UCDAVIS

PLUG-IN HYBRID & ELECTRIC VEHICLE RESEARCH CENTER

of the Institute of Transportation Studies

The Integration of Used Electric Vehicles into Fleet Operations

Dahlia Garas

University of California, Davis

Plug-In Hybrid & Electric Vehicle Research Center

Policy Driving this Research

- In 2017, California passed Senate Bill 498 requiring 50% of new vehicle purchases within California vehicles fleets to be zero-emission by 2024.
- An executive order by the Governor in 2018 increased the target for zero emission vehicles in California to five million vehicles by 2030.
- In addition, the University of California (UC) has set system-wide goals of achieving carbon-neutral building and vehicle fleet operations by 2025 through adopting renewable energy sources and improving energy efficiency across the ten UC campuses

Project Description

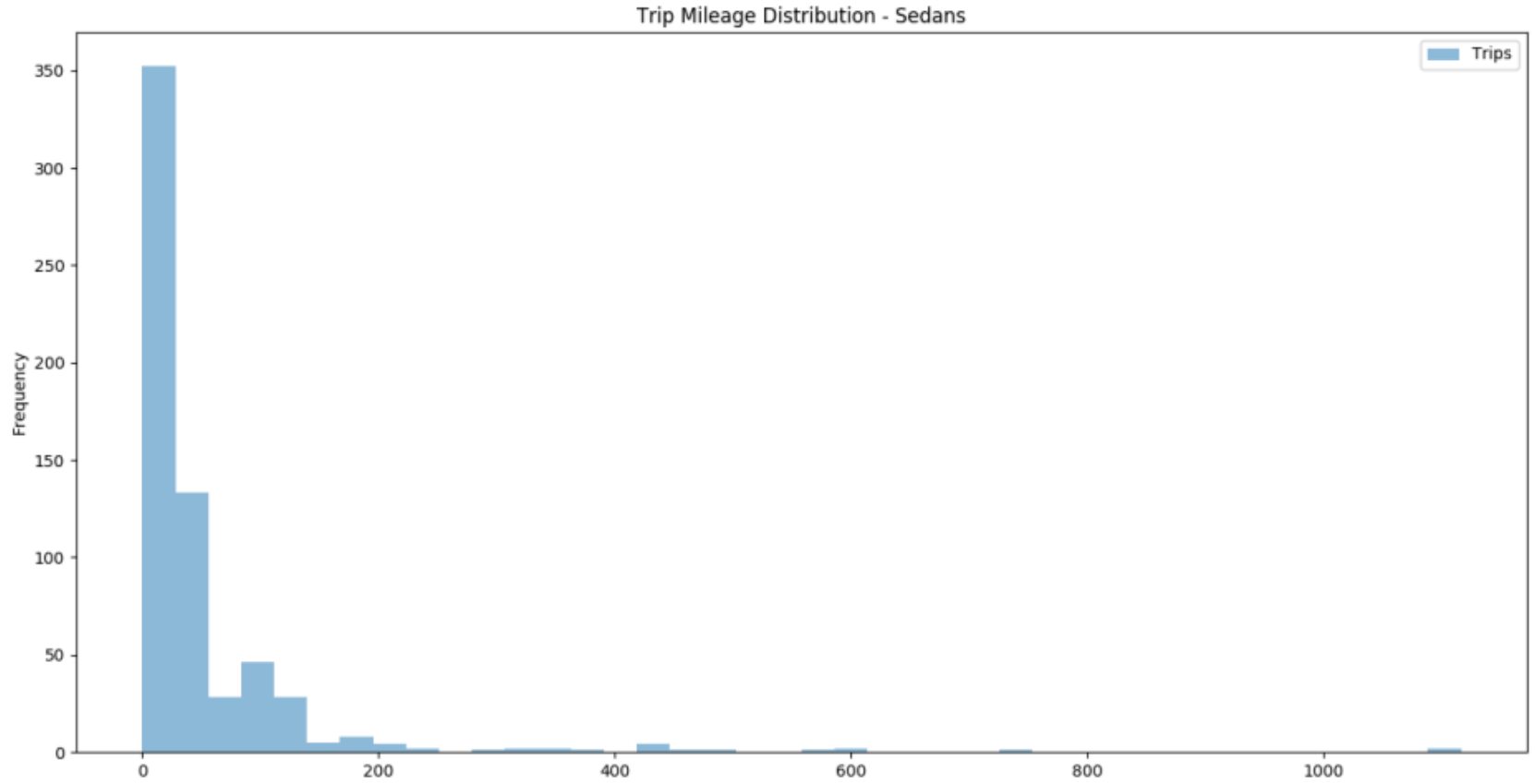
UCDrive
FLEET SERVICES CAR SHARE PROGRAM

- 10 previously-owed BMW i3's integrated into the UC Davis fleet
  - 3 Departmental assignments (one in parking enforcement)
  - 1 Daily rental
  - 6 Hourly rental for faculty/staff through UCDrive (Data shown is for 4 vehicles) at 3 different locations on campus
- Each vehicle has charging available at it's "home base"
- Vehicles integrated into fleet between Dec. 2018 – May 2019

Project Questions

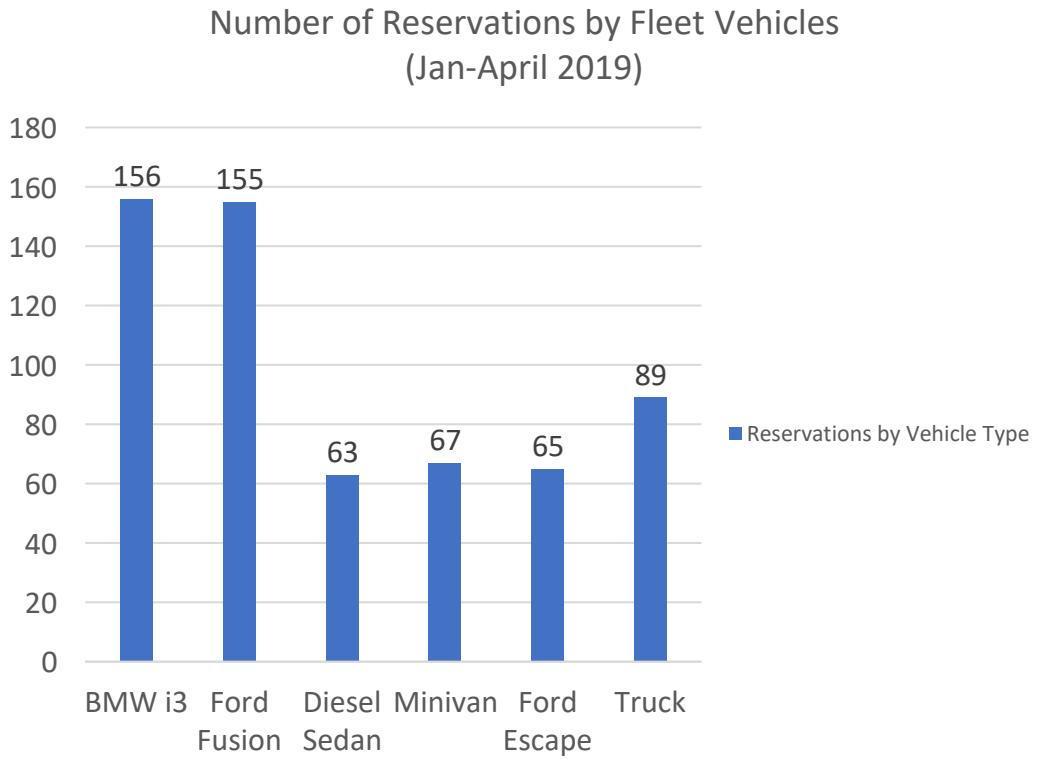
- What are the challenges for incorporating electric vehicles into fleets?
- How can these challenges be addressed before and during fleet adoption?
- How can fleets benefit from adding EVs to their vehicle fleet?
- Are there unique benefits from adopting used EVs?
- Are EVs used effectively in fleets?

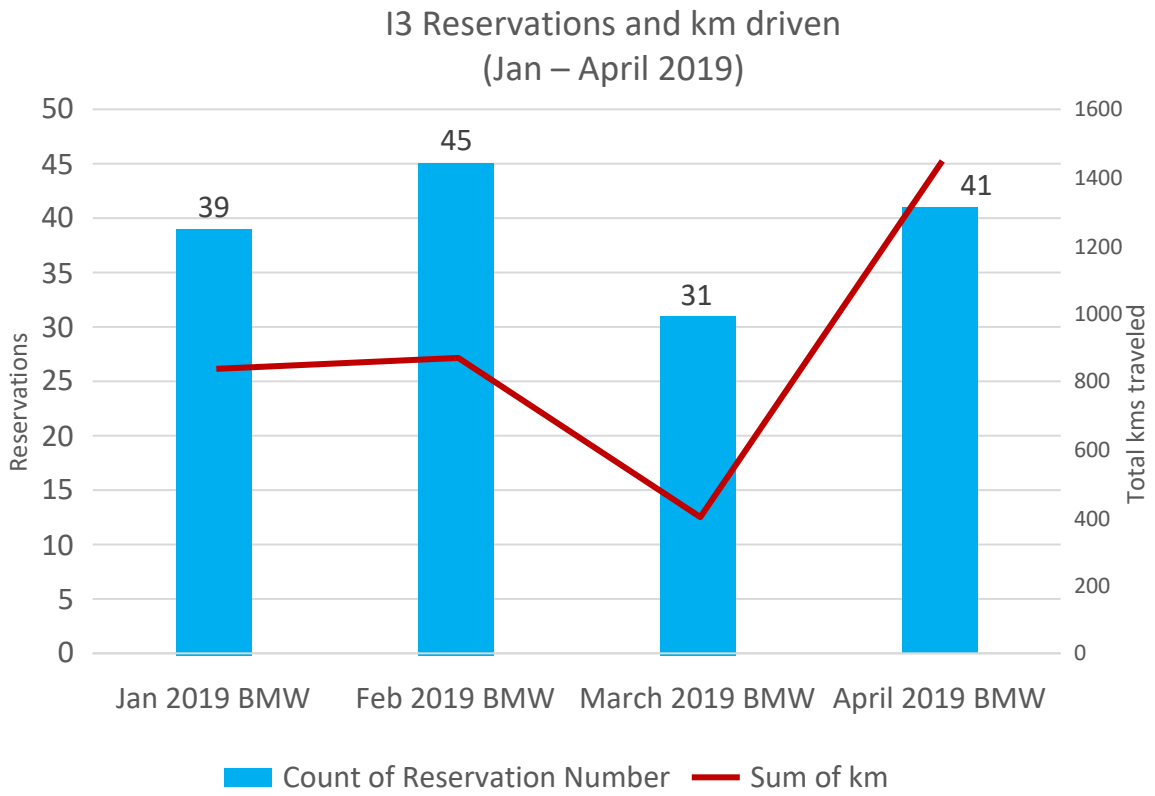
Historical Data on Fleet Sedan use



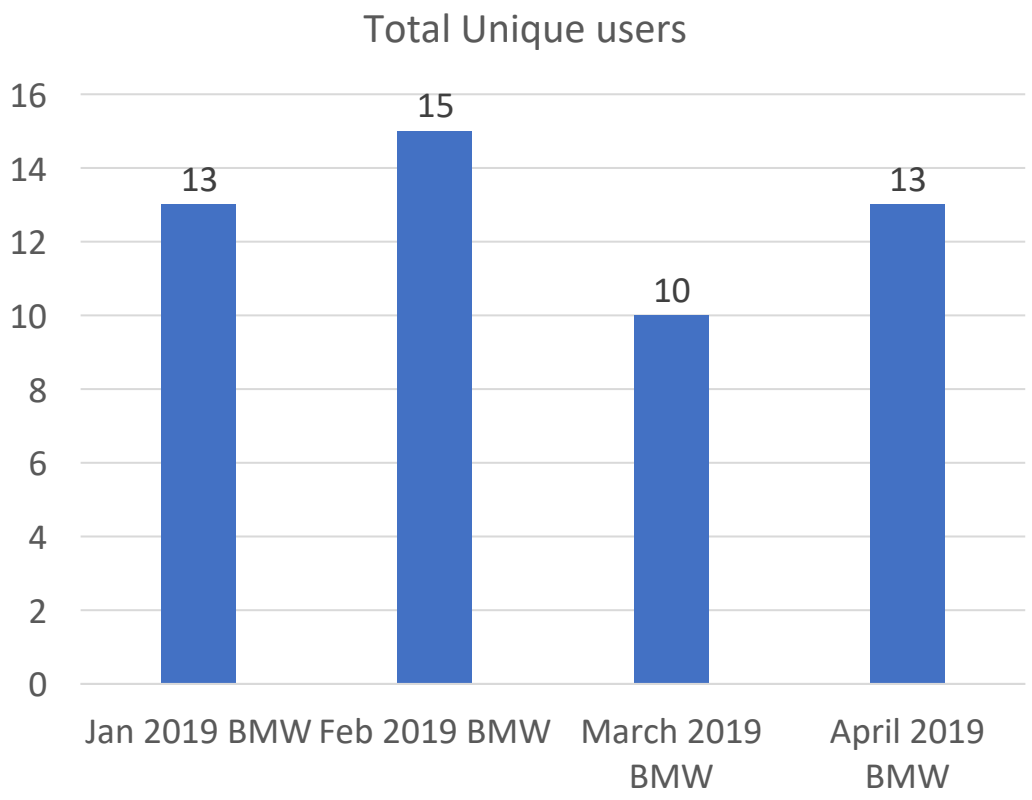
UC Drive vehicle reservations

(includes 4 i3's from Jan – April 2018)



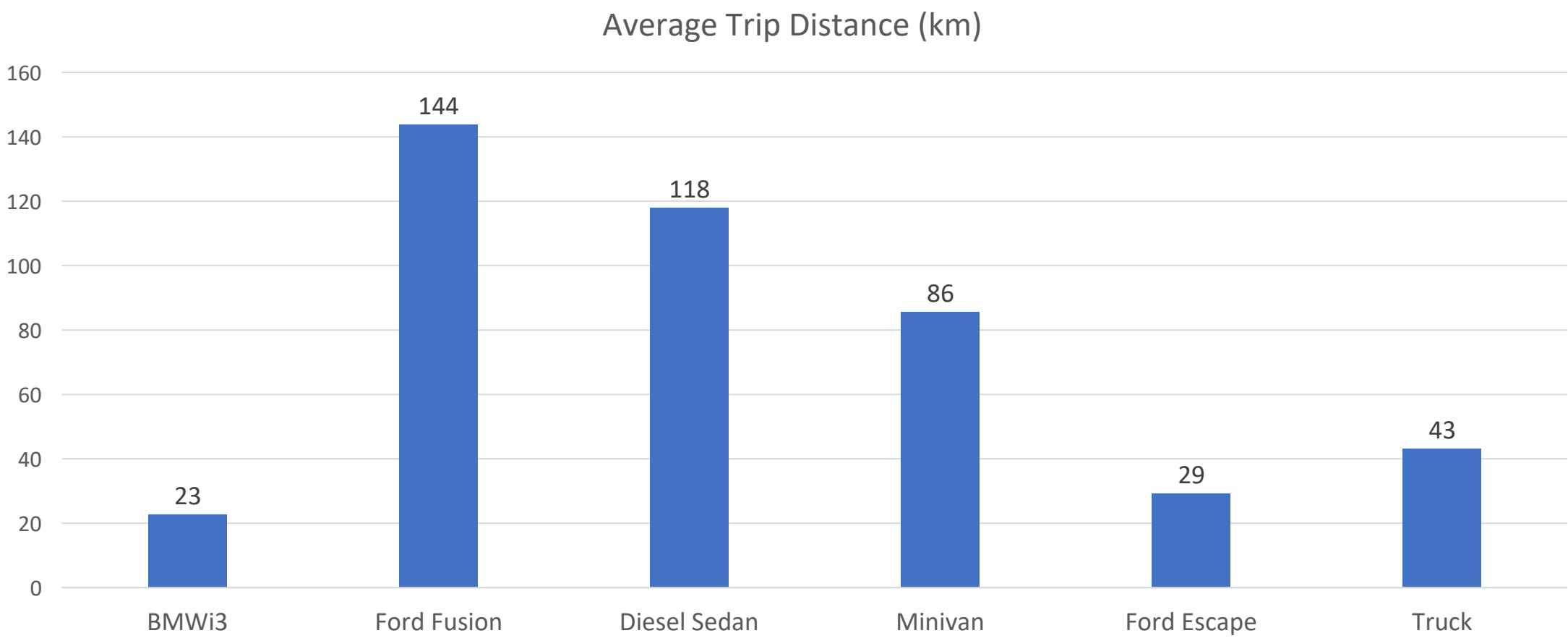


Unique i3 Users per month



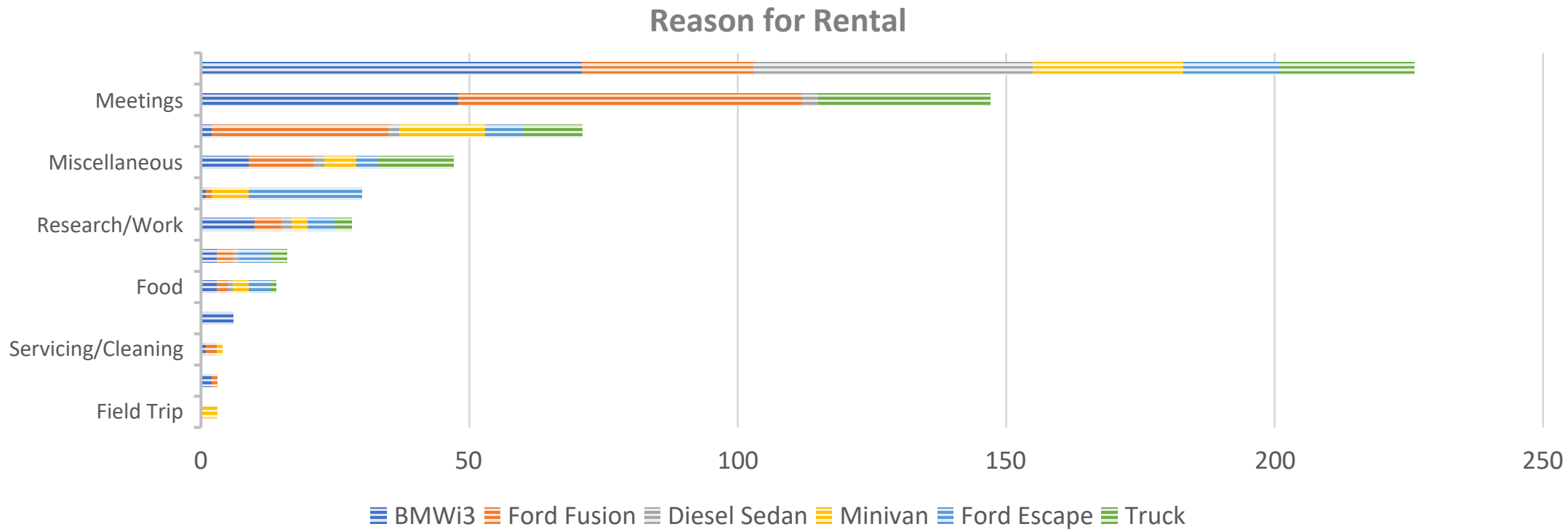
- New educational materials developed
- Campus outreach and training events occurring in April and on-going
- 2 additional i3's placed in hourly rental beginning in May, for 6 total, at each of 3 different campus locations

Average Trip Distance (km) by Vehicle Type



Vehicle Reservation Purpose

- Free-form information from users that was then clustered by researchers, so lots of “codes” we don’t know
- More data will be gathered through follow-up survey

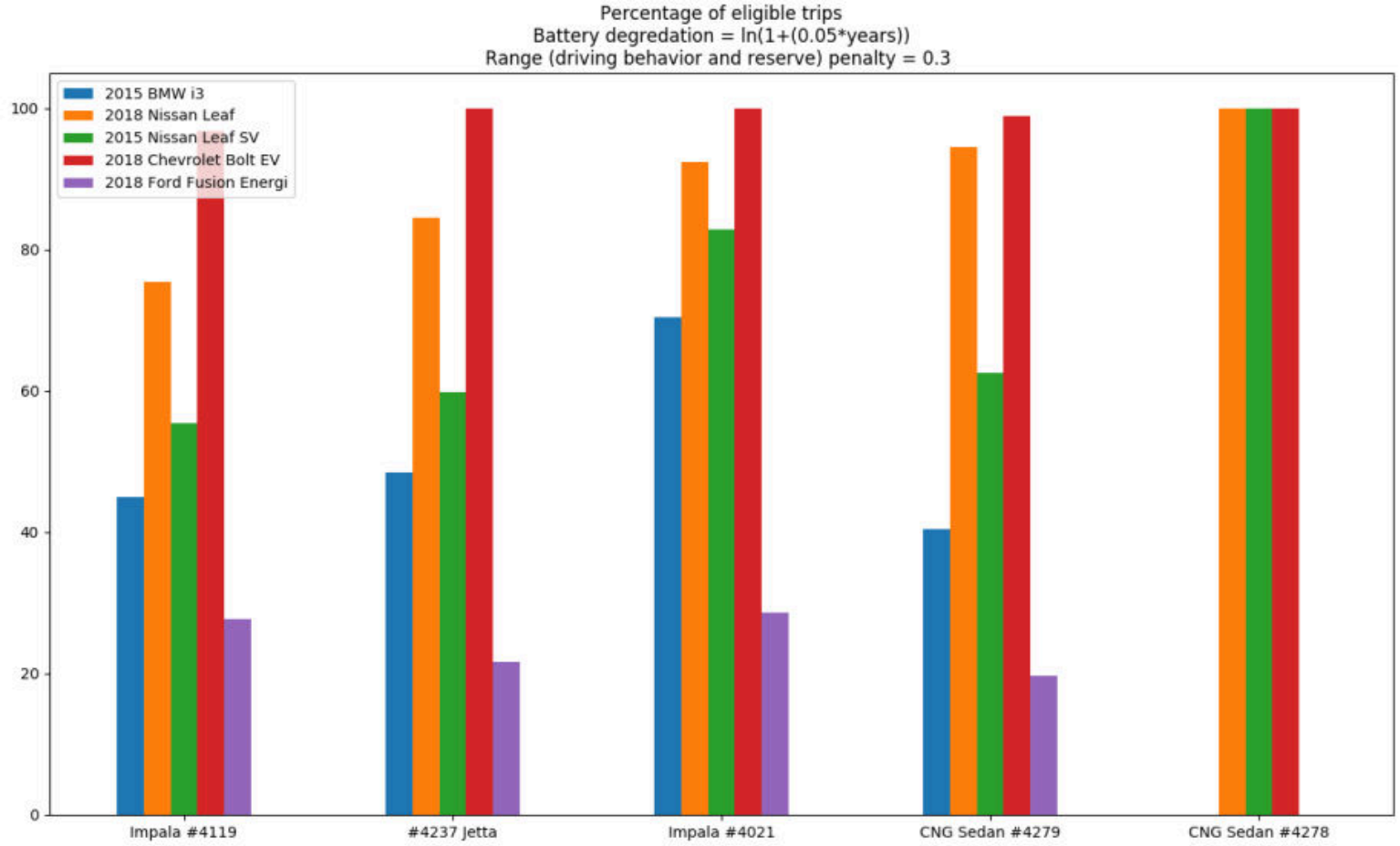


Identifying the right car for the job

Percentage of trips from regular sedans that could be replaced by an EV based on EV range and driving history

Average Miles per month by assignment

- Daily rental = 99 km/month
- Hourly rental = 178 km/mo
- Department = 502 km/mo



Results

- Interest from Fleet Manager, and ability to ensure charging at each “home base” for the EVs is critical to project success
- Meeting minimum use goals of 161km (100 miles)/month per vehicle
- Hourly rentals are being used, but at very low mileage compared to other vehicle types
- Daily rental use is very low, both in terms of number of rentals and number of miles
- Matching the vehicle to the job is critical
- Continued need to increase awareness and interest to increase users

UCDrive
FLEET SERVICES CAR SHARE PROGRAM

Next Steps

- Ongoing data collection to follow trends over time
  - Is number of rentals indicative of functionality or novelty of the vehicles?
  - Do repeat renters become more comfortable and start driving longer distances?
- Survey of EV users in the UCD fleet to understand their reaction to the vehicle
  - Can fleet use influence personal vehicle purchase choices?
- Calculate Fleet operating cost comparisons for new and used EVs and hybrid or conventional vehicles
  - Does the used vehicle purchase price make it a more approachable choice for fleet operators?
- Adding more EVs with longer ranges to understand impact of range on use
- Smart integration of EVs into utility operation for the campus

Thank you! Merci!

- BMW for their support for this project
- PI Gil Tal
- Team Members Scott Hardman, Debapriya Chakraborty
- Graduate and Undergraduate Students who are assisting with various aspects of the project: Claire Sugihara, Scott Begneski, Victor Yu, Everett Wu
- UC Davis Fleet Manager Dan McCann