



PG&E's BMW i ChargeForward Pilot Program

October 19, 2015





Pacific Gas and Electric Company



Company Facts

- Fortune 200 company located in San Francisco, CA
- \$17B in operating revenues in 2014
- Over 22,000 employees

Energy Supply

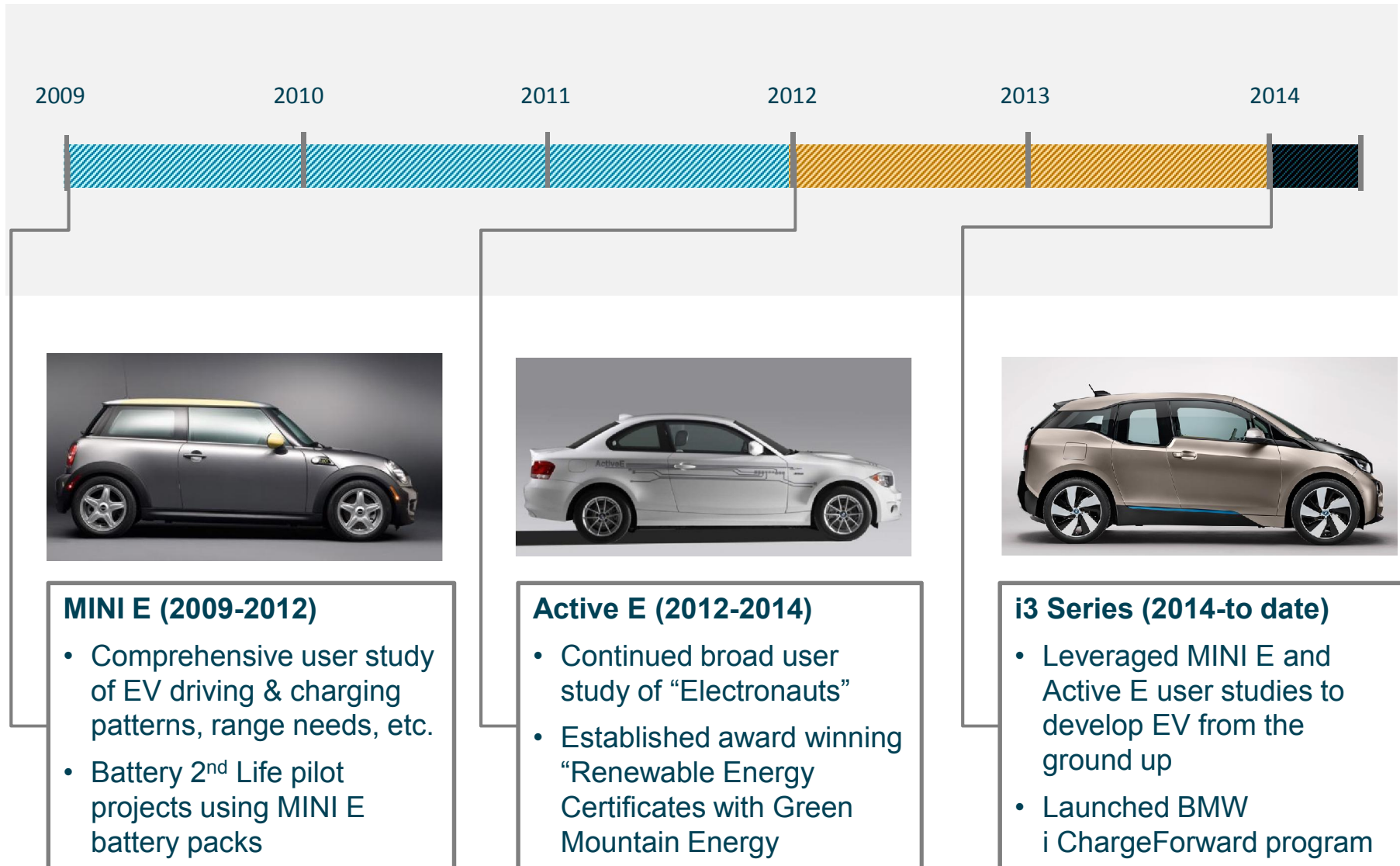
- Services to 15M people:
 - 5.2M Electric accounts
 - 4.3M Natural Gas accounts
- Peak electricity demand: Approx. 22,000 MW
- Approx. 55% of PG&E's electric supply comes from non-greenhouse gas emitting facilities

Service Territory

- 70,000 sq. miles with diverse topography
- 160,000 circuit miles of electric transmission and distribution lines
- 49,000 miles of natural gas transmission and distribution pipelines



BMW leads EV innovation by leveraging customer feedback

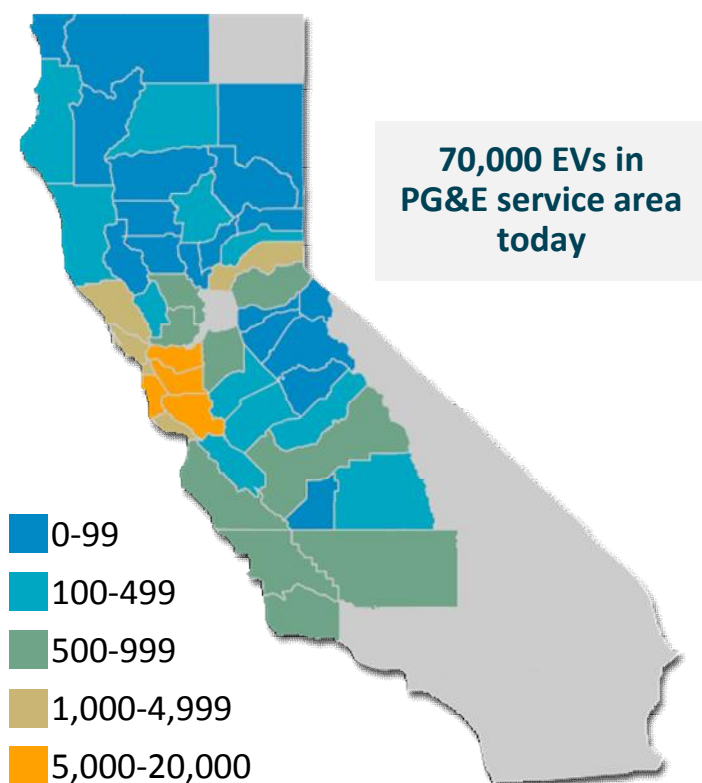




PG&E and California are seeing strong EV market growth but barriers to adoption still exist

Cumulative EV Sales by County¹

PG&E Service Area



3 Key EV challenges today:

1. Higher upfront cost of EVs relative to conventional vehicles
2. Range anxiety and lack of available charging infrastructure
3. Lack of easily-accessible customer information about EVs

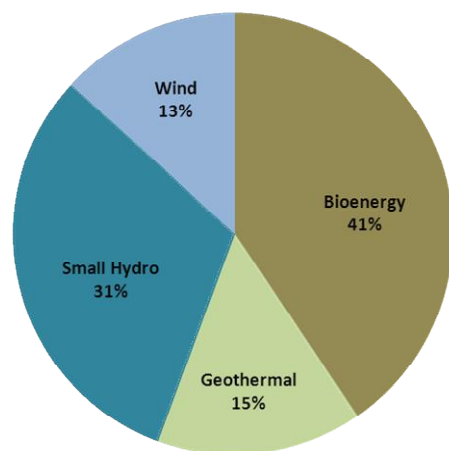
1. EPRI, R.L. Polk Data, Sep 2015



PG&E's resource mix has changed significantly and will continue to change

2002 Actual

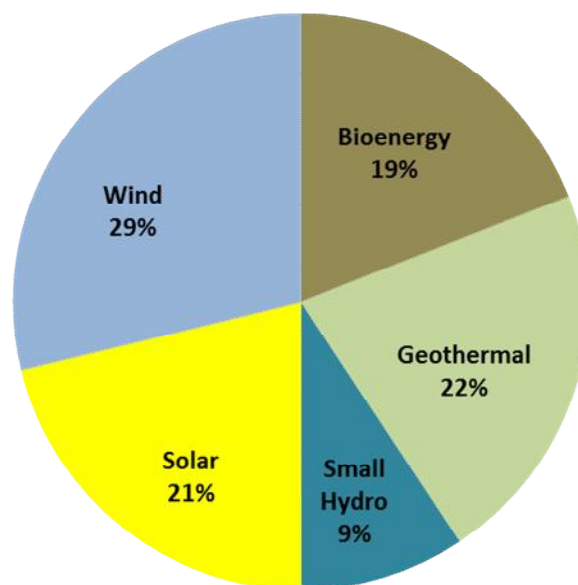
11% of total bundled retail sales



Total RPS-Eligible Procurement
7,504 GWh

2013 Preliminary

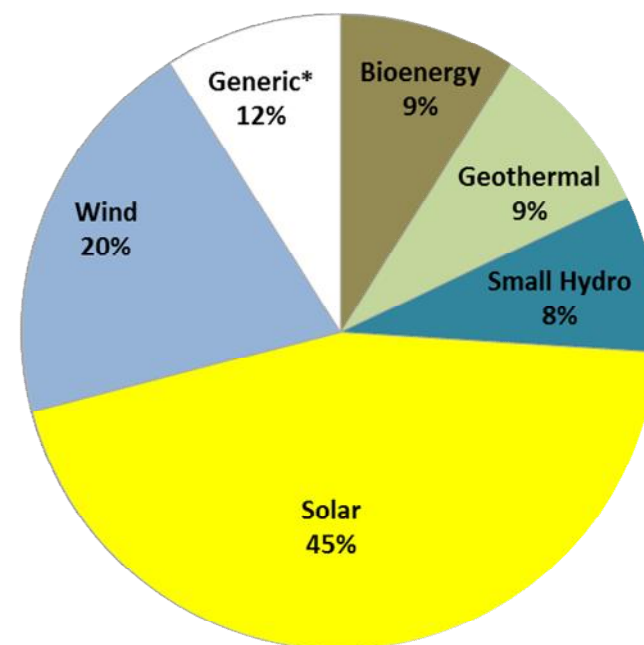
22% of total bundled retail sales



Total RPS-Eligible Procurement
17,030 GWh

2020 Projected

33% of total bundled retail sales

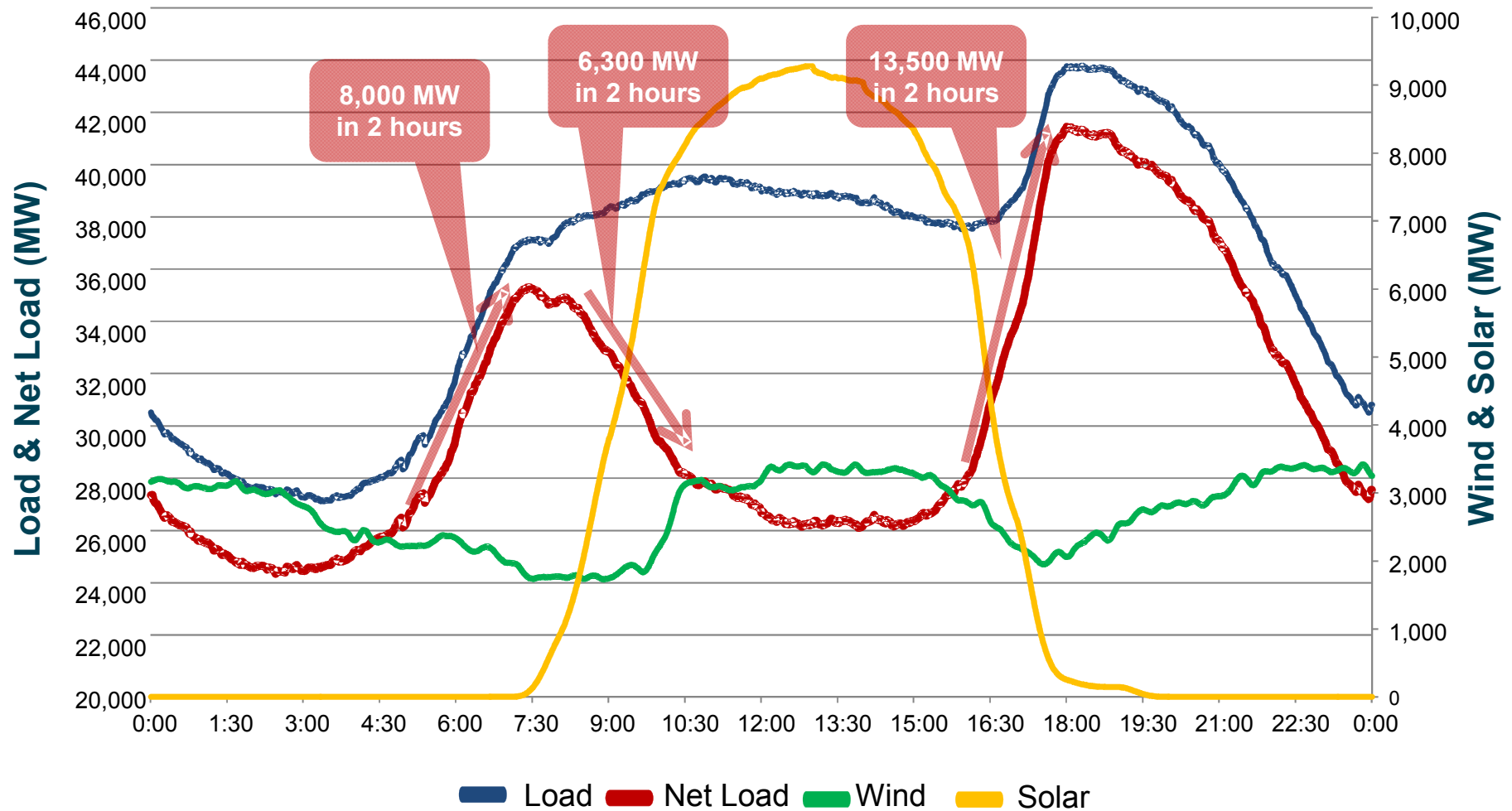


Projected RPS-Eligible Procurement
~26,500 GWh



Flexible resources will be an important part of the resource mix in the near future

Load, Wind & Solar Profiles – High Load Case January 2020

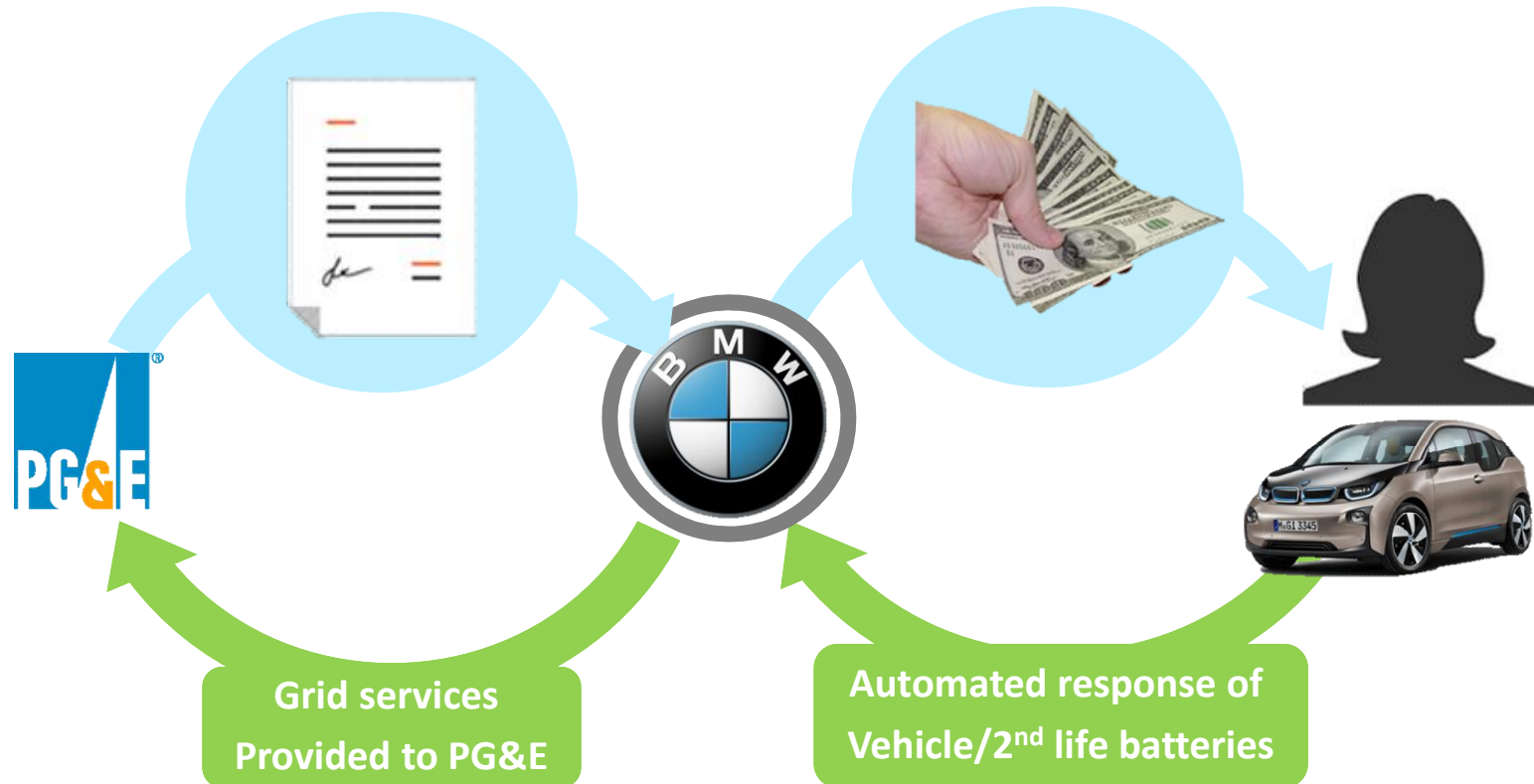




Goal of the pilot is to reduce the overall cost of EV ownership, increasing EV sales while supporting the grid

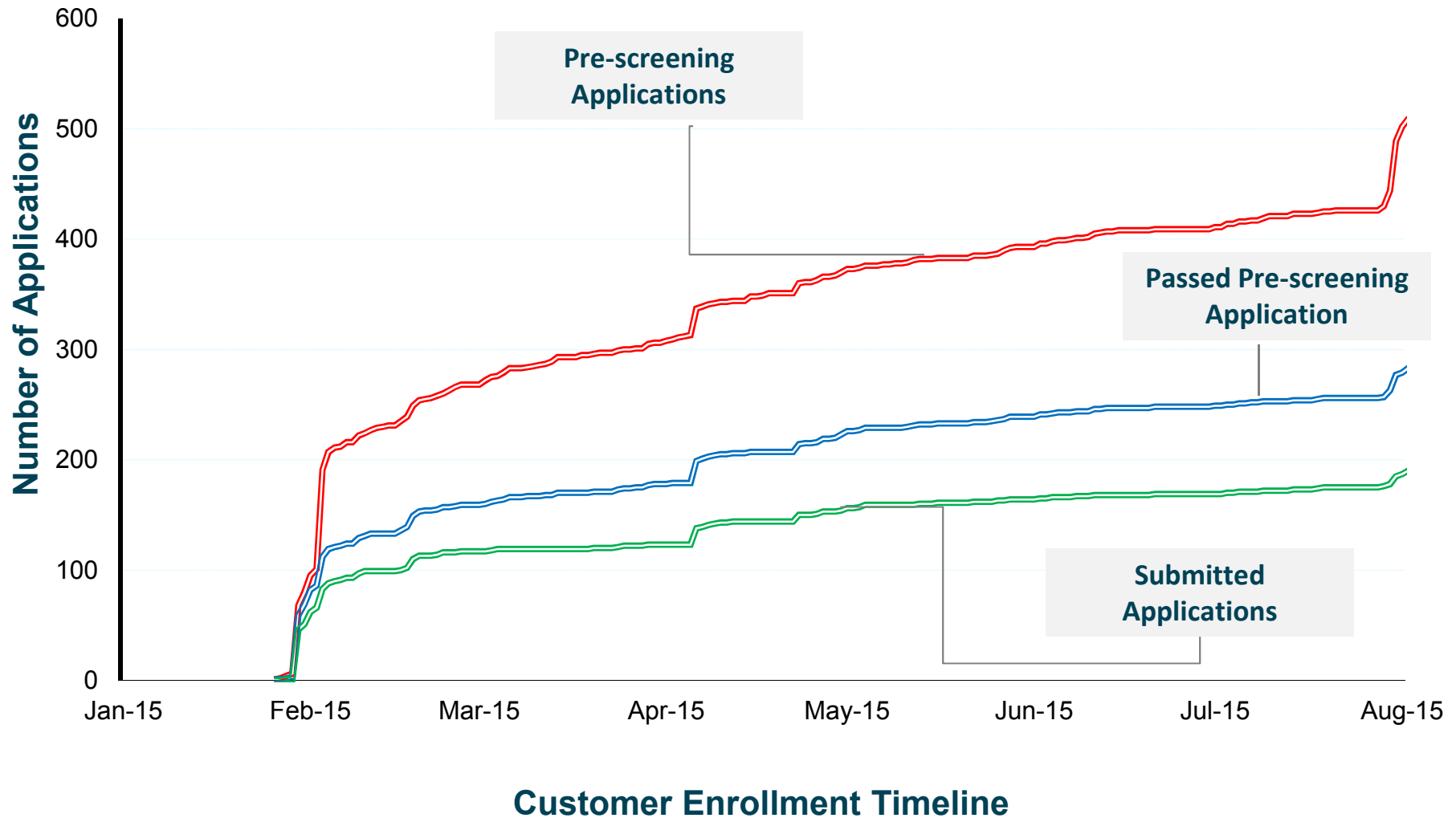
PG&E-BMW Contract

BMW-Driver Incentive (\$\$\$ / vehicle)



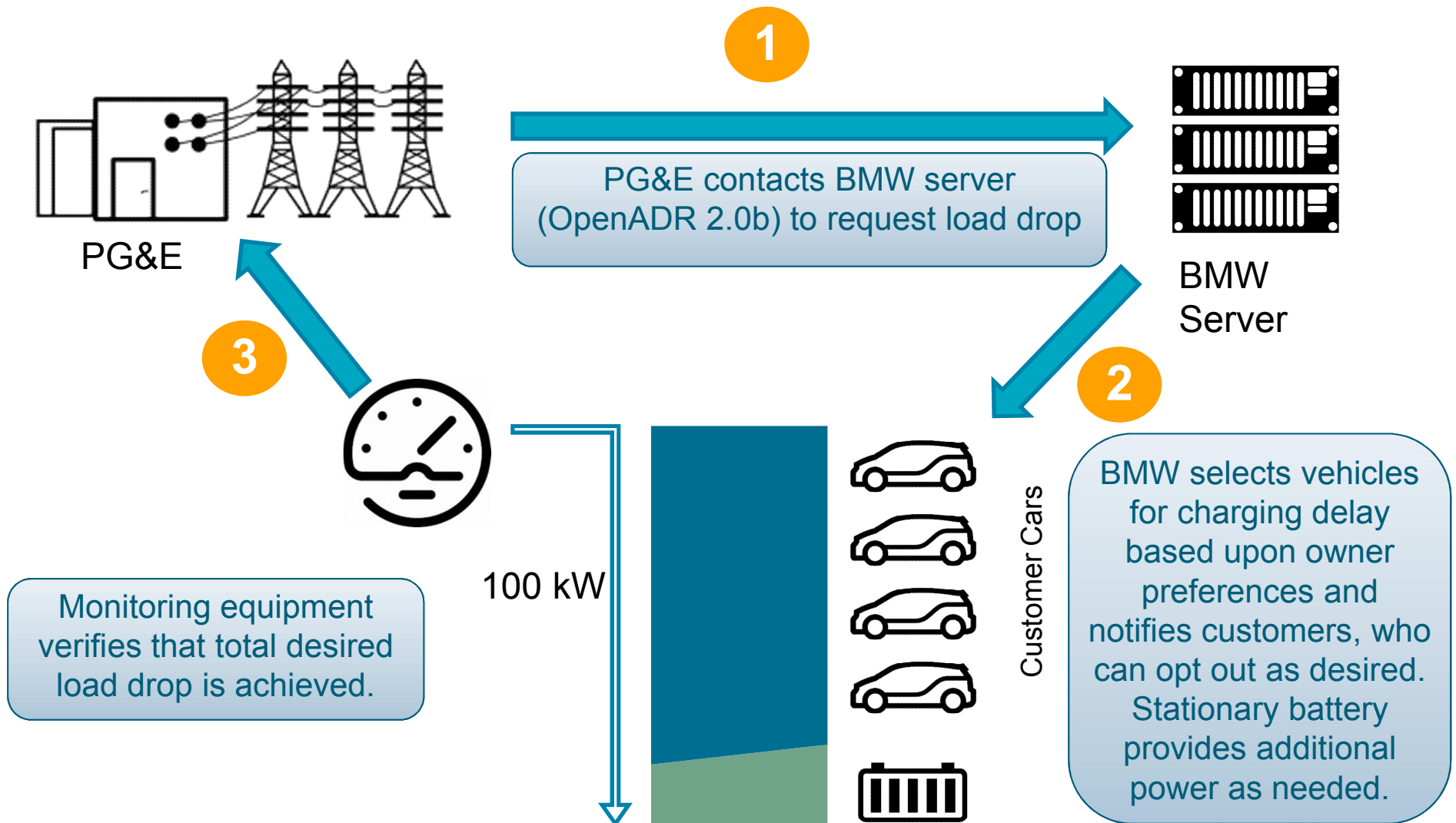


Significant demand for the pilot with over 500 customers indicating interest in 100 available spots





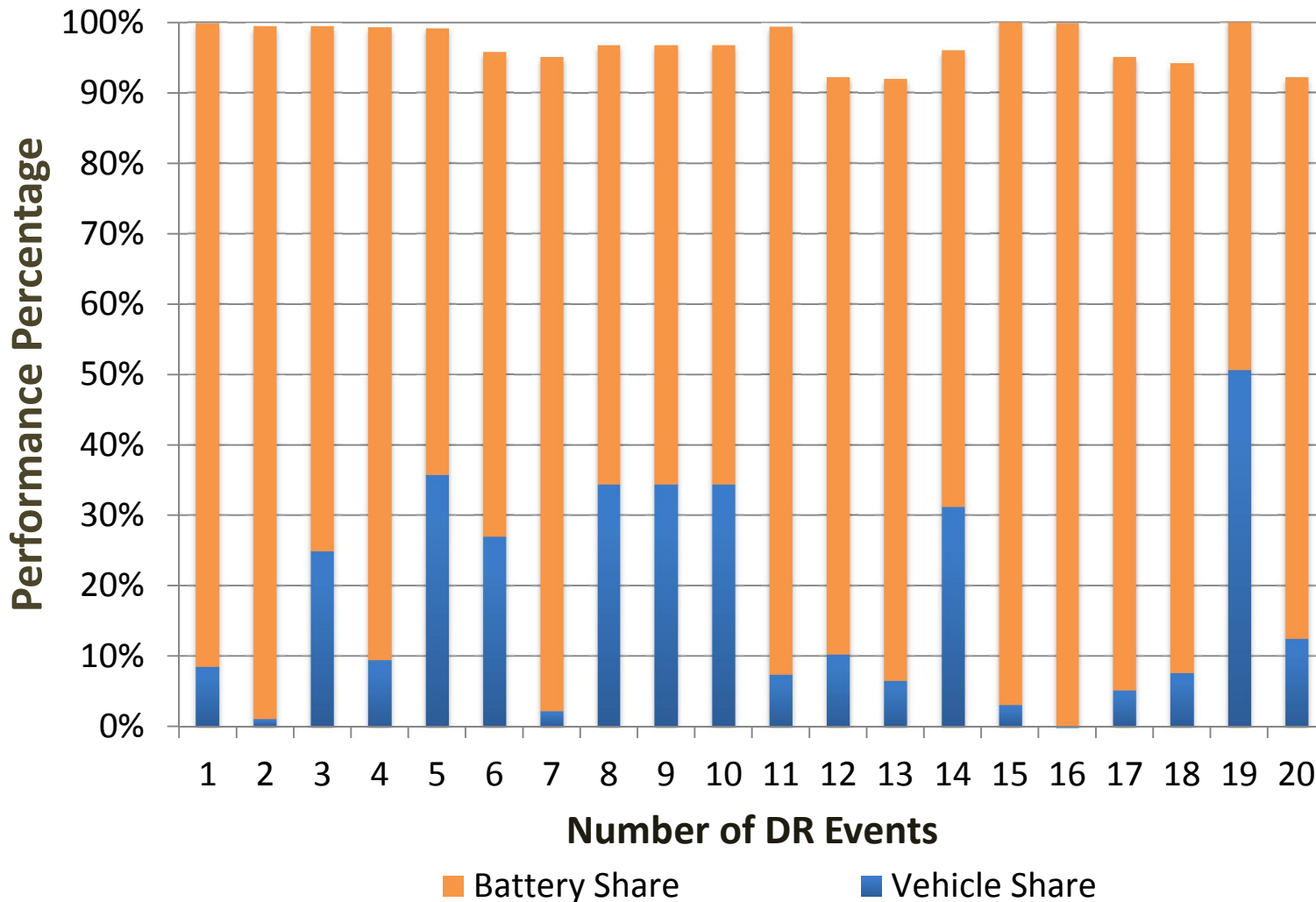
BMW leverages “smart charging”, battery storage or both to supply grid services to PG&E





BMW has met performance targets with a combined approach in each event since project launch

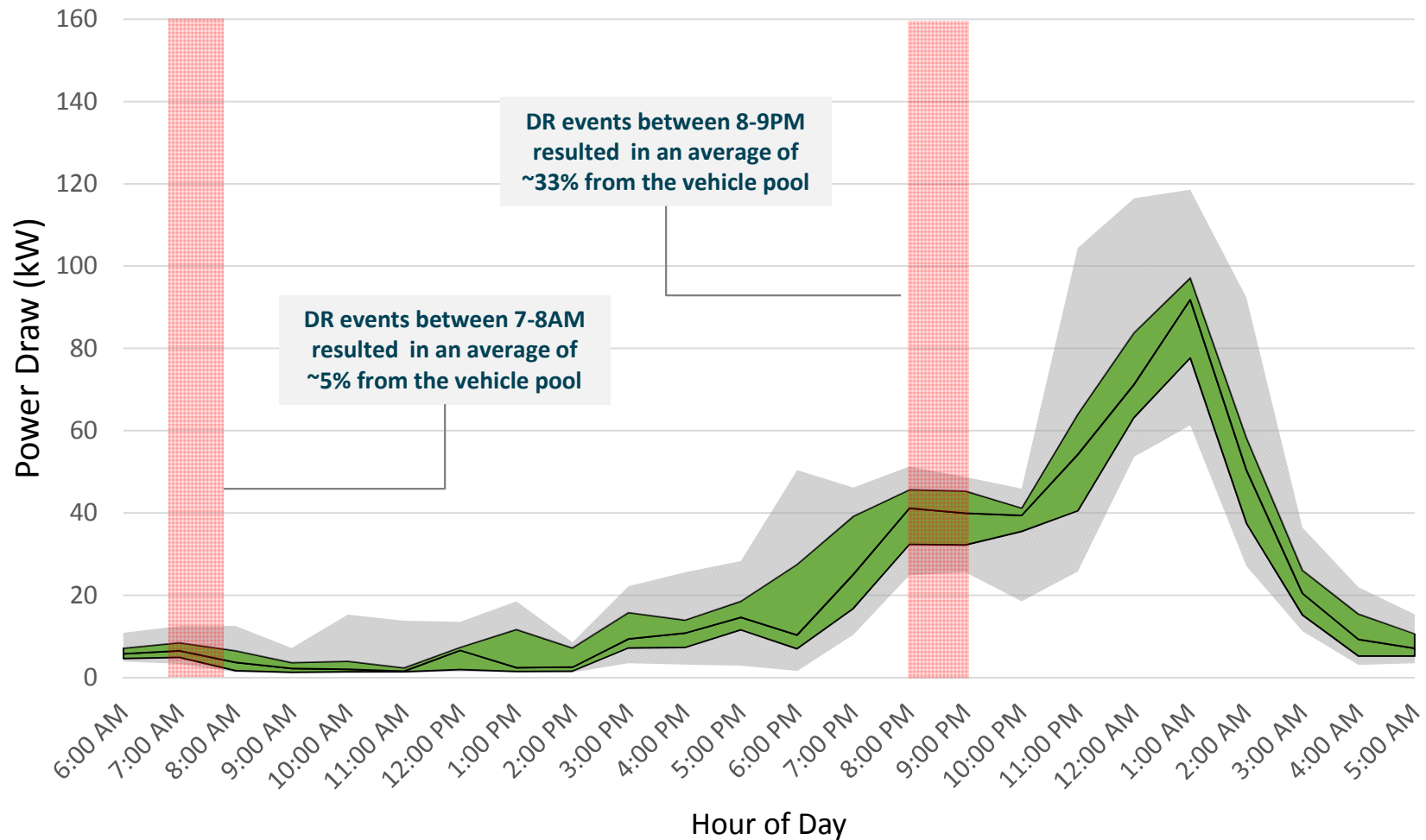
BMW's Performance in DR Events





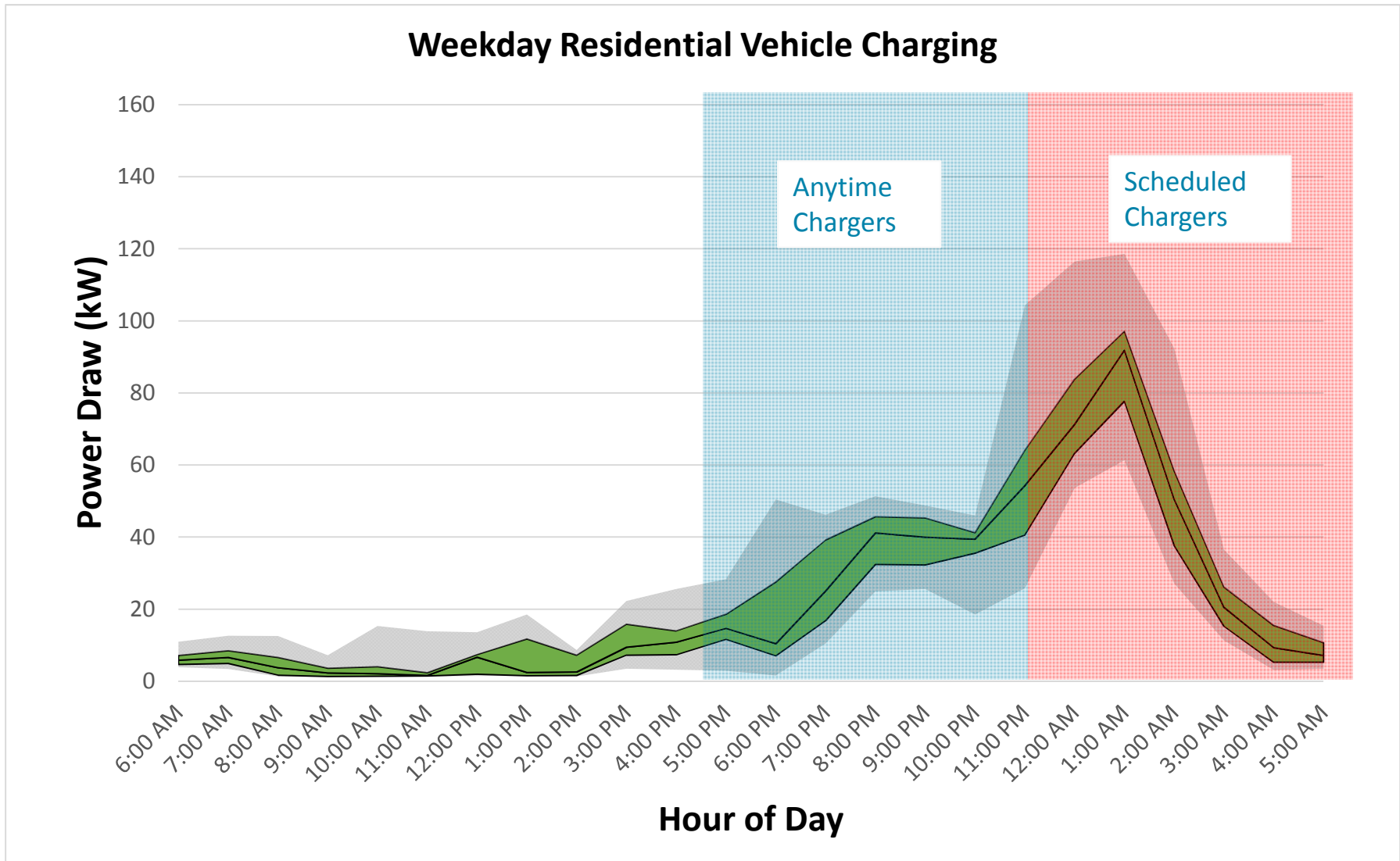
Evening demand response events have resulted in a significantly higher share from the pool of EVs

Weekday Residential Vehicle Charging



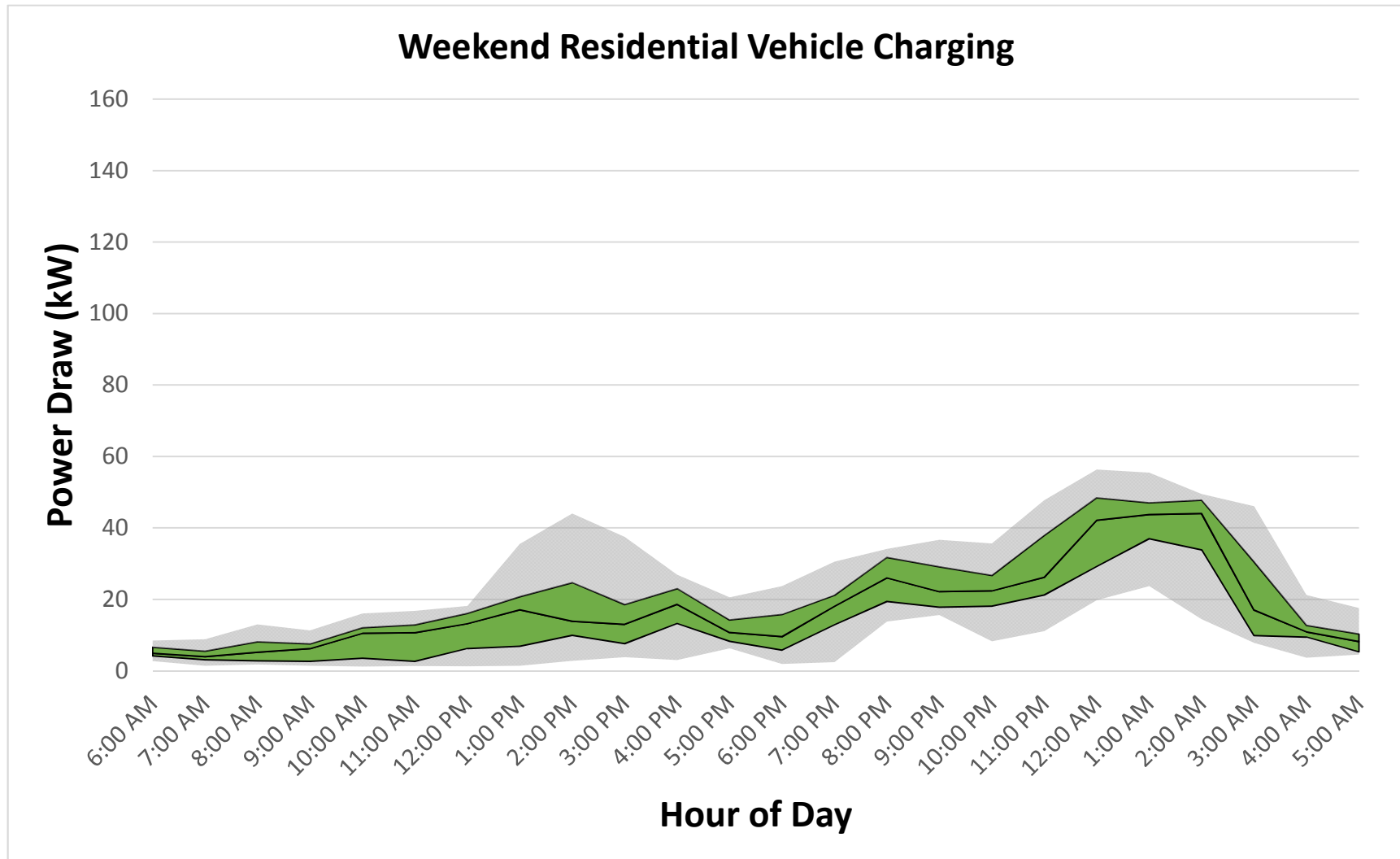


Time-of-use rates likely influence charging behavior for *many* customers





Customers charge during the day more but overall *less* on the weekend





Research on customer preferences will help inform future programs

BMW and PG&E will partner with a research institution to better understand the following:

- 1** Motivation for Pilot Program Participation
- 2** Customer Feedback on Program Mechanics
- 3** Understand Role of Incentives
- 4** Smartphone App User Testing
- 5** Identify customer's home electricity needs

Estimate contract executed by end of October 2015



Thank You!

David Almeida

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The i ChargeForward pilot is focused on evaluating three key objectives that may lead to scalable programs

- 1 Determine if automakers are willing to provide grid services
- 2 Evaluate the benefit of smart charging and second-life battery uses
- 3 Develop incentives to reduce the total cost of owning an EV



PG&E has been working closely with automakers on this pilot since mid 2013

BMW i ChargeForward Timeline

