Smart Charging of Electric Vehicles and Driver Engagement for Demand Management and Participation in Electricity Markets

Policy and Innovation Coordination Group
Transportation Electrification Workstream #3

Douglas Black, Ph.D.

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Project Overview

- Alameda County (AlCo) objectives:
  - Offer low-cost charging to the public to encourage EV use
  - Convert fleet vehicles from ICEs to EVs to meet environmental goals
  - Aim to reduce costs, particularly demand charges for both fleet and privately-owned EVs that use AlCo charging stations
- Project goal is to create an automated smart charging control system to minimize electricity costs related to fleet and public EV charging
- Funded by the California Energy Commission Electric Program Incentive Charge program

PROSPECT Silicon Valley
PARTNER TO CLEAN TECH INNOVATORS

chargepoint

COUNTY OF ALAMEDA CALIFORNIA

KISENSUM

Alameda County Fleet EVs and EVSEs

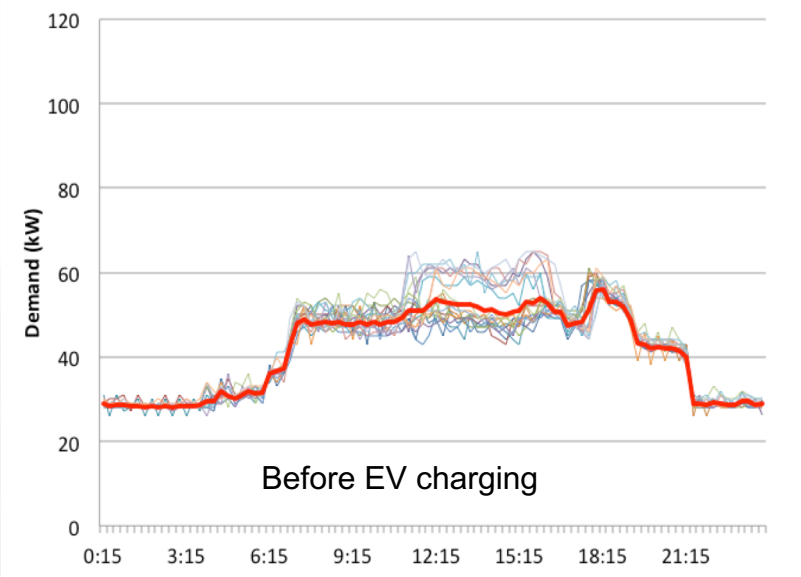
36 Level 2 ports and one DCFC

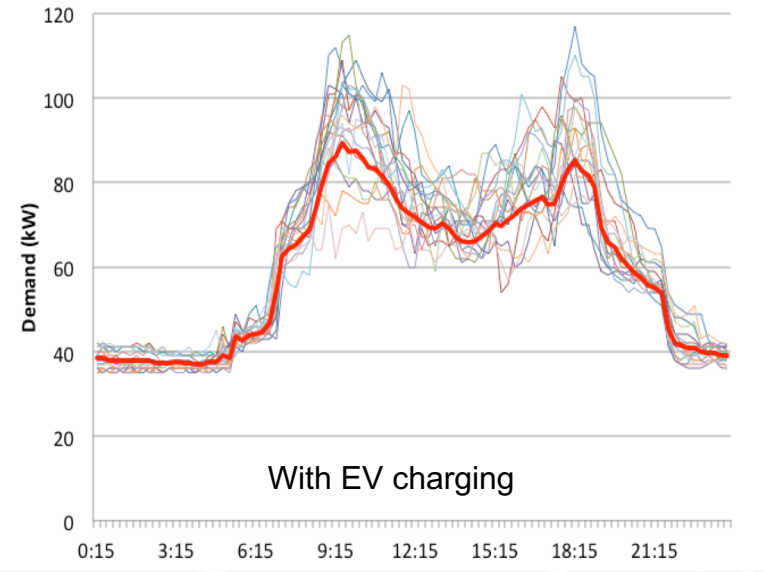
12 Nissan LEAF
24 kWh battery

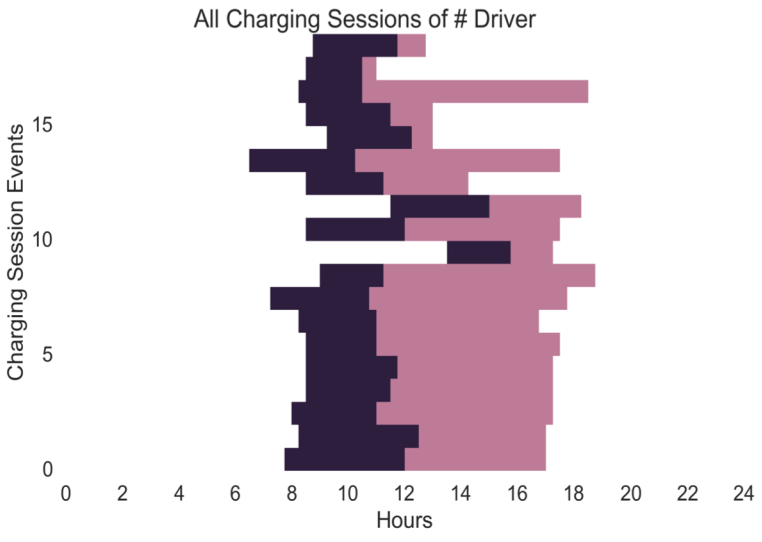
17 Ford Focus Electric
23 kWh battery

2 Chevy Bolt
60 kWh battery

AlCo Fleet and Public EV Smart Charging







AlCo Fleet and Public EV Smart Charging

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Smart Charging at Alco Park Garage

Planned Departure Time: (HH:mm AM/PM)

HH | mm | AM/PM

how much charge would you like?

kWh | Or | miles

Remember my request info

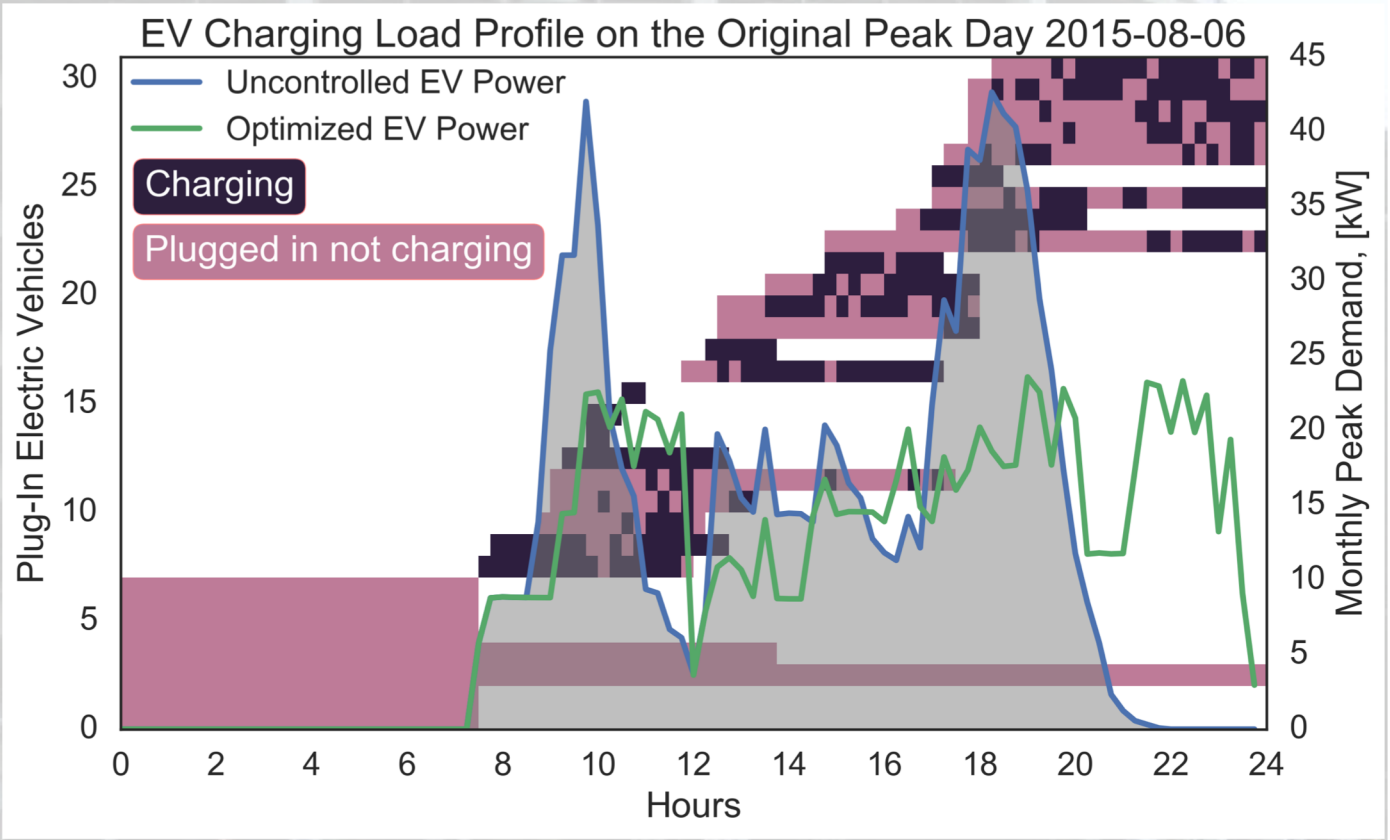
If your planned departure time changes, please use the same link to complete another smart charging form and we will re-adjust charge schedule.

Submit

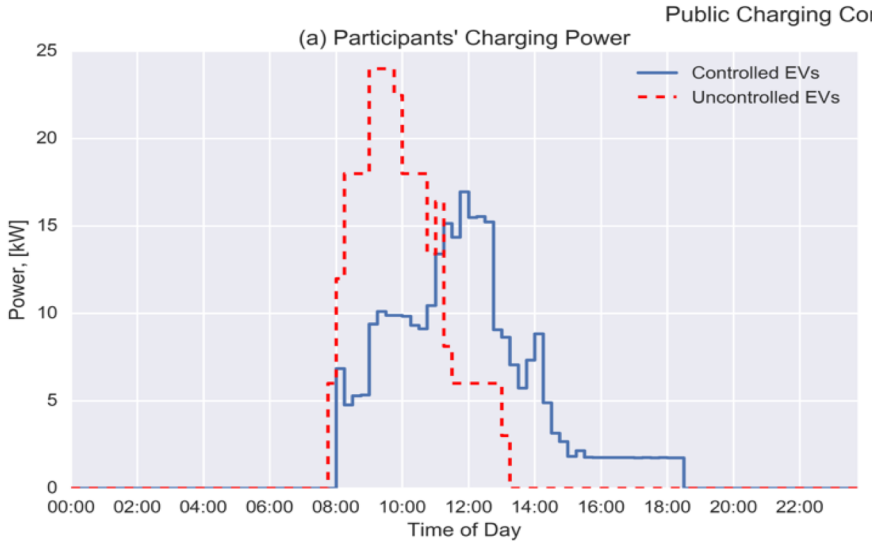
If you have any questions please call or e-mail:

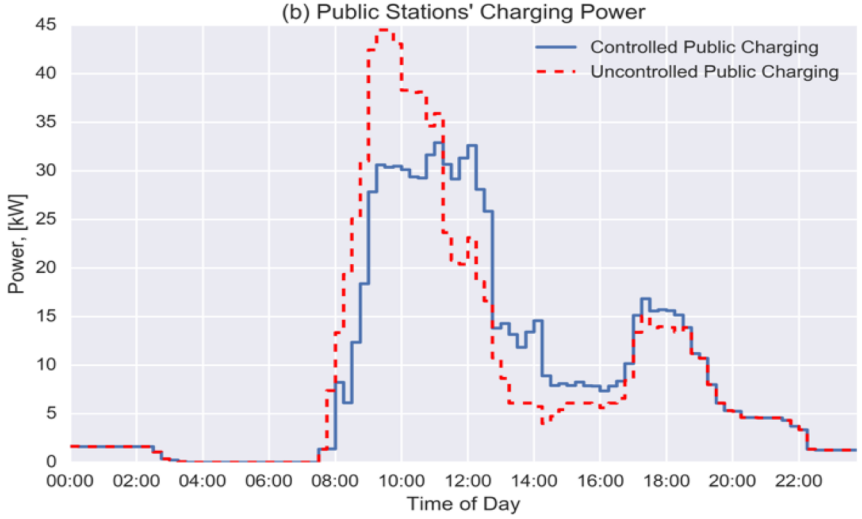
Douglas Black, Principal Investigator, 510-486-7904, DRBlack@lbl.gov

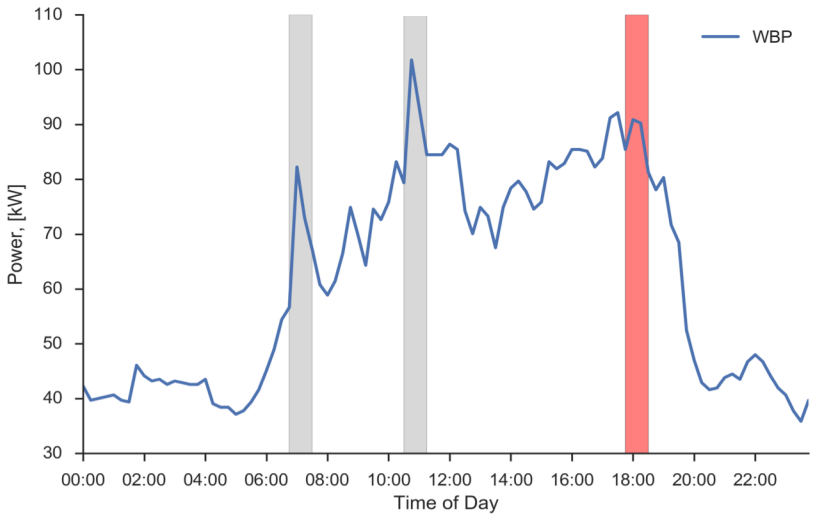
Phillip Kobernick, Sustainability Project Manager, 510-272-6505, Phillip.Kobernick@acgov.org

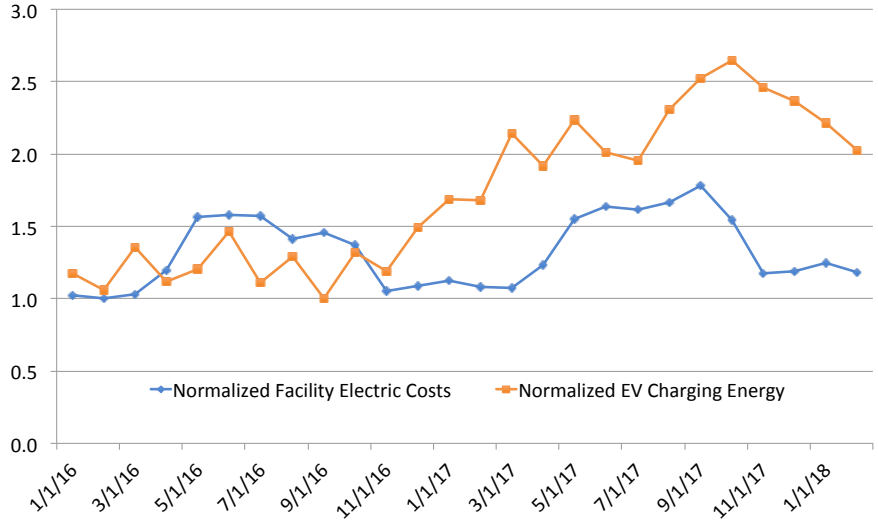


Impact of Smart Charging









Real-world Lessons from Smart Charging

- Technically, not particularly difficult; human behavior, as usual, was a challenge…
- Fleet operation logistics are more complicated in reality than in planning and simulation, especially when number of EVs is greater than the number of EVSE ports
- Public charging needs are hard to determine from customer interfaces; biggest challenge is retaining participation without requiring incentives that exceed cost savings
- Fast charging has to be used wisely so as not to set a costly maximum demand in peak period
  - If fast charging is critical to operations look at solutions to off-set charging sessions during peak periods

Thanks!

Questions: Doug Black, LBNL, drblack@lbl.gov

AICo Smart Charging System Architecture

- LBNL Server:
  - Web-service to: 1) handle smart charging requests; 2) interact with users; 3) data collection; 4) issue control commands
  - Database: storage for all session data, meter data, smart charging requests
  - Smart control optimizer: charging schedule optimization
- Kisensum Server:
  - Communicates with each AICo EVSE via ChargePoint API
  - Sends session info (including user ID) from EVSE to LBNL server
  - Sends optimized charging set points from LBNL server to EVSE