

evs | 27

The 27th INTERNATIONAL
ELECTRIC VEHICLE
SYMPOSIUM & EXHIBITION
BARCELONA
17th-20th November 2013

UCDAVIS

PLUG-IN HYBRID & ELECTRIC VEHICLE RESEARCH CENTER
of the Institute of Transportation Studies

- **Studying the PEV Market in California:
Comparing the PEV, PHEV and Hybrid
Markets**

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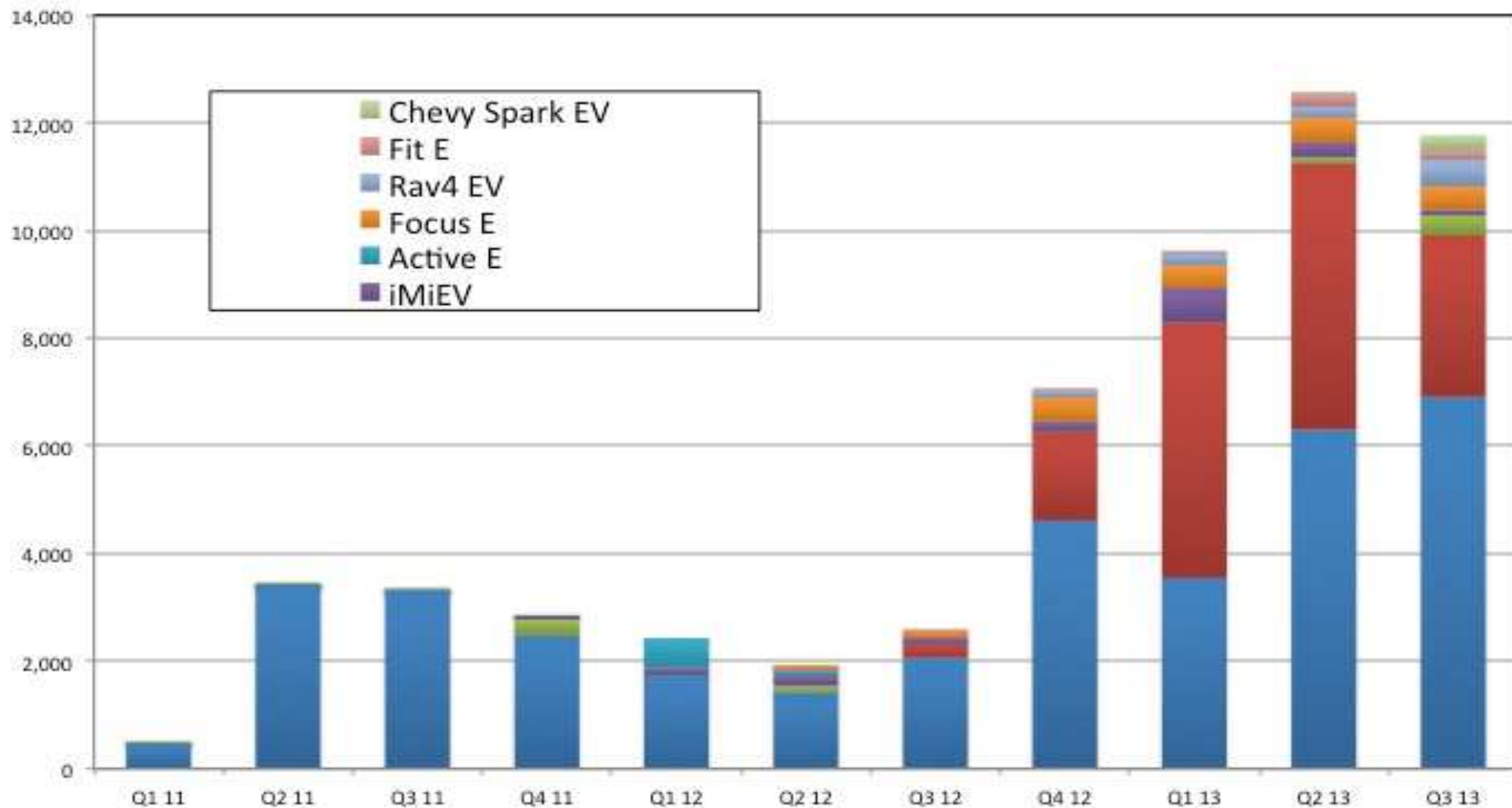
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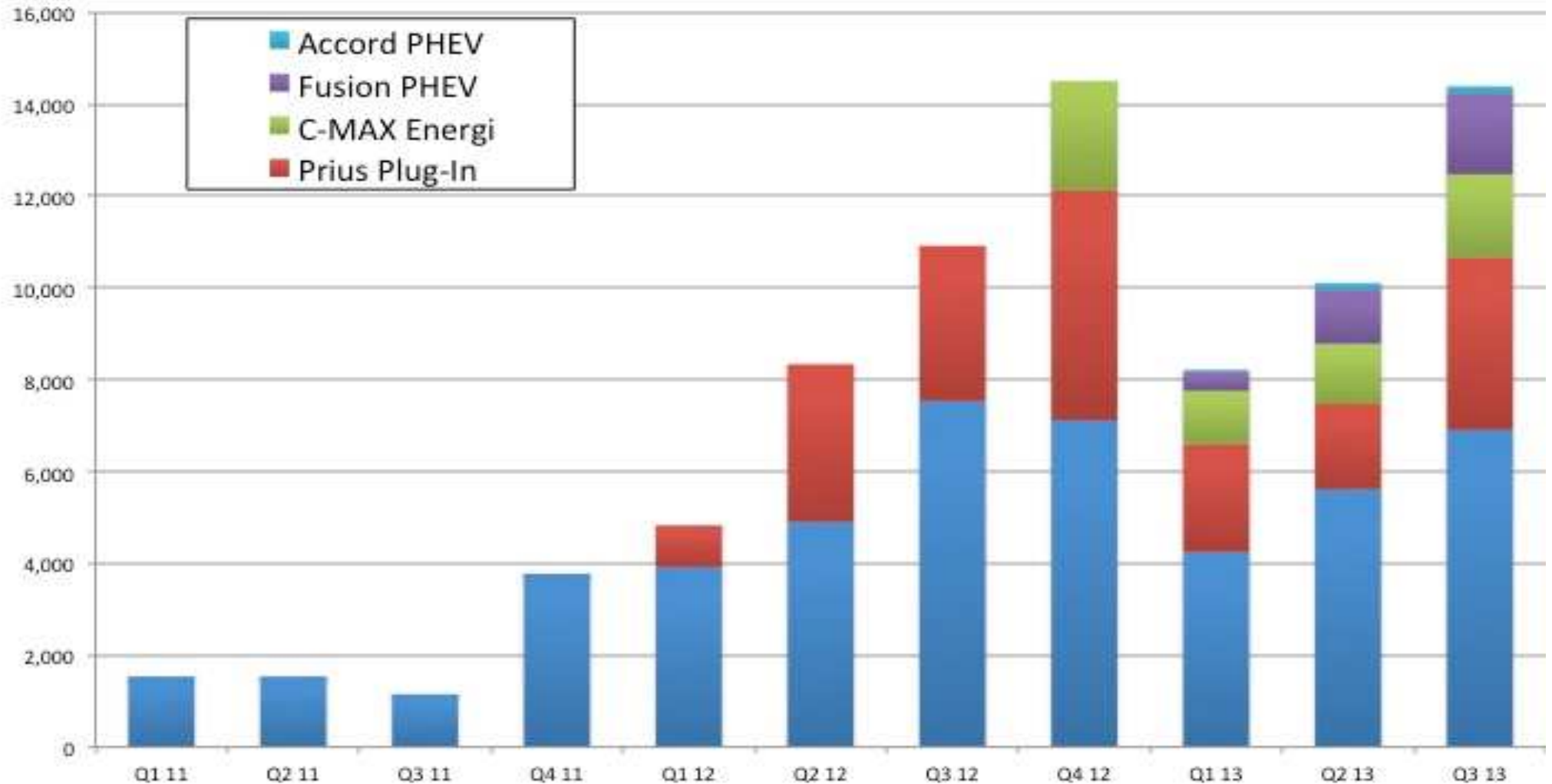
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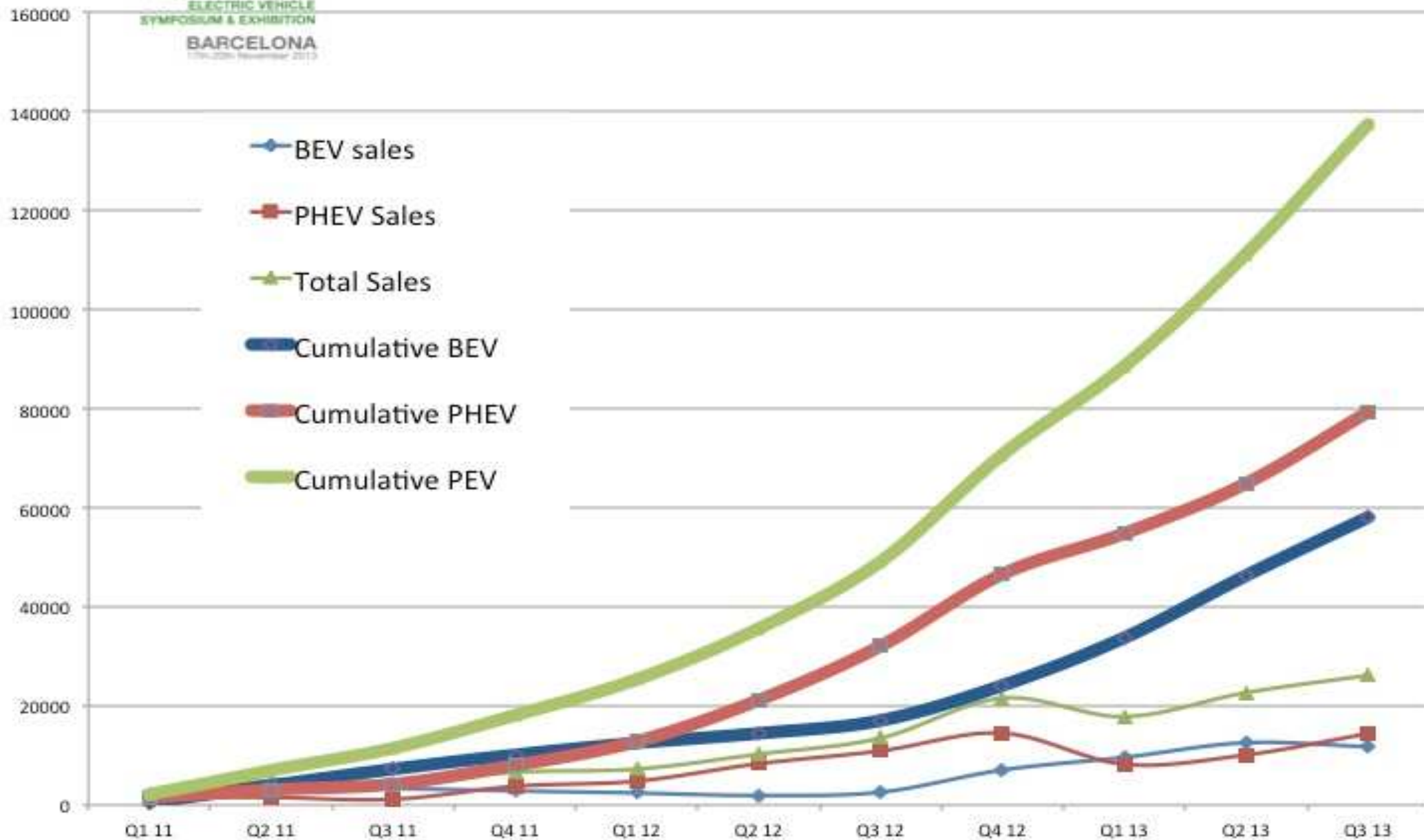
US Market: BEV Sales by Model



US Market: PHEV Sales by Model



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Sales growth rate Linear or Exponential?

Linear?

- More than 80% of the market is based on 4 models.
- Sales rate is growing linearly

Exponential?

- First two years of PEV sales outpacing HEV's first two years (BEVs & PHEVs separately about same rate as HEVs)
- World PEV totals 200,000+, USA PEV totals over 140,000 (around 10,000 per month) - Sales rate is growing linearly
- California is about 40 % of USA market
- Many new models Ford sales add 2 strong models
- Sales within some segments looks strong: luxury sedans (Tesla Model S) compact sedans (Volt, Leaf)

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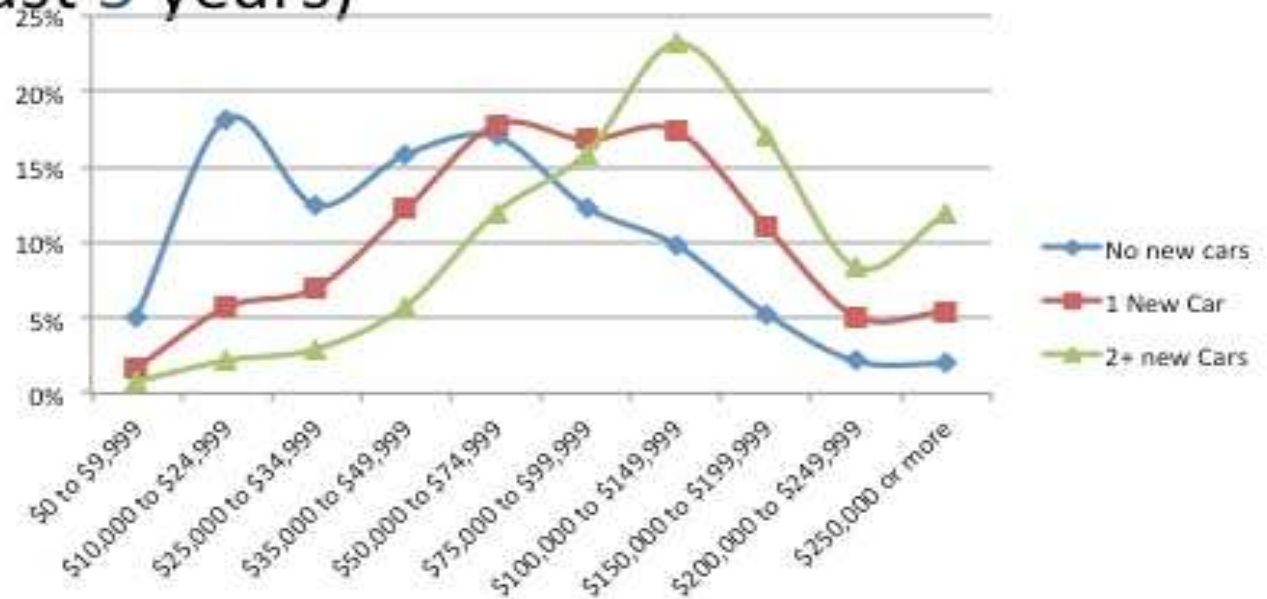
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New Car Buyers (households who purchased a new car in the last 5 years)



- 7% of the households are responsible for one third of the market
- New car purchases are highly correlated with income, but not all high income households buy new cars and some lower income household purchased one or more new cars.

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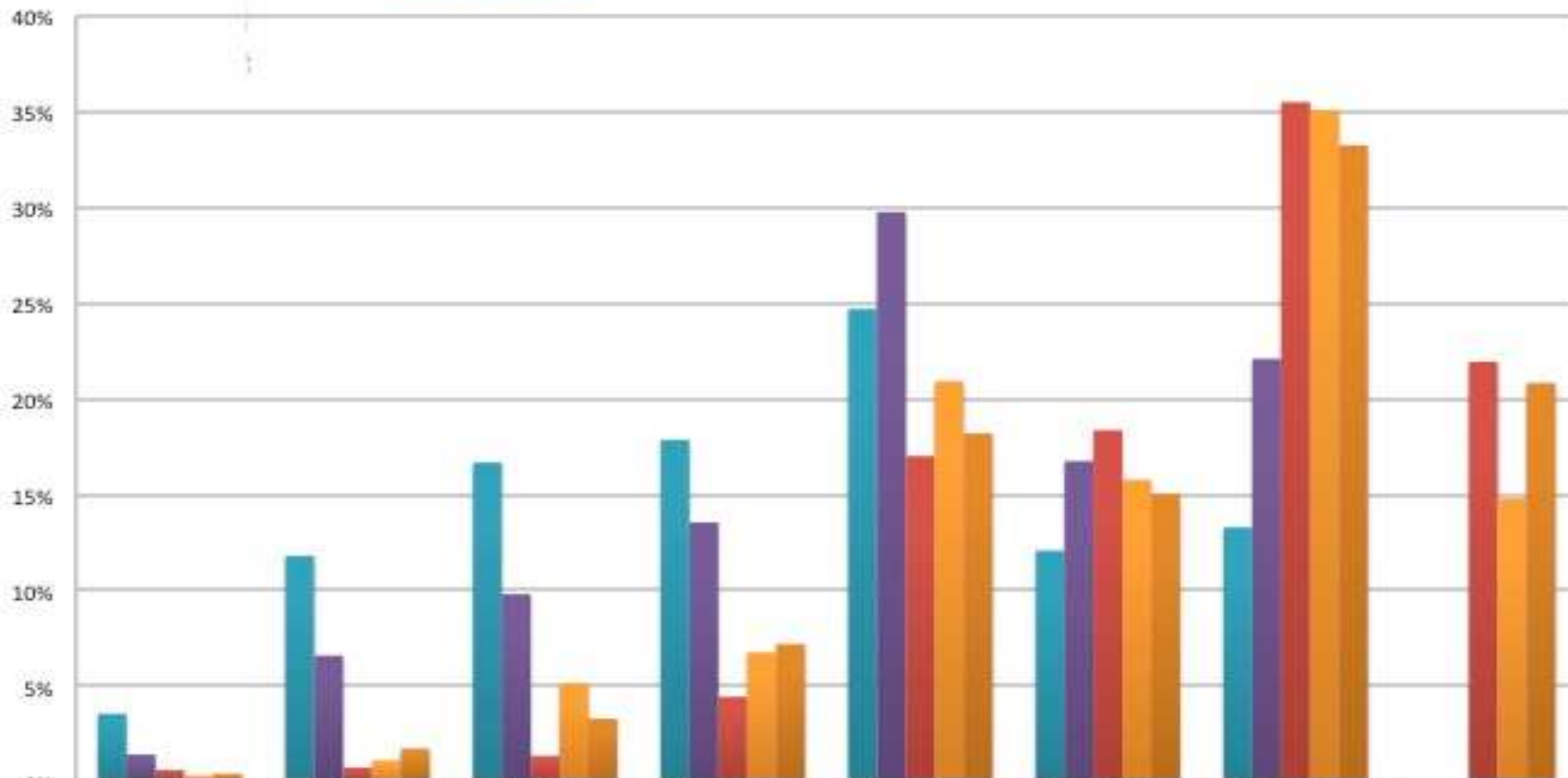
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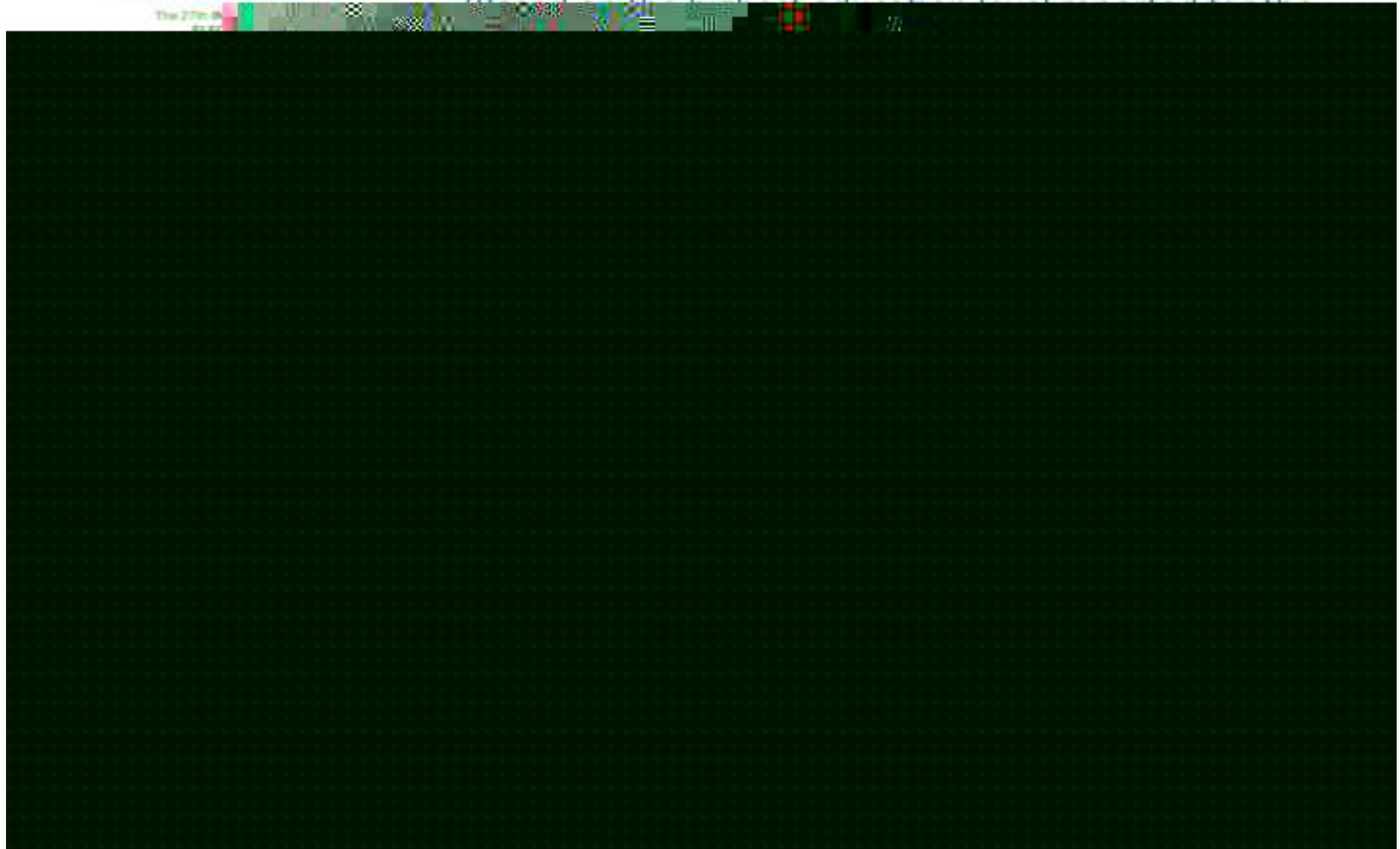
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California New Car Buyers: Household Income



	Less than \$24,999	\$25,000 to \$49,999	\$50,000 to \$74,999	\$75,000 to \$99,999	\$100,000 to \$149,999	\$150,000 to \$199,999	\$200,000 or more	No answer
ICE	4%	12%	17%	18%	25%	12%	13%	0%
Hybrid	1%	7%	10%	14%	30%	17%	22%	0%
PRIUS PLUG-IN	1%	1%	1%	4%	17%	18%	36%	22%
VOLT	0%	1%	5%	7%	21%	16%	35%	15%
LEAF	0%	2%	3%	7%	18%	15%	33%	21%



Model	N	Detached house	Attached house (townhome, duplex, triplex, etc)	Apartment/Condo	Other
ICE	5108	86.63%	5.29%	7.92%	0.04%
Hybrid	612	87.42%	5.23%	7.35%	0.00%
PRIUS PLUG-IN	814	86.36%	7.49%	6.02%	0.12%
Volt	623	80.43%	8.83%	6.10%	0.64%
LEAF	2130	90.14%	6.10%	3.05%	0.71%
TESLA ROADSTER	47	91.89%	4.26%	4.26%	0.00%

Model	N	Own	Rent
ICE	5108	88%	12%
Hybrid	612	92%	7%
PRIUS PLUG-IN	814	91%	8%
Volt	623	89%	10%
LEAF	2130	95%	5%
TESLA ROADSTER	47	91%	9%

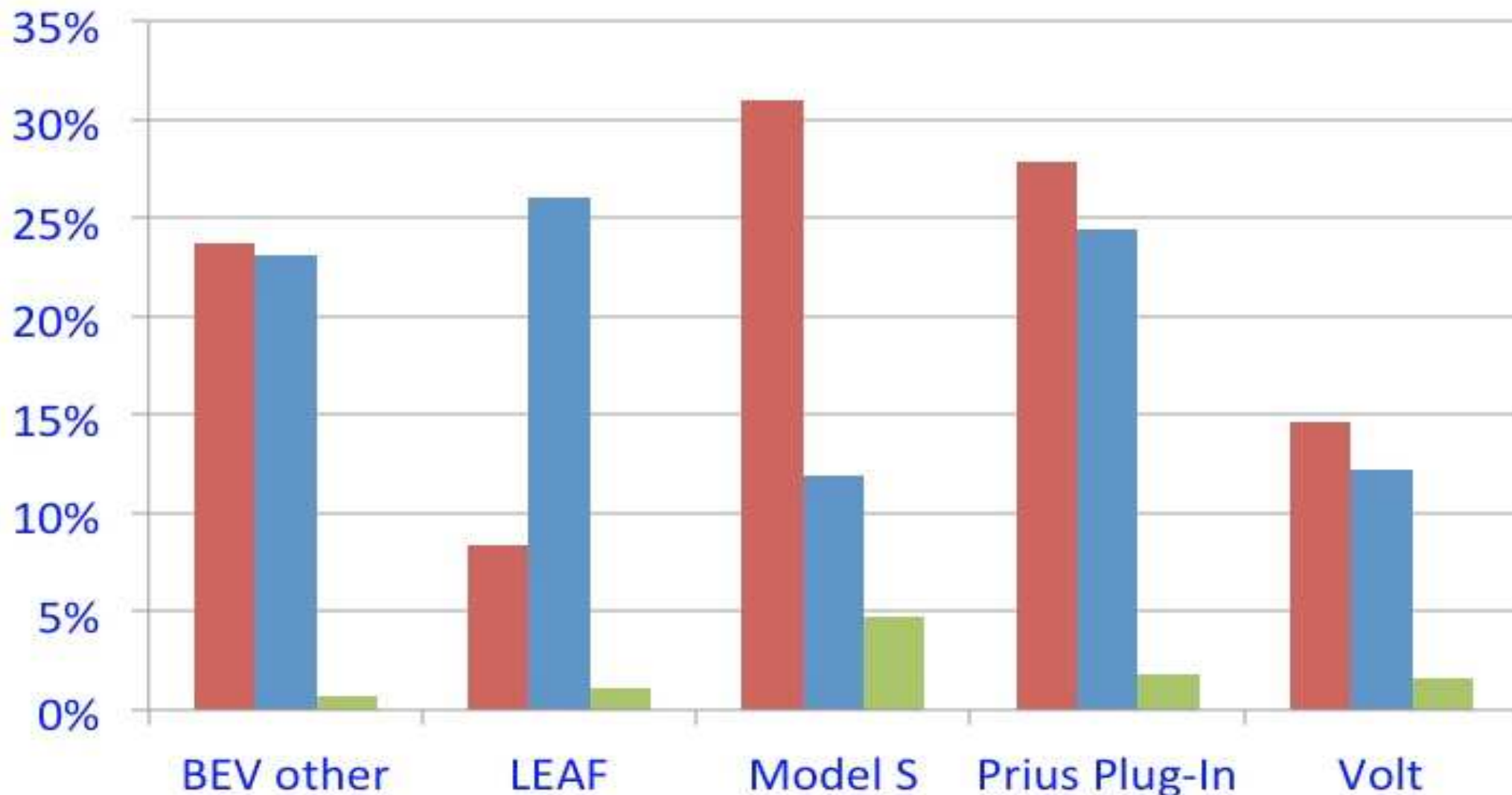
- Multi unit dwellings (24% of households) and rentals are not common among new car buyers in general.
- 87% of the ICE new buyers live in a detached house, similar to hybrid and PHEVs and about 3% lower than LEAF owners.
- Plug-in owners typically don't live in MUDs (particularly apartments/condominiums) or in rental properties but still 6% of the PHEVs live in apartments/condos as well as 3% of the LEAFs.

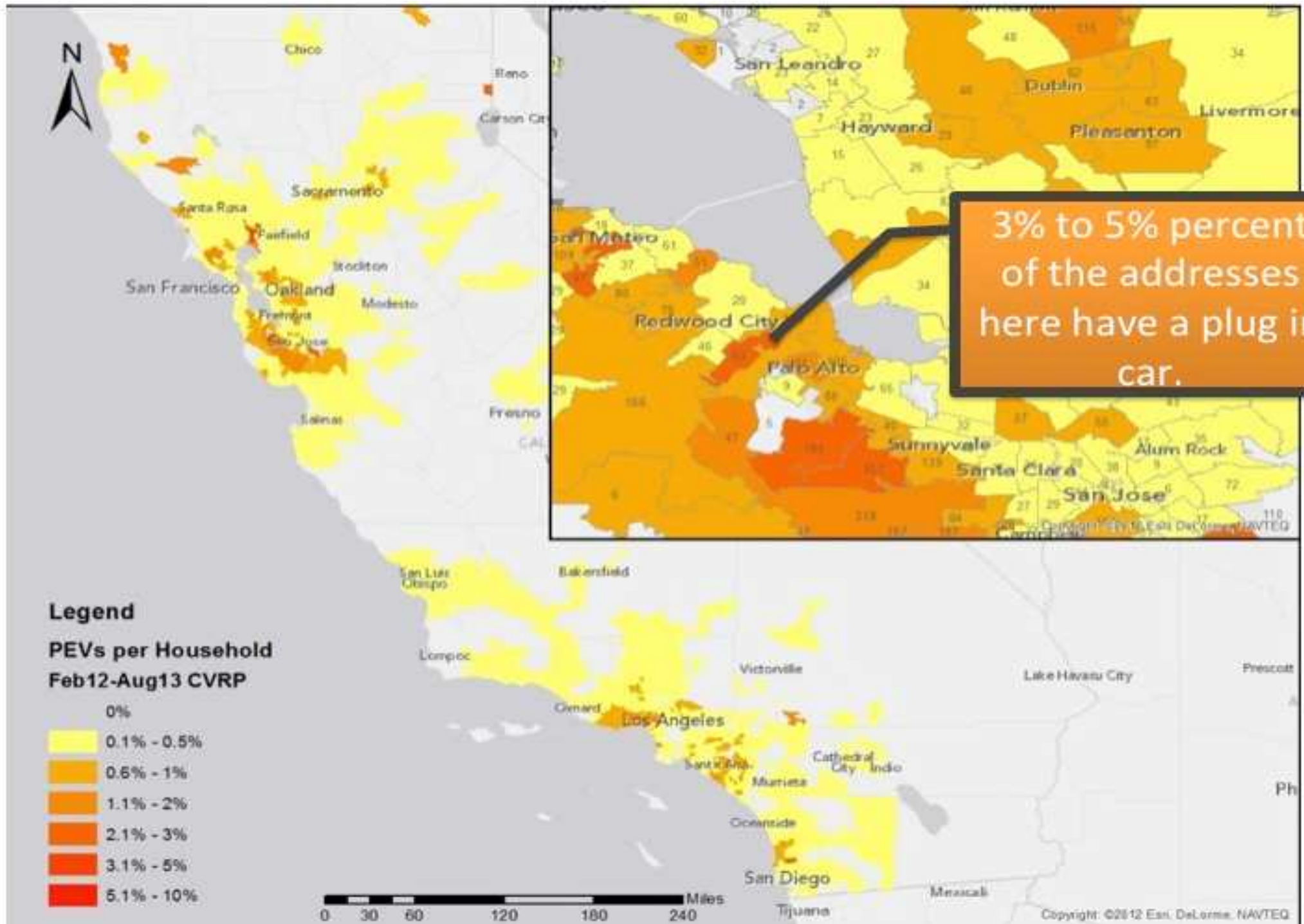
MUDs and rentals considered to be a barrier to PEV adoption because of the difficulty to install EVSEs. The data shows that this problem may be limited for now as most regular car buyers live in owned detached houses. We also believe that in many cases that attached house EVSE installation is not different than detached houses.

We expect MUDs to be a bigger barrier when lower price PEVs will enter the market and used PEV market is more mature.

Many of These PEV Households Had & Keep an HEV

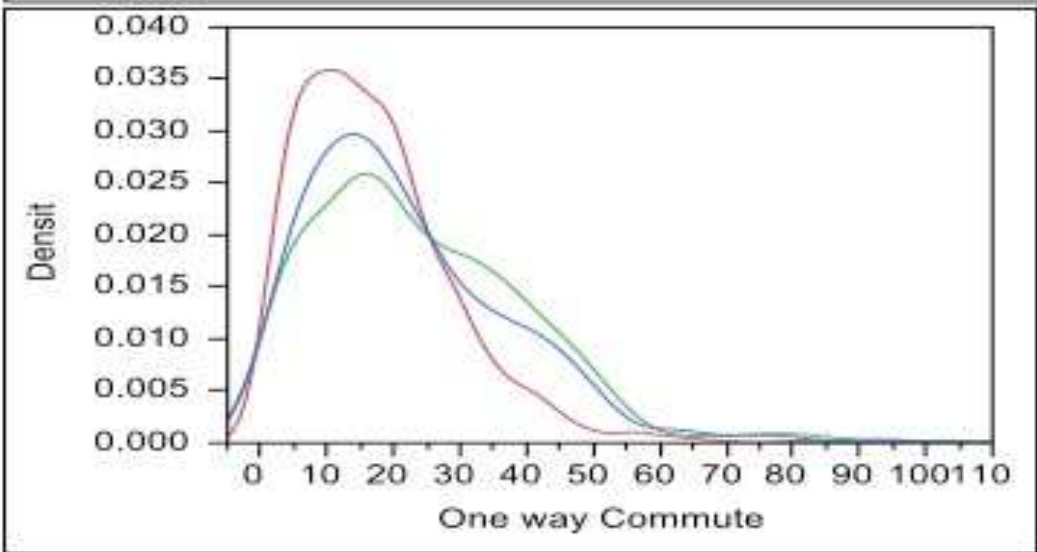
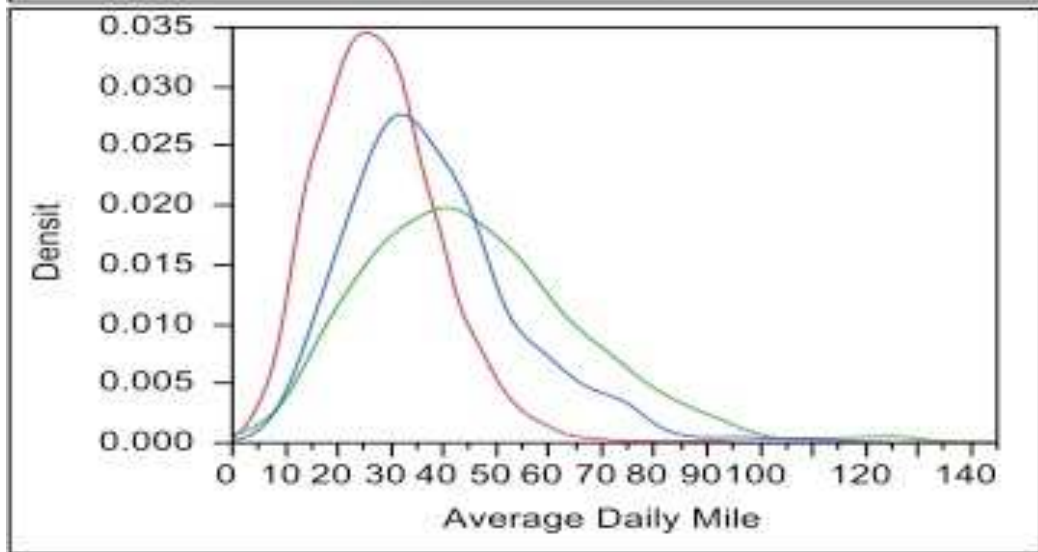
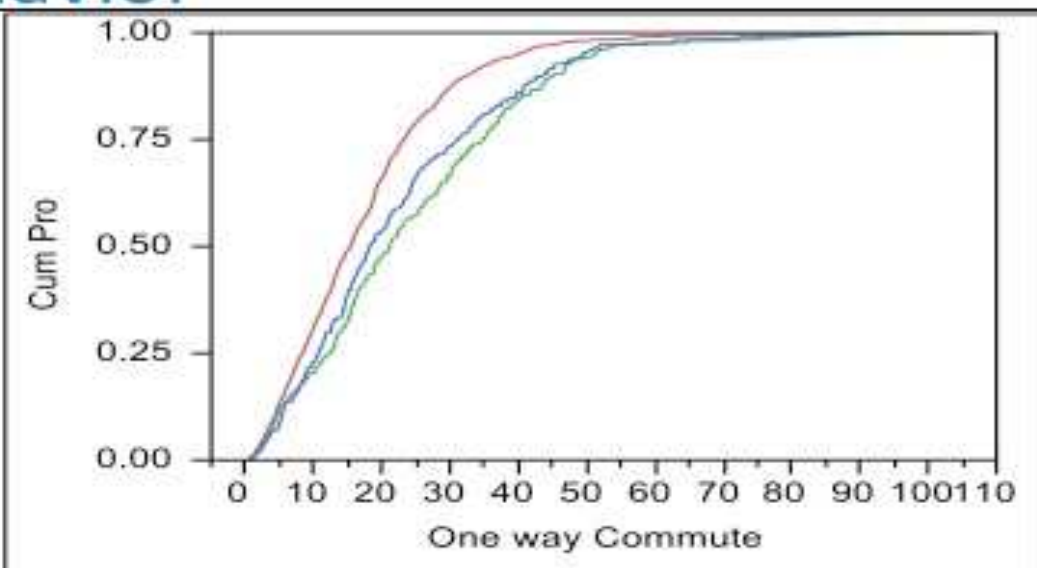
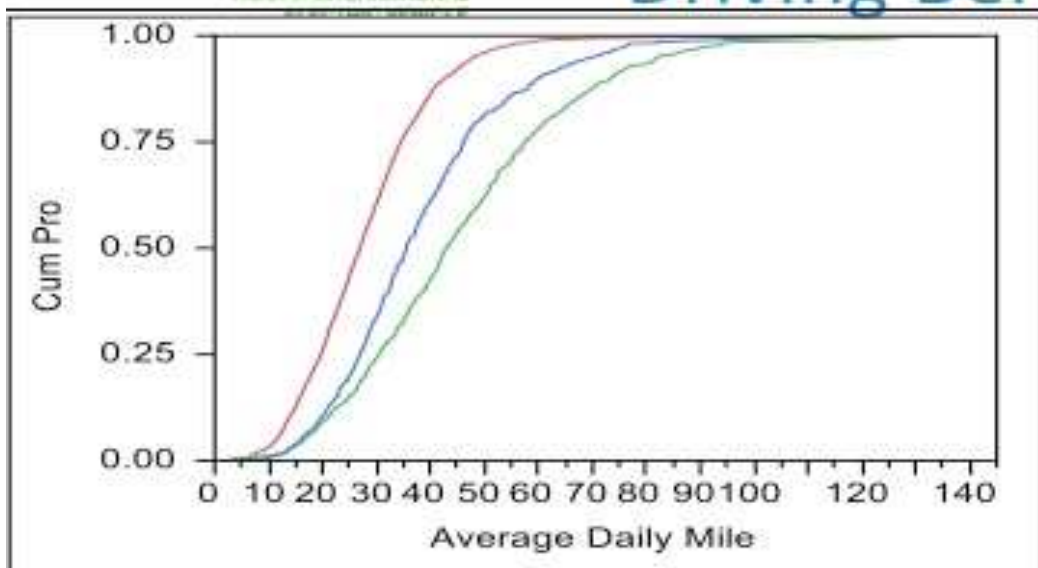
Had Hybrid Have Hybrid Had natural gas veh





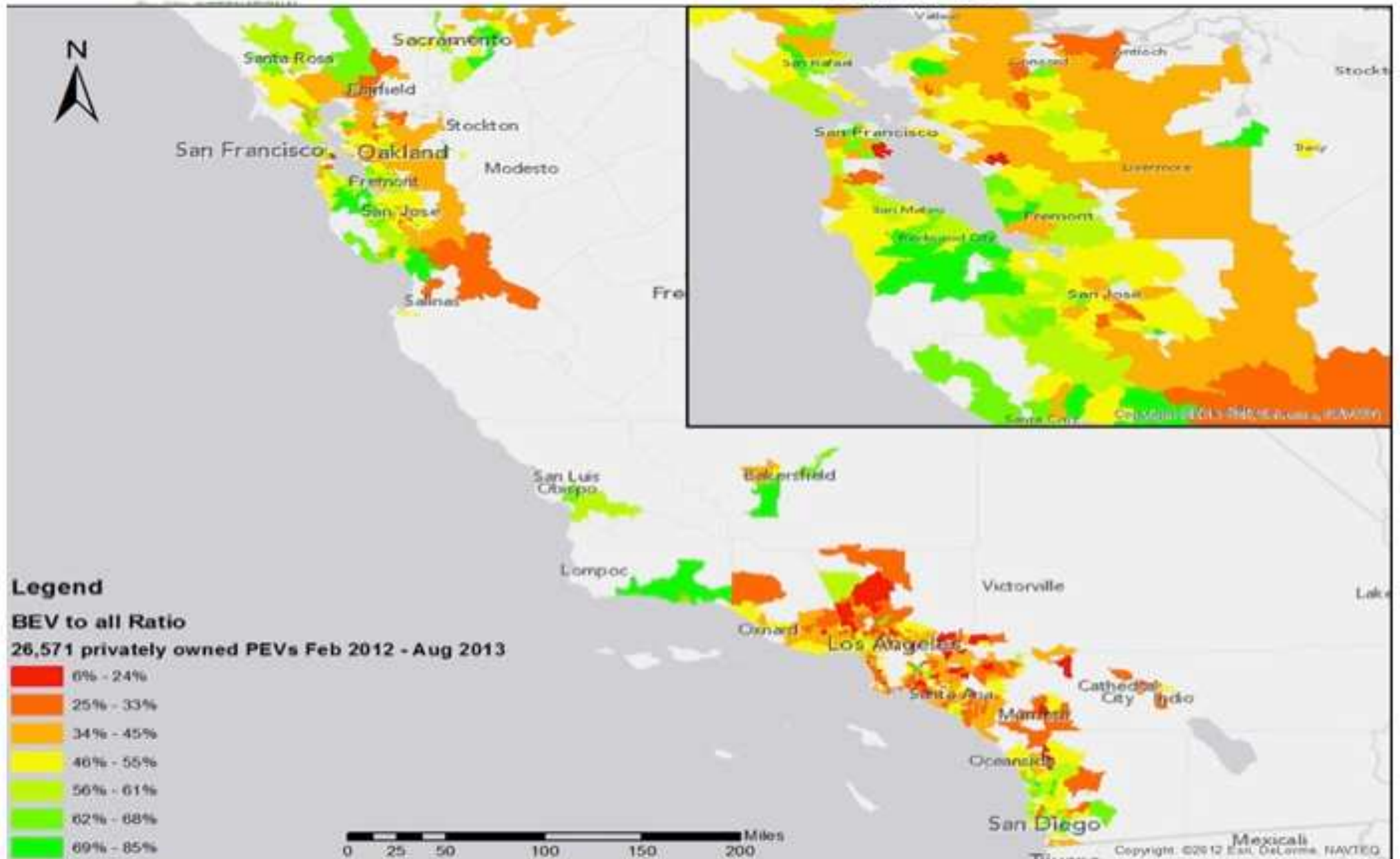
BEVs and PHEVs Have Different Driving Behavior

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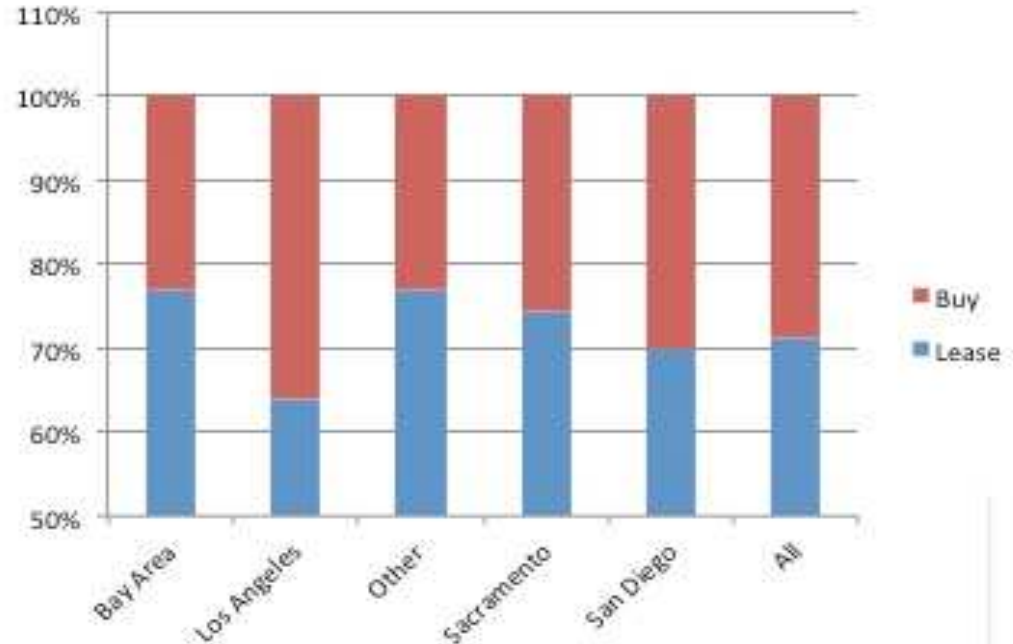
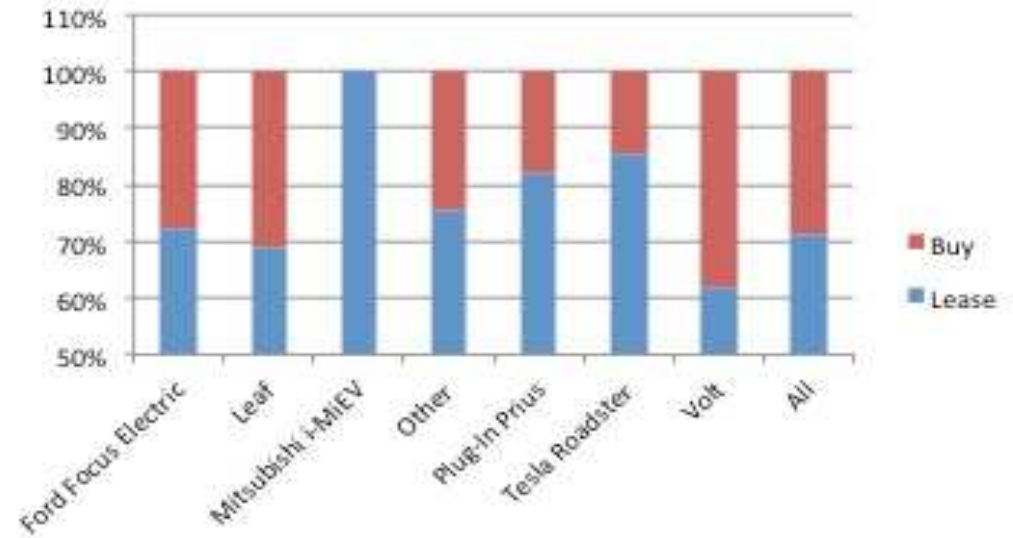
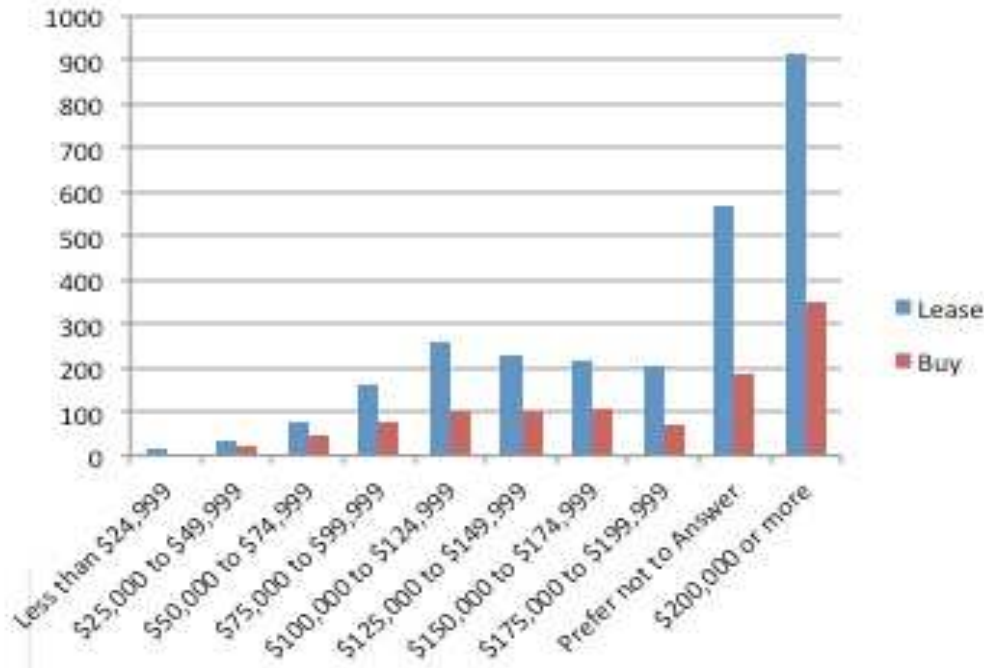
- Leaf
- Plug-In Priu
- Volt

More BEVs in Urban Core While PHEVs in Suburbs



Buy or Lease

- Most PEV household Lease the car maybe because it is a somewhat new and risky technology.
- Lease is used by all income groups.
- Leases may reflect the OEM policy and the consumer preference



Where Can We Find the Next PEV Buyers?

- **Sales of PEVs are strong in particular locations:**
 - High income, high education, homeowners
 - Tech industry,
 - Sales of PHEVs and BEVs in slightly different ratios
- **In these locations, market will grow faster than other areas for many years**
 - And likely repeat buyers with present households
 - Used PEVs will enter the market and broaden it
- **Importance of social processes**
 - Social influence at workplaces, localized social network effects
 - Social symbolic role of PEVs (and EVSEs) as future technology
- **California policy:**
 - Importance of HOV stickers
 - Is public infrastructure (free?) more important to market grow than to eVMT?
 - Adjust CVRP to maximize benefit for a given amount of money

Open Question:

- Can the Californian market (ZEV mandate) create the critical mass of models and sales?

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Thank You Questions?

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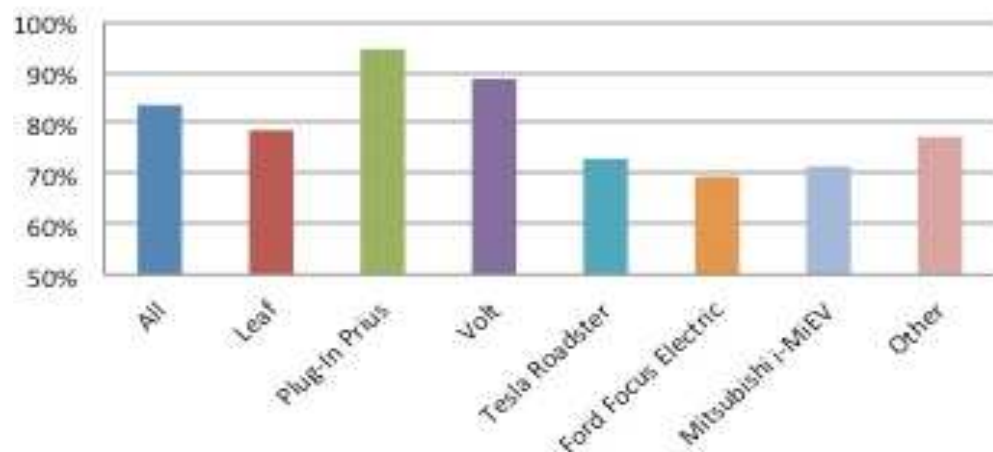
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Share Have Sticker



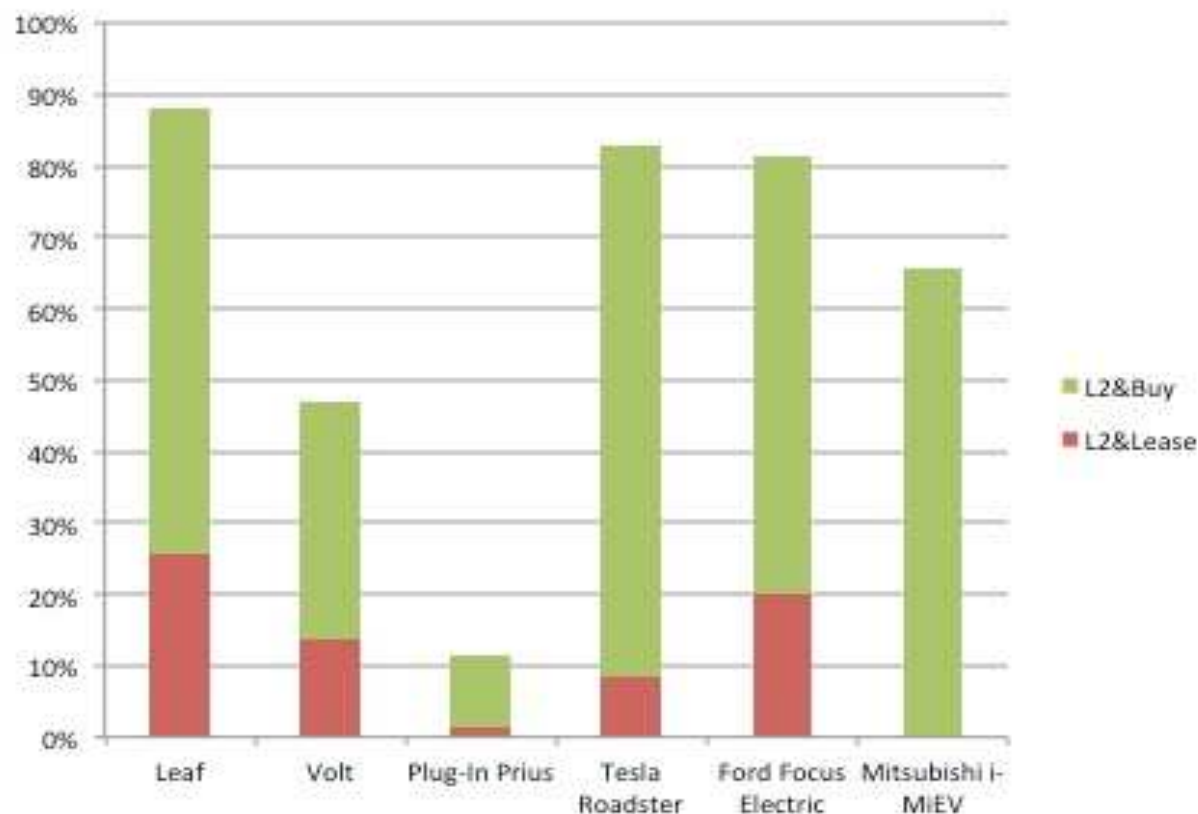
Share Have Sticker



- 3164 out of 3757 in our sample have an HOV sticker.
- PHEVs tend to have more stickers with Prius at 95% and Volt at 89%. The highest BEV, the LEAF, has only 79%
- When testing the impact of the region we see that the Bay area and Los Angeles area have higher share of stickers for all vehicles and also higher share of PHEVs but even when controlling for that we still have a significant impact of the vehicle type.

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Likely Next Car? By EVSE and Buy/ Lease



- EVSE at home is an investment that may lead to continued buying of PEVs the next time
- Next time will be in:
 - 2-3 years for leasers

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