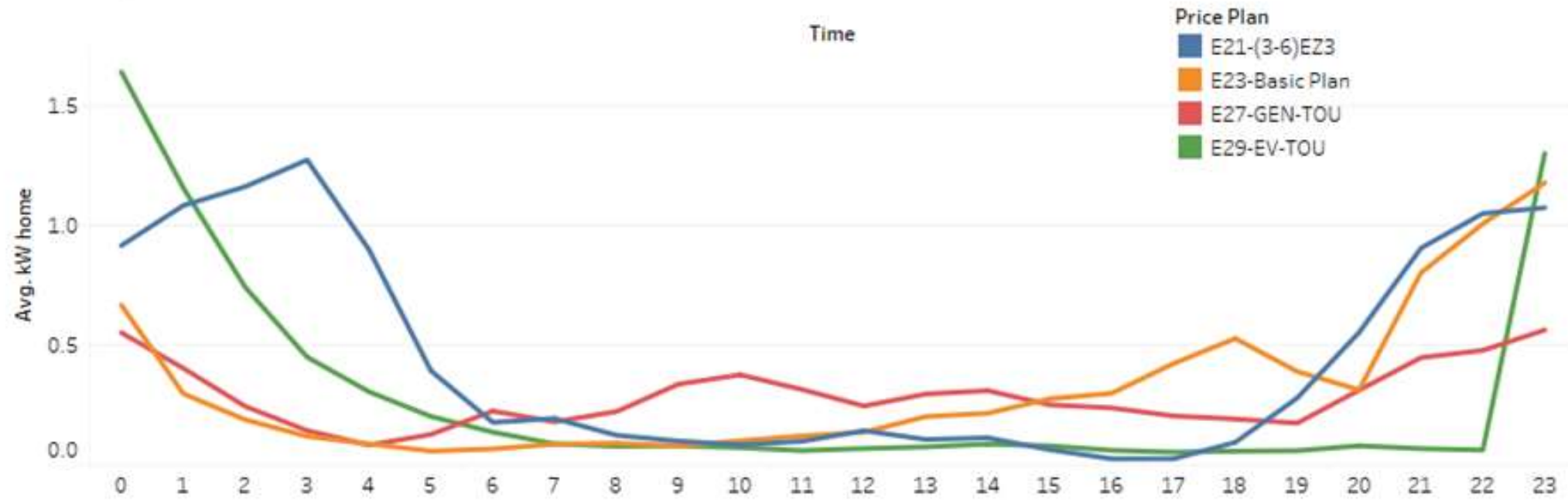
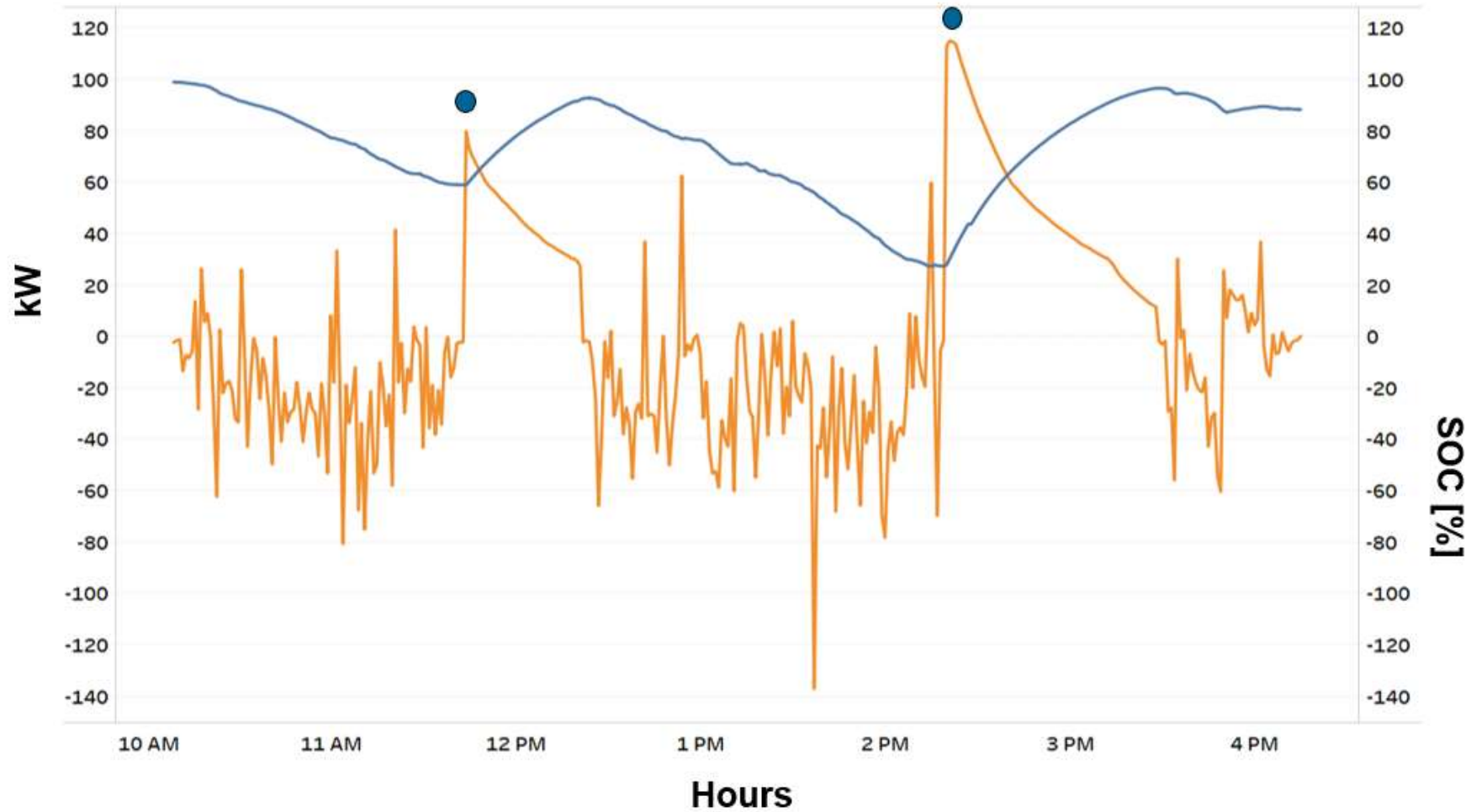


Figure 28: Weekday average load shape colored by four rate plans

The shape of DC Fast charging



Key Findings

- Teslas in this study used approximately 2,380–7,180 kWh per year.
- Utility TOU rates are very effective in shifting peak loads.
- Public charging accounted for 20% of the total charging, 80% of that public charging was at DC Fast chargers
- Approximately 63% of charging occurred at home
- Home charging was almost exclusively at Level 2
- Efficiency 3 miles per kWh



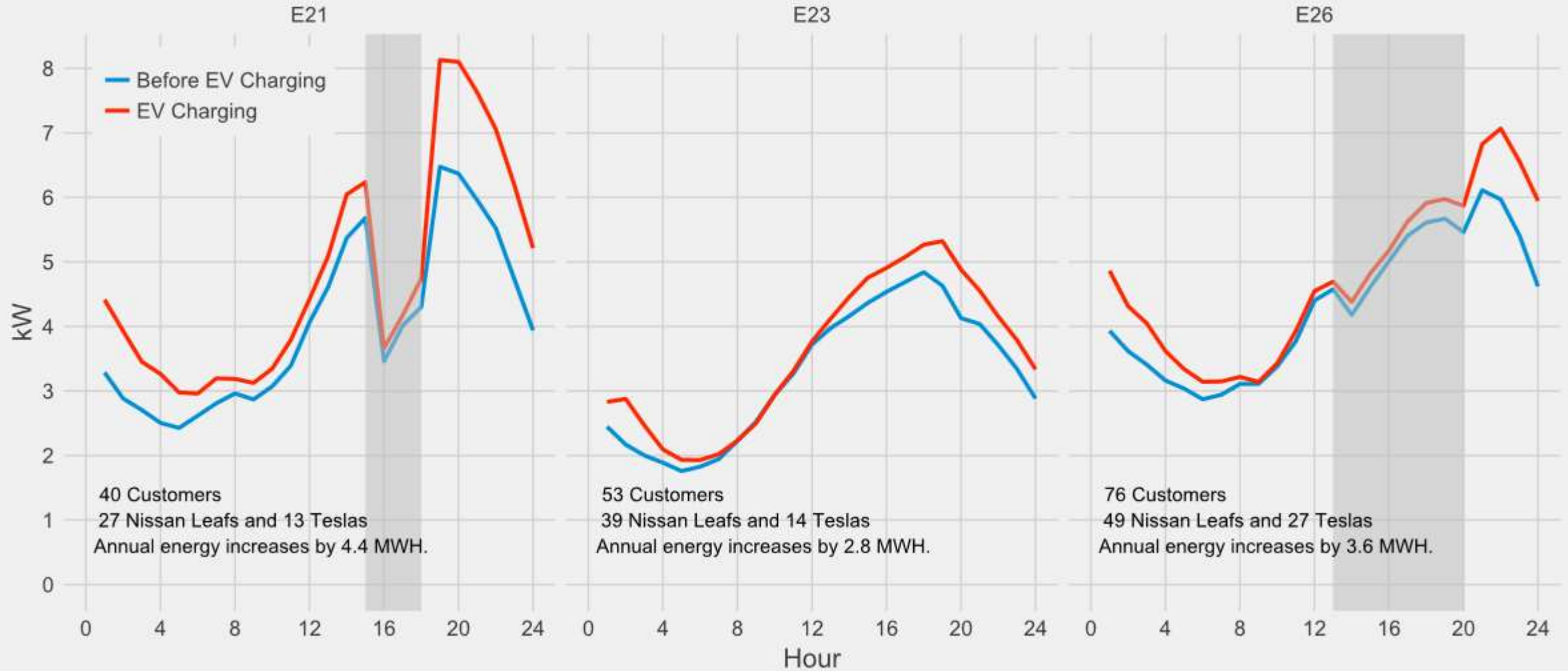
We see this in whole house load shapes as well

- Over 1,300 SRP customers self reported EV's
- Linked customers to SRP's MDMS system
- Before and after EV study by Residential Price Plan
- Compared New EV super-peak plan vs. like TOU plan without super-peak
- Study Term: 1 year before EV, 1 year with EV and adjusted for weather



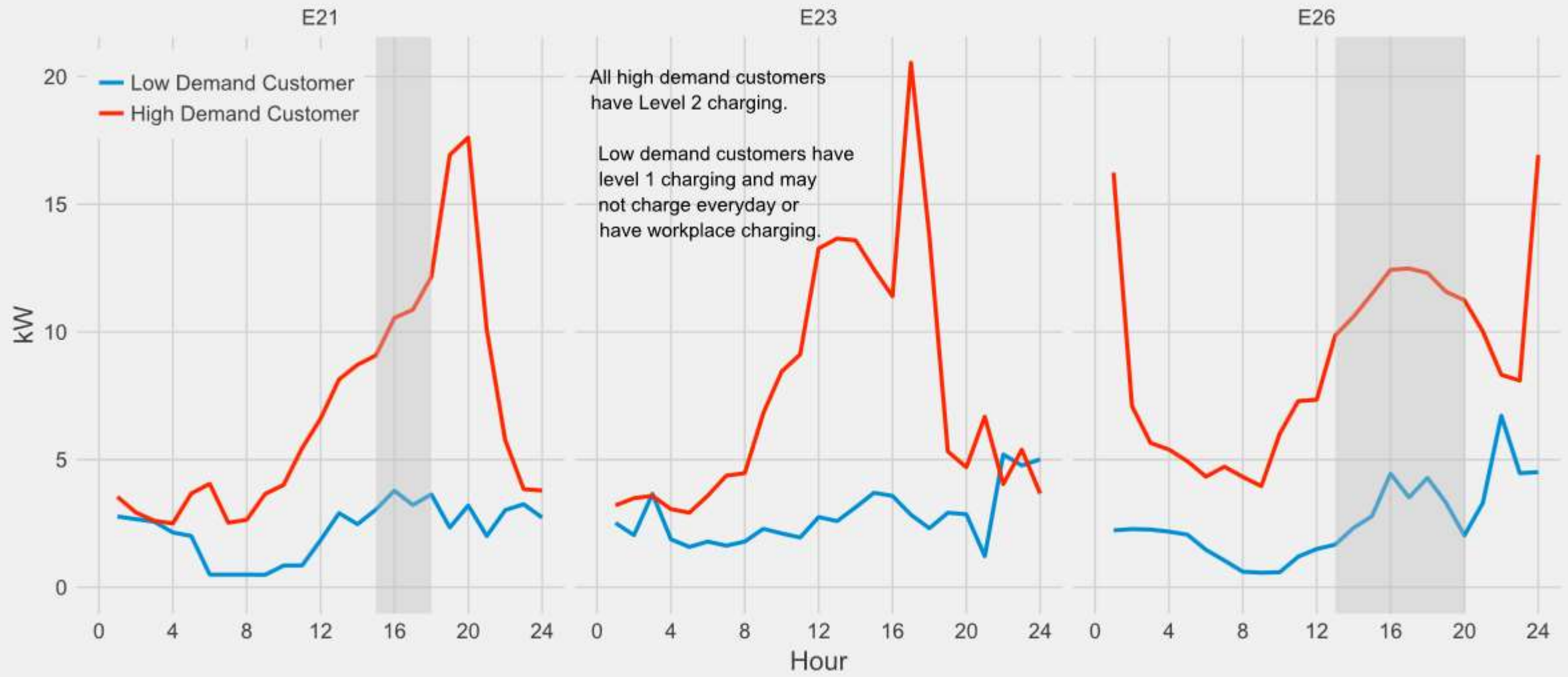
Average Weekday Battery Electric Vehicle Customer Load by Rate

July 2017 Load Before and After At-Home Charging



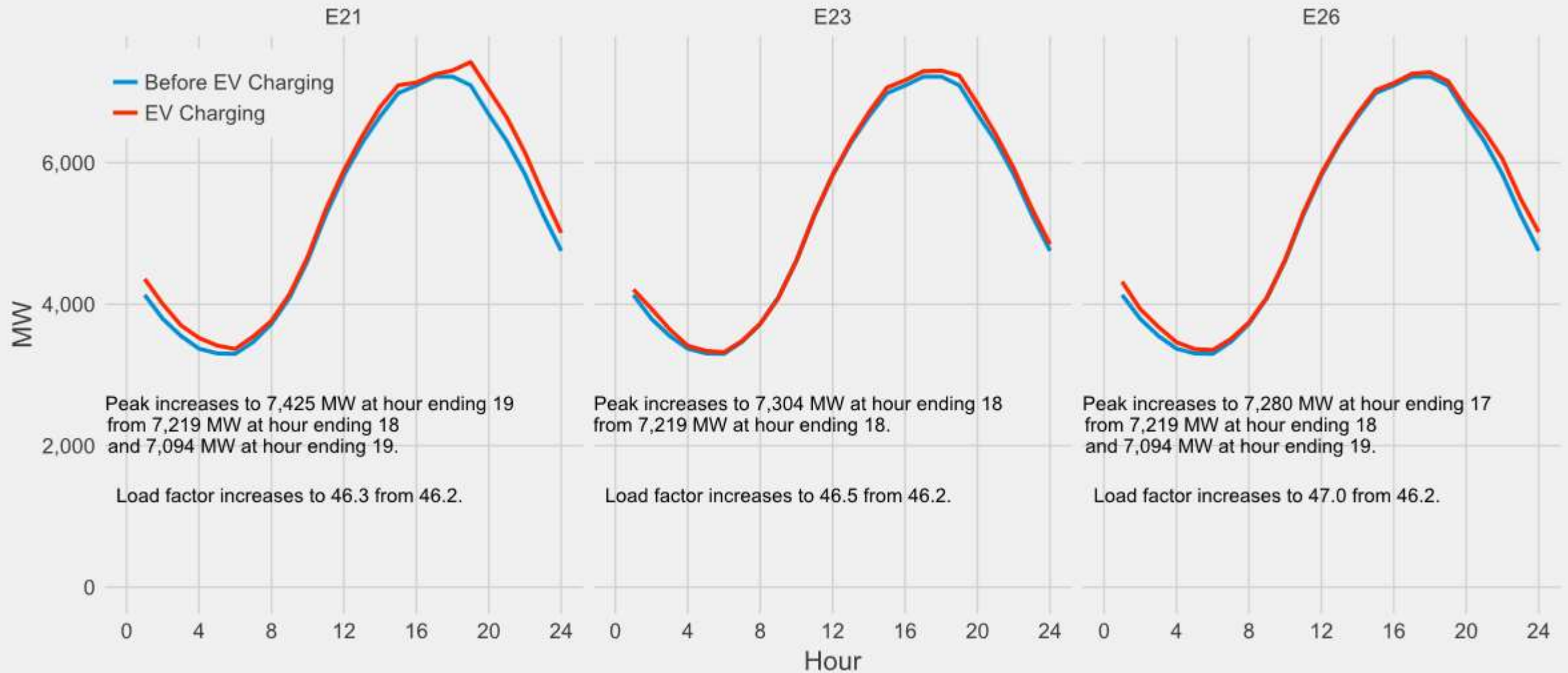
July Weekday Electric Vehicle High and Low Customer Peak Demand by Rate

July 20, 2017



Peak Day Load Given 200,000 EV Customers by Rate

June 20, 2017, Load Before and After At-Home Charging



Conclusions

- Charging load patterns vary greatly by customer
- Customers manage charging via Residential TOU price signals
- There is a place for more direct managed charging for those not on a TOU rate
- In a post study survey 91% of customers would participate in more studies like these



Would you be willing to participate in a follow up research to provide additional information on your experiences as an electric vehicle driver?



91%

Kathy Knoop

kathy.knoop@srpnet.com

www.srpnet.com/ev

Questions?

