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AMI Informed EV Charging Behaviors

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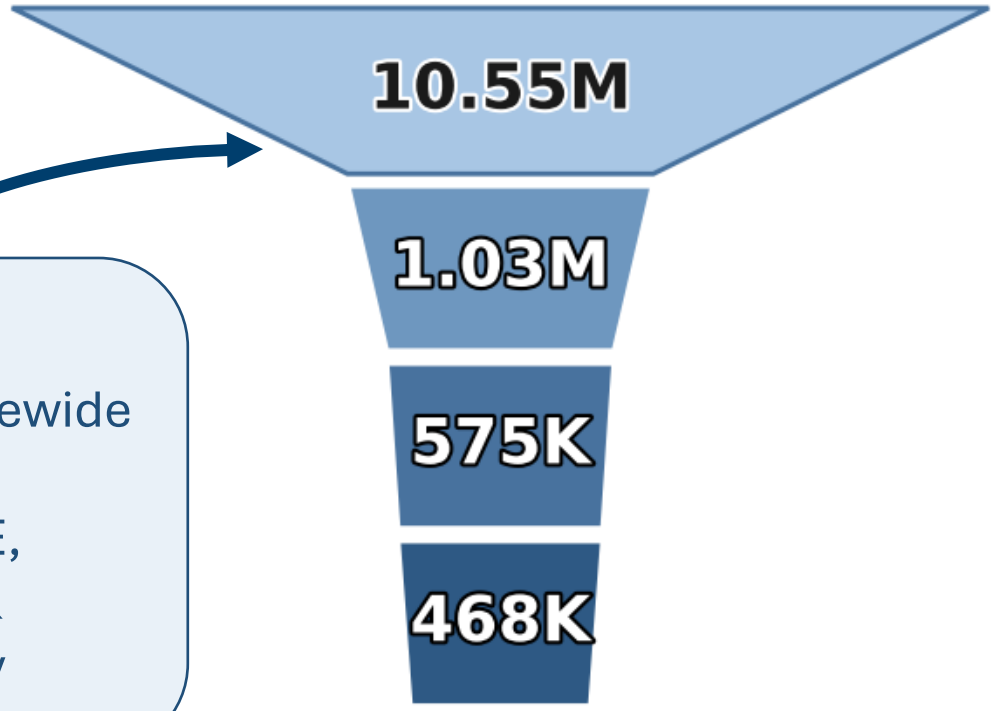
Purpose: inferring EV adoption and charging from the meter

Demonstrate the use of advanced metering data to analyze EV household characteristics and load patterns.

1) **The population** who charges at home: scope, geography, housing, rates
2) **The behavior** when charging happens: shapes, patterns, prevalence
3) **Days of interest** the system peak day and a high solar day

Getting to the study population



1.89M EVs registered statewide (DMV 2024)
1.51M in PG&E, SCE, SDG&E & SMUD territory

Residential meters with hourly data
PG&E, SCE, SDG&E, SMUD

Homes with a DMV registered EV
2024 registrations matched to a meter

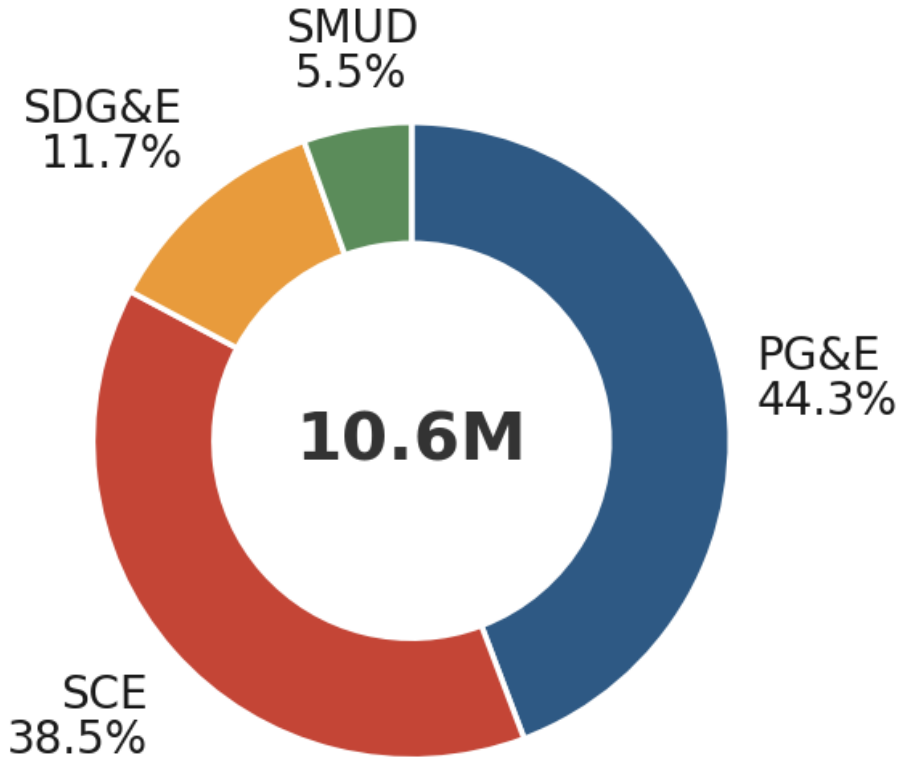
EV charging detected at the meter
A regular home charging signal

Level 2 charging detected
Core sample

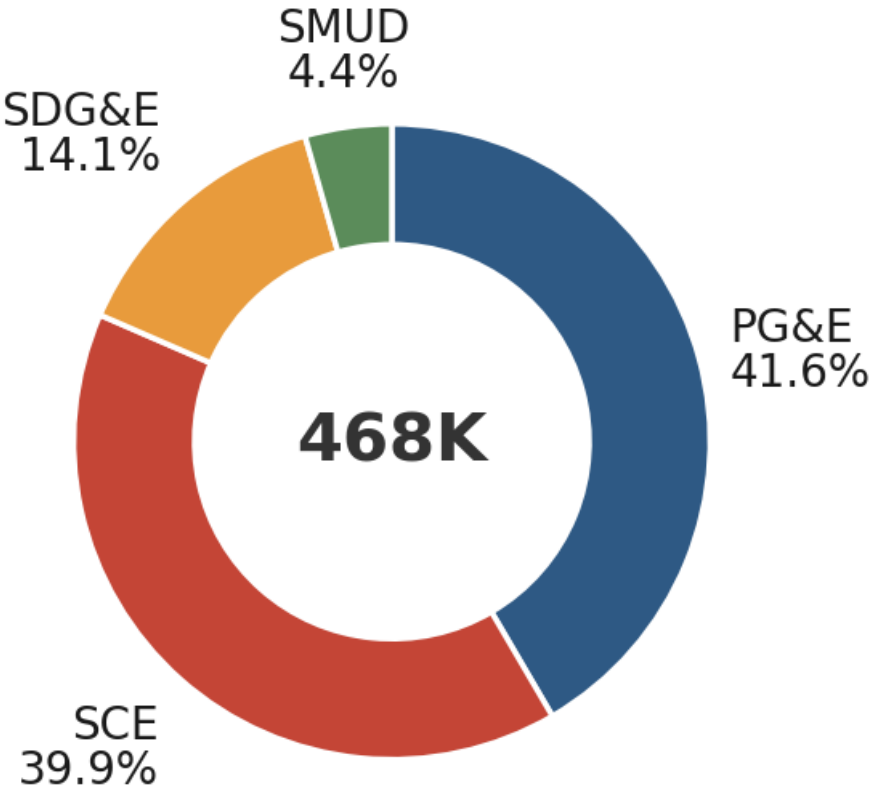
Source: CEC analysis of utility interval data (20 CCR § 1353); DMV 2024 registrations.

Takeaway 1.89M registered EVs narrow to 468K detected L2 homes

The scope: 10.6M meters, 468k detected L2 EVs



Residential Service Points

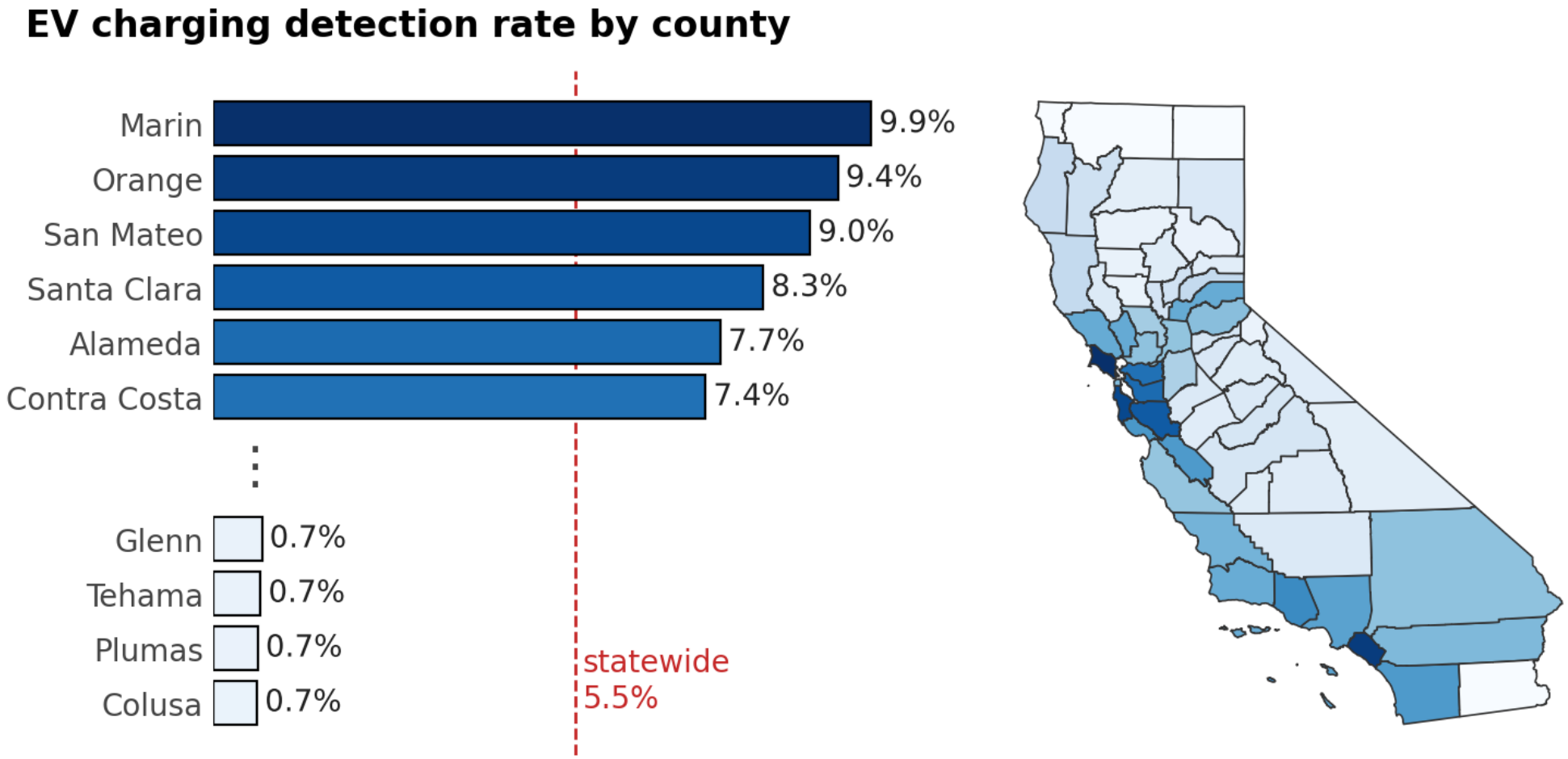


L2 detected homes

Source: CEC analysis of utility interval data (20 CCR § 1353)

Takeaway L2 detection rate is roughly proportional to a utility's meter count

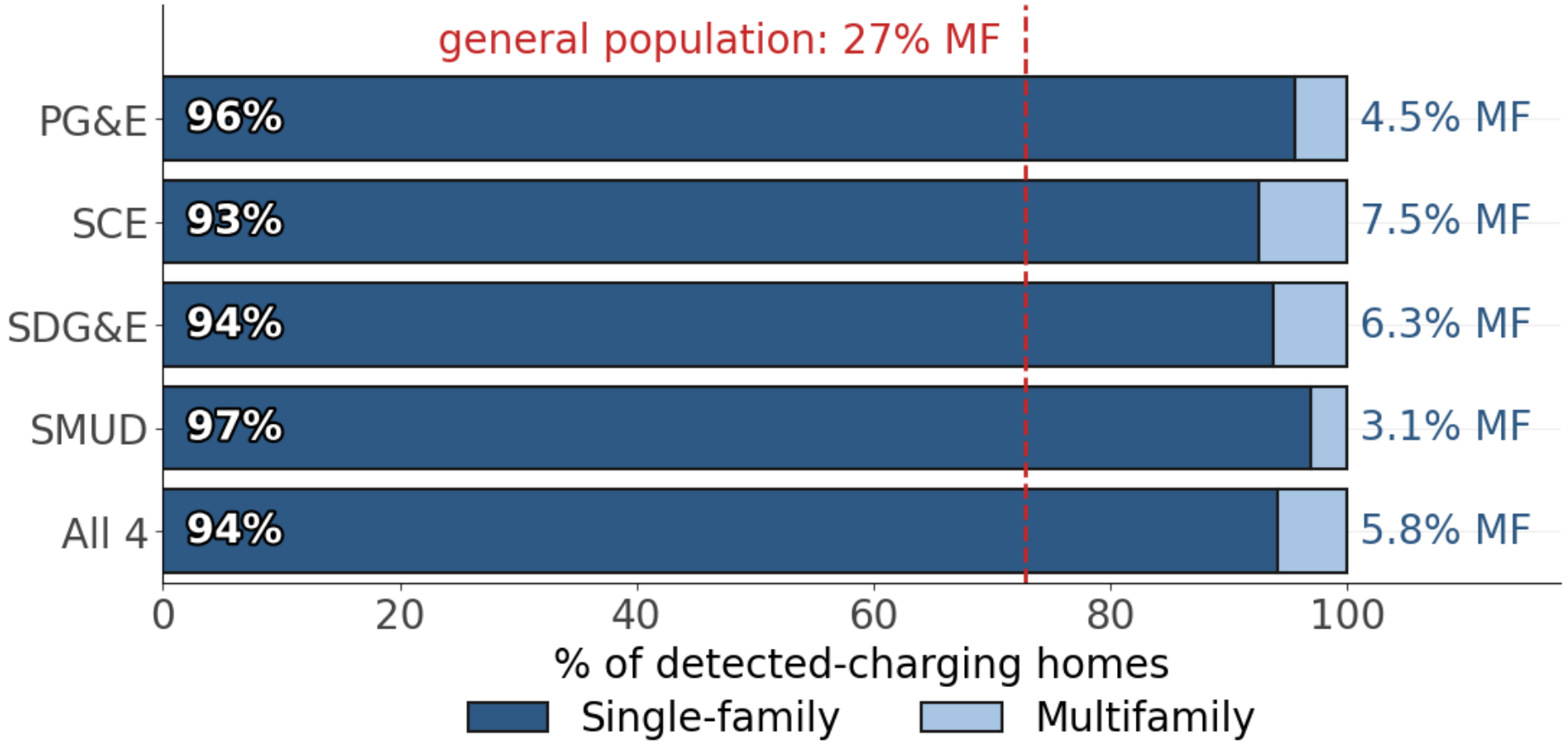
Penetration varies geographically



Source: CEC analysis of utility interval data (20 CCR § 1353)

Takeaway EVs are concentrated in specific counties

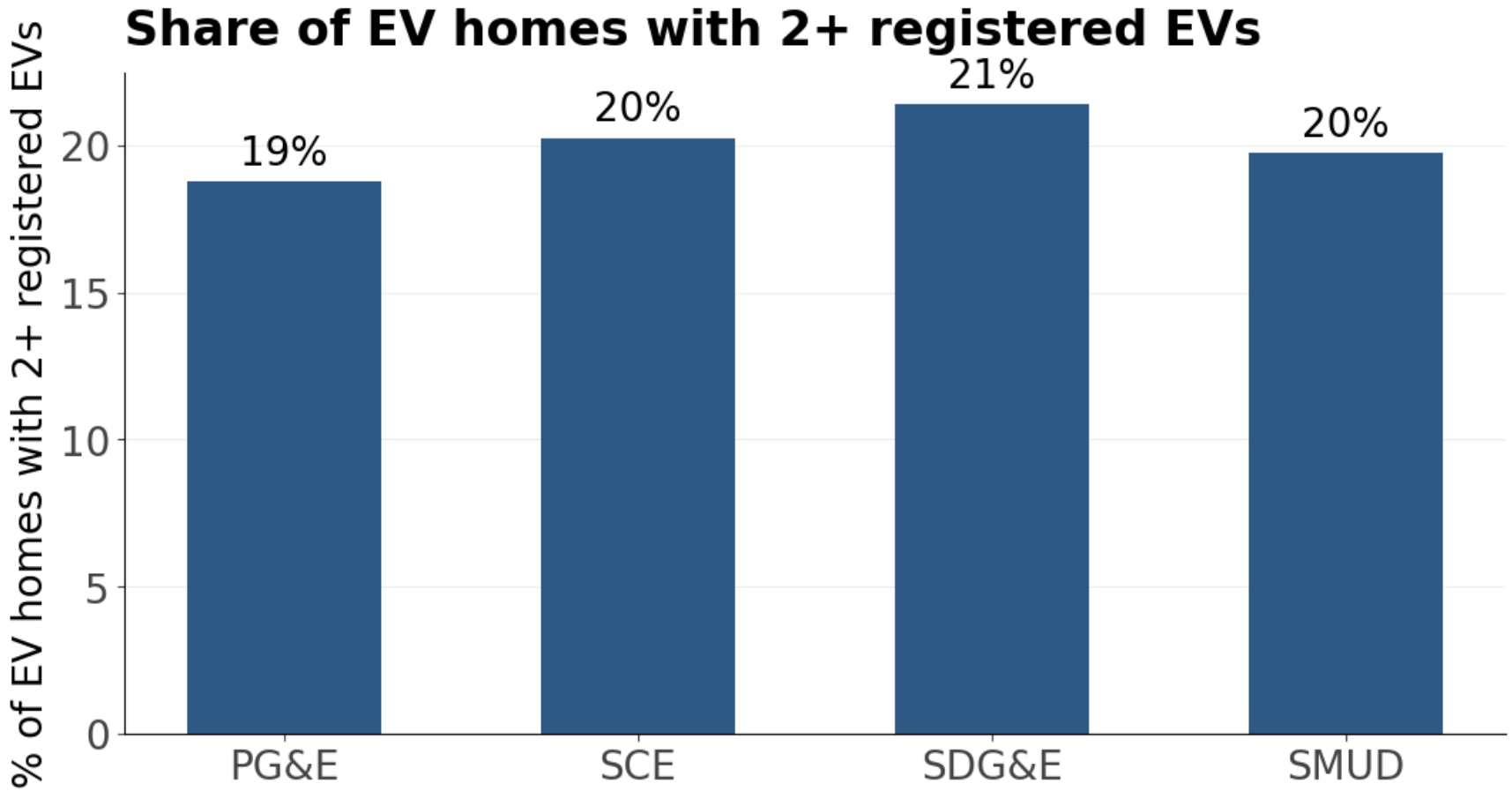
Detected charging skews single-family



Source: CEC analysis of utility interval data (20 CCR § 1353)

Takeaway Home charging appears far more prevalent in single family homes

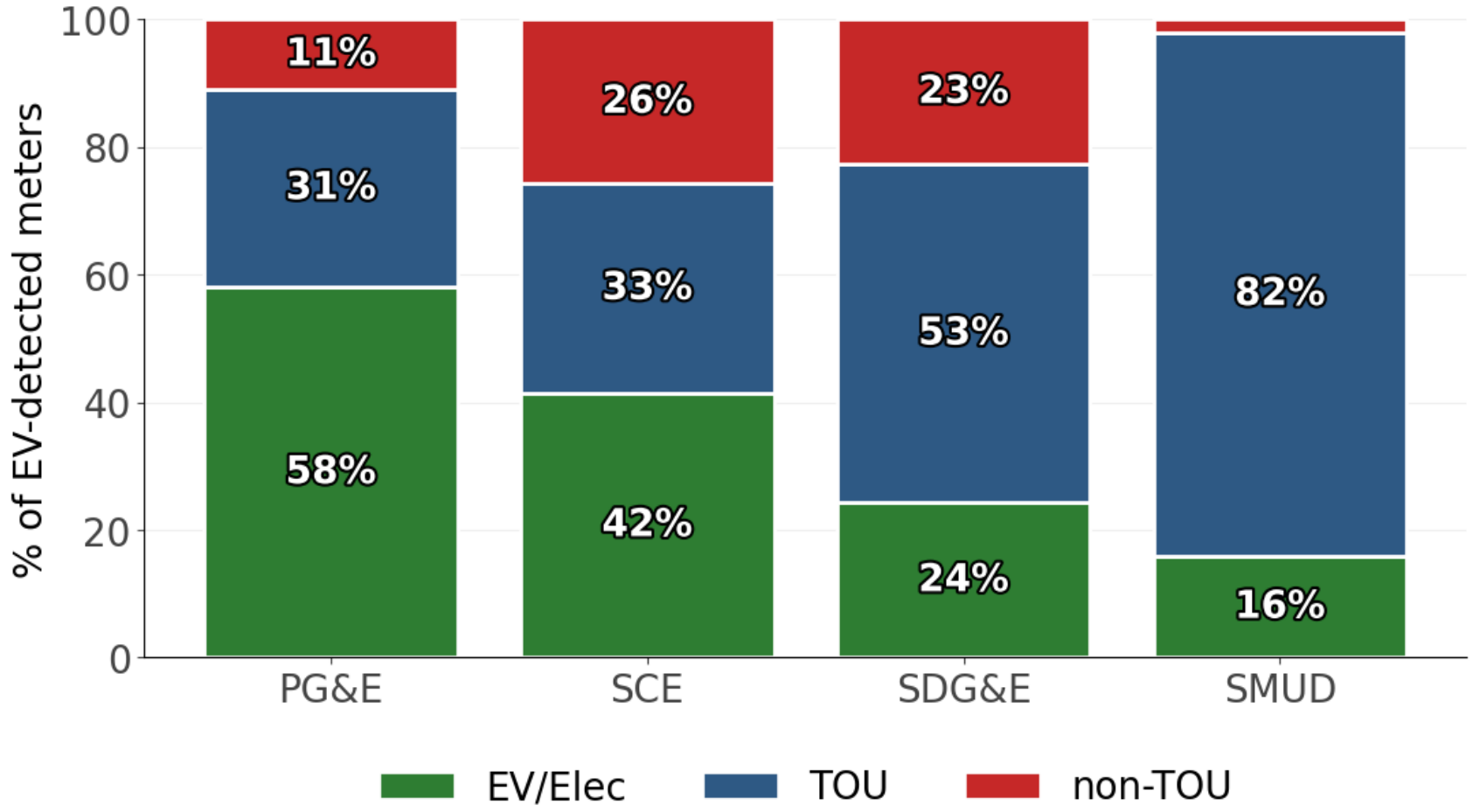
Multi-EV homes are significant



Source: CEC analysis of utility interval data (20 CCR § 1353)

Takeaway Multi-EV households are common and significant when totaling home charging

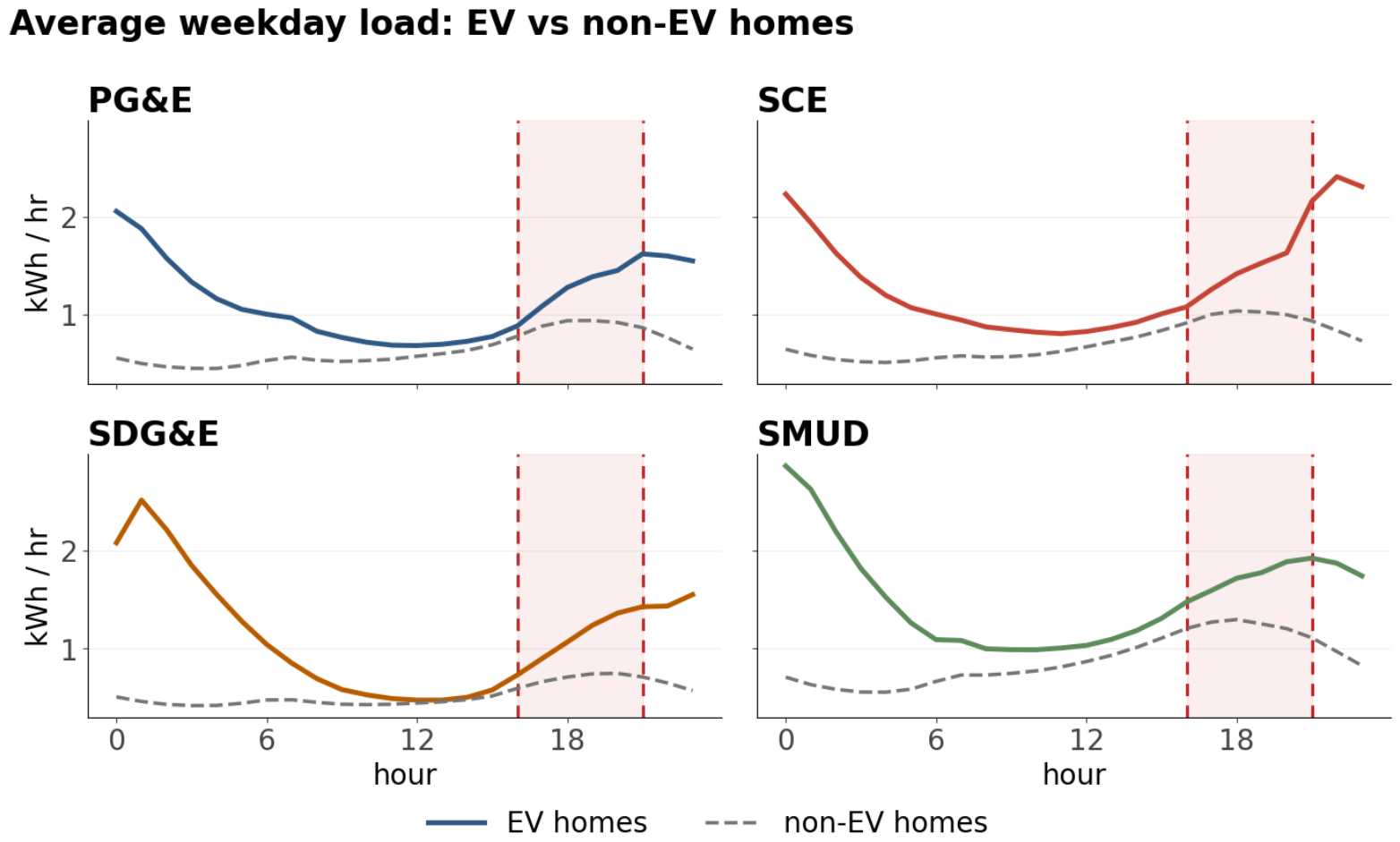
EV detected homes: rate mix by utility



Source: CEC analysis of utility interval data (20 CCR § 1353)

Takeaway EV-TOU is high where it exists and non-TOU residential customers are a minority

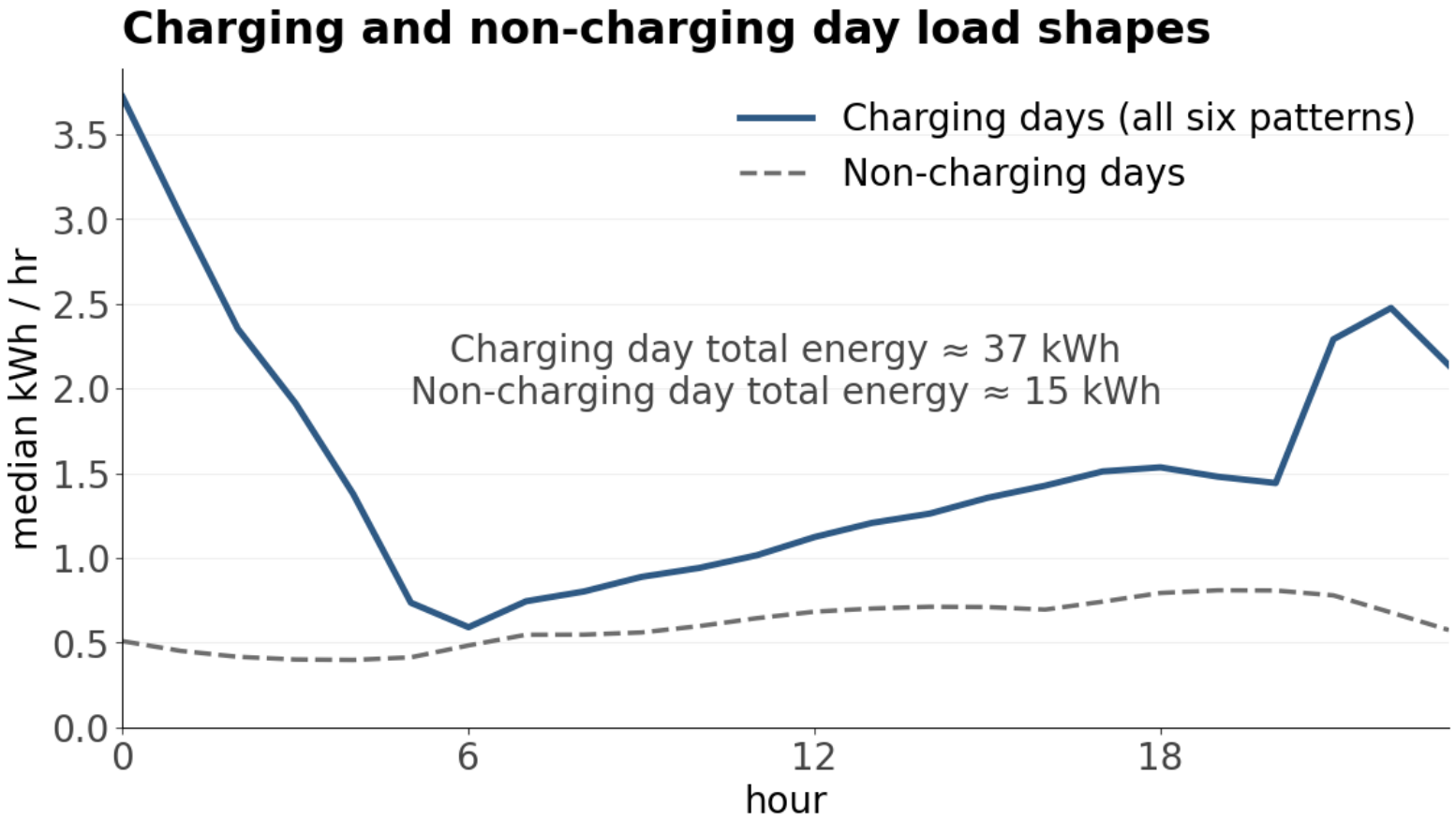
The shape of an EV day



Source: CEC analysis of utility interval data (20 CCR § 1353)

Takeaway The extra EV load typically peaks overnight, not generally in the 4-9 PM window

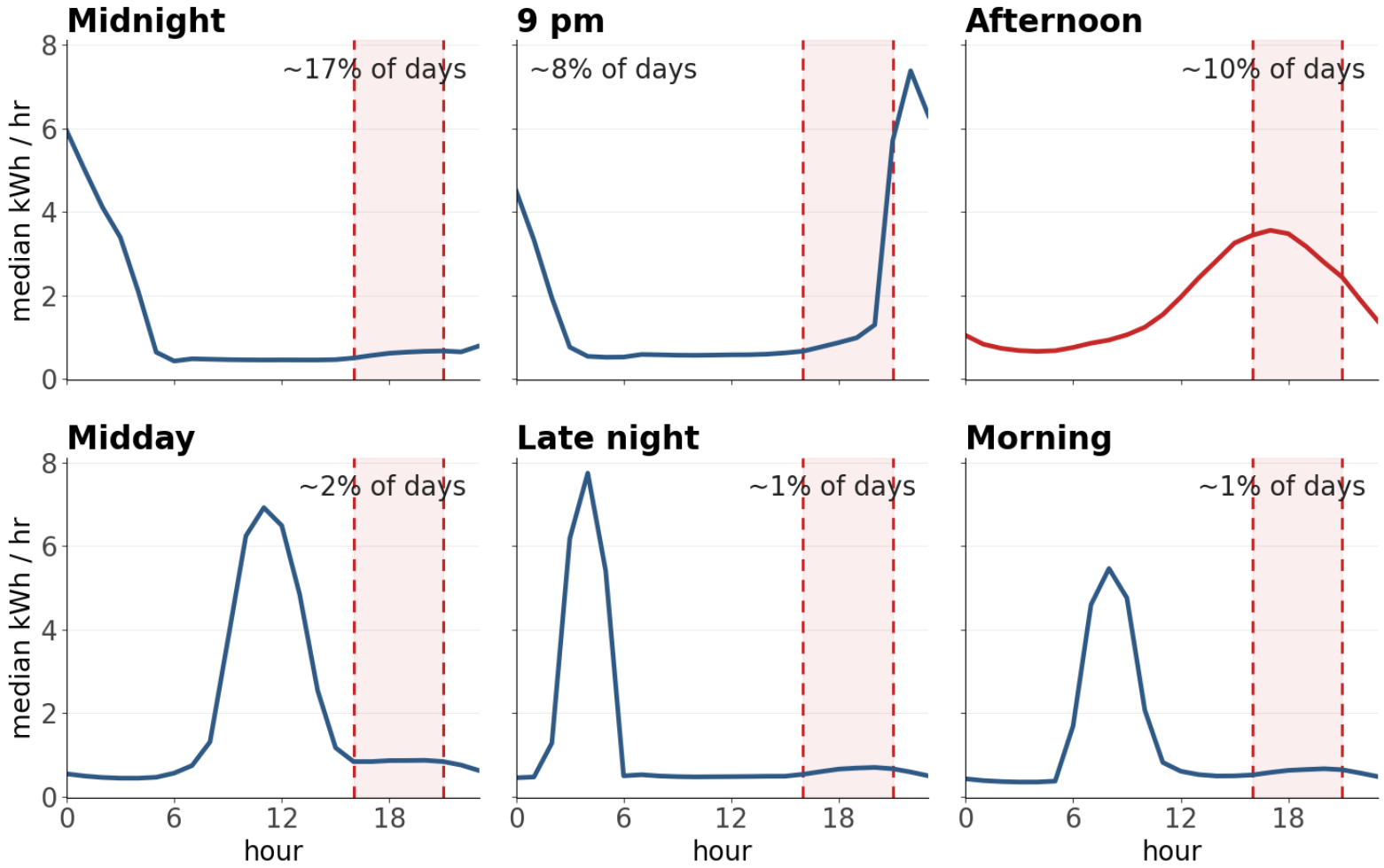
Charging vs Non Charging Day



Source: CEC analysis of utility interval data (20 CCR § 1353)

Takeaway Charging days use more than double the energy vs. non-charging days

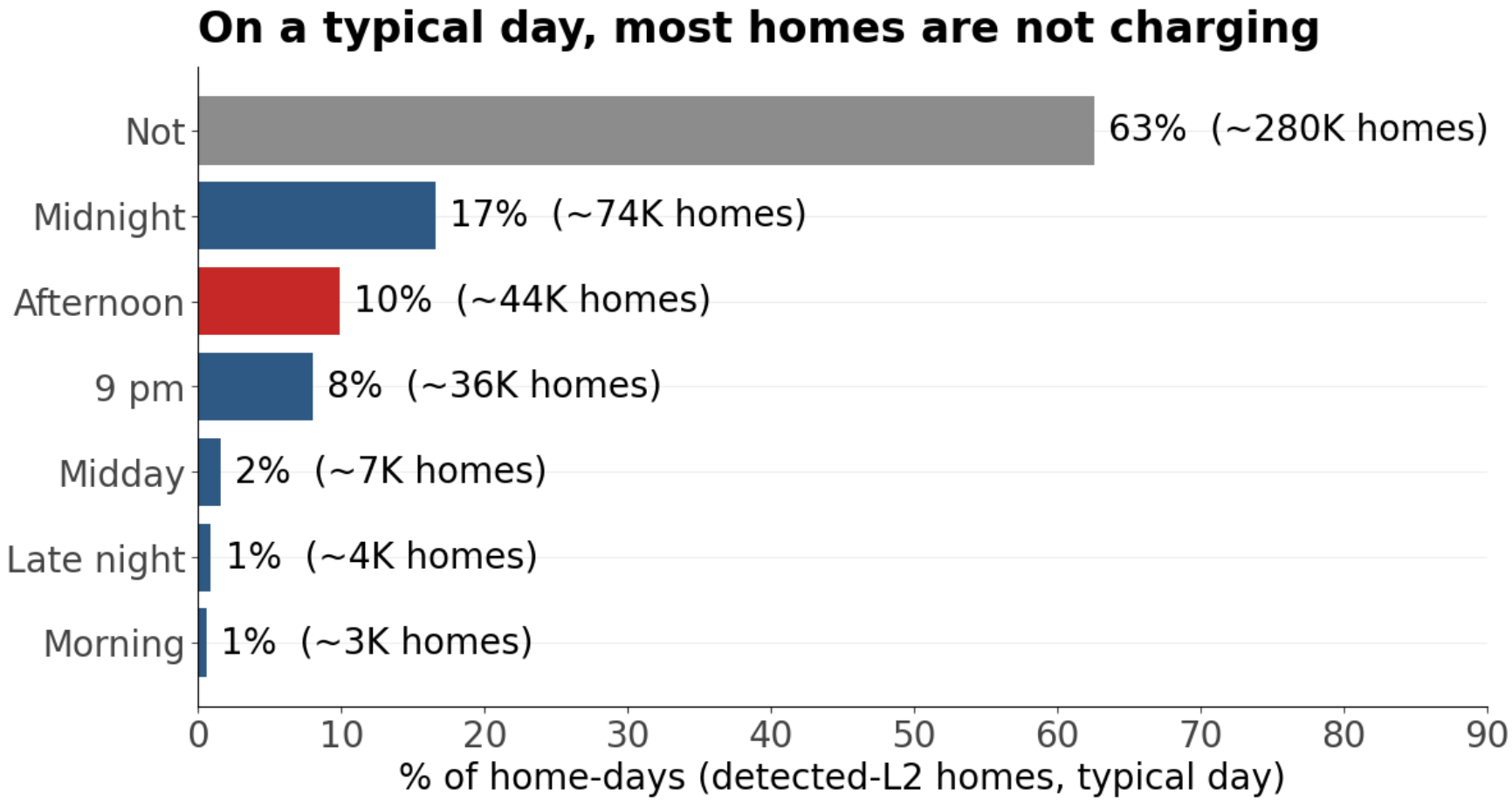
The six charging-day median patterns



Source: CEC analysis of utility interval data (20 CCR § 1353)

Takeaway The “afternoon” charging pattern is relatively common and most relevant to load shifting

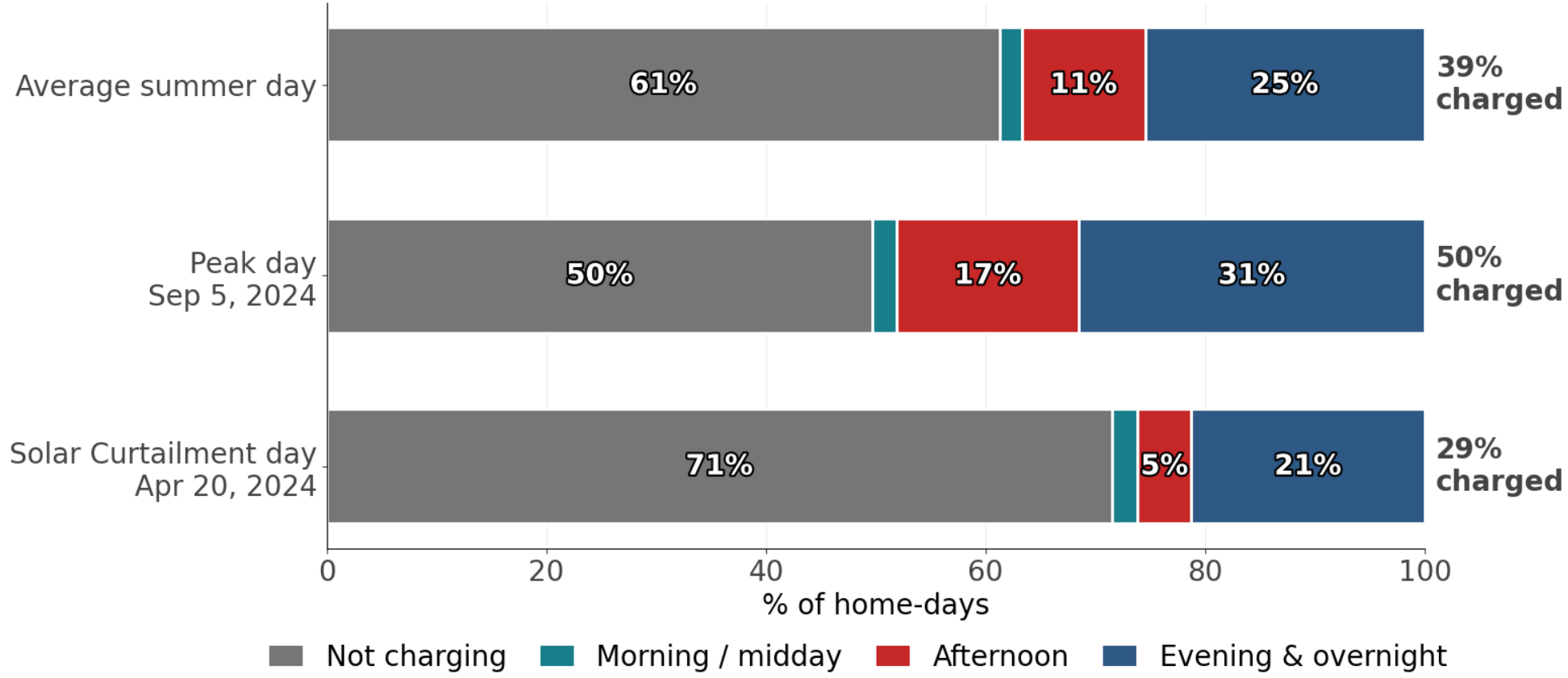
Prevalence of each charging pattern



Source: CEC analysis of utility interval data (20 CCR § 1353)

Takeaway Most homes aren't charging on a given day, and most charging sits off peak

Prevalence of each charging pattern on days of interest



Source: CEC analysis of utility interval data (20 CCR § 1353)

Takeaway Day type changes how much homes charge, but not as much when

Key Insights and Next Steps

- Comparing AMI based conclusions to the CEC's California Vehicle Survey (CVS) results.
- CEC staff will hold a Demand Analysis Working Group (DAWG) meeting to discuss a framework for incorporating AMI data into EV load forecasting.
- The results will also inform CEC's demand scenarios and demand flexibility analysis efforts, including the Load-Shift Goal analysis.

Thank You!

For any follow up questions:
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