

EXPLORING THE GLOBAL DEMAND FOR PEVS AND THE IMPACT OF POLICIES AND INCENTIVES ON THE MARKET

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UCDAVIS

PLUG-IN HYBRID & ELECTRIC VEHICLE RESEARCH CENTER

of the Institute of Transportation Studies

2017 marks 10 years of the Plug-In Hybrid & Electric Vehicle Research Center



Dr. Tom Turrentine, Director
Dr. Gil Tal, Research Director
Dahlia Garas, Program Director



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PH&EV Center 2018

Researchers

Dr. Tom Turrentine, World Market, supply and demand

Dr. Gil Tal, PEV Markets, Travel Behavior

Dr. Ken Kurani, Consumer Studies

Dr. Alan Jenn, PEV Regulations and Market Models

Dr. Angela Sanguinetti, Energy Feedback Systems

Dr. Chris Nitta, Professor of Computer Science

Postdoctoral Researchers

Dr. Scott Hardman, Global Policy, Consumer adoption

Dr. Jaehyun Lee, GIS and travel data analysis

Dr. Yan Xing, China and PH&EV Centers

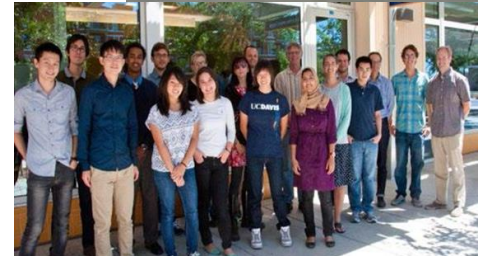
5 Research Staff, programmers, visiting scholars

12 Graduate Students

15 Undergraduate Students

248 publications, 72 in 2017, 14 under review

SAE INTERNATIONAL



2015-18 SUPPORTERS



PH&EV Center Data Collection



24,000 New car Buyers surveys

- 2010-2018
- 12 US states
- Focus groups



27,000 Electric car buyer surveys 2012-2018

- 16 US states, China, Germany
- Used PEV buyers
- Focus groups and Interviews



PEV and ICE on road data collection

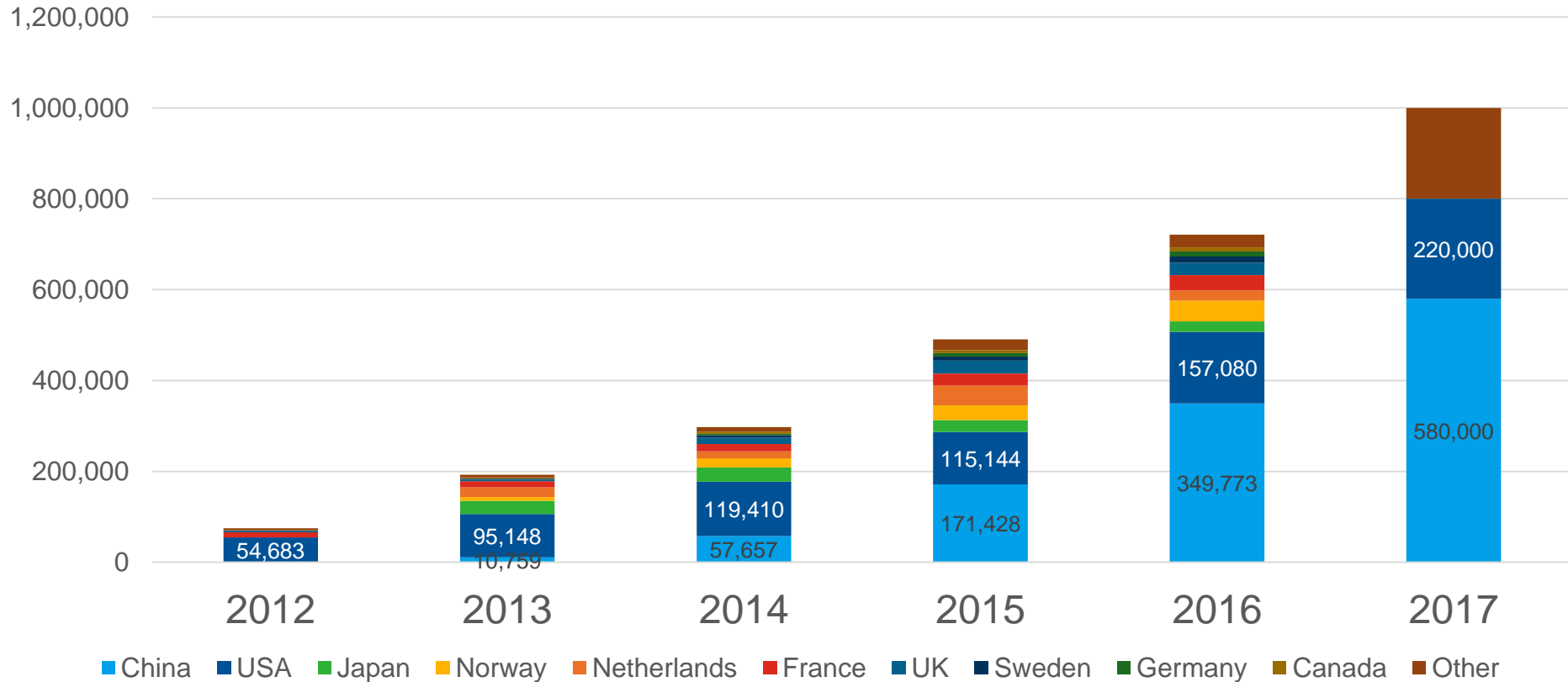
- OBD data 600+ vehicles over a year (28 billion data points)
- GPS data 54,000 vehicles over 2.5 years (4 OEMs)
- 4,000 ICE Vehicles second by second dataset for California



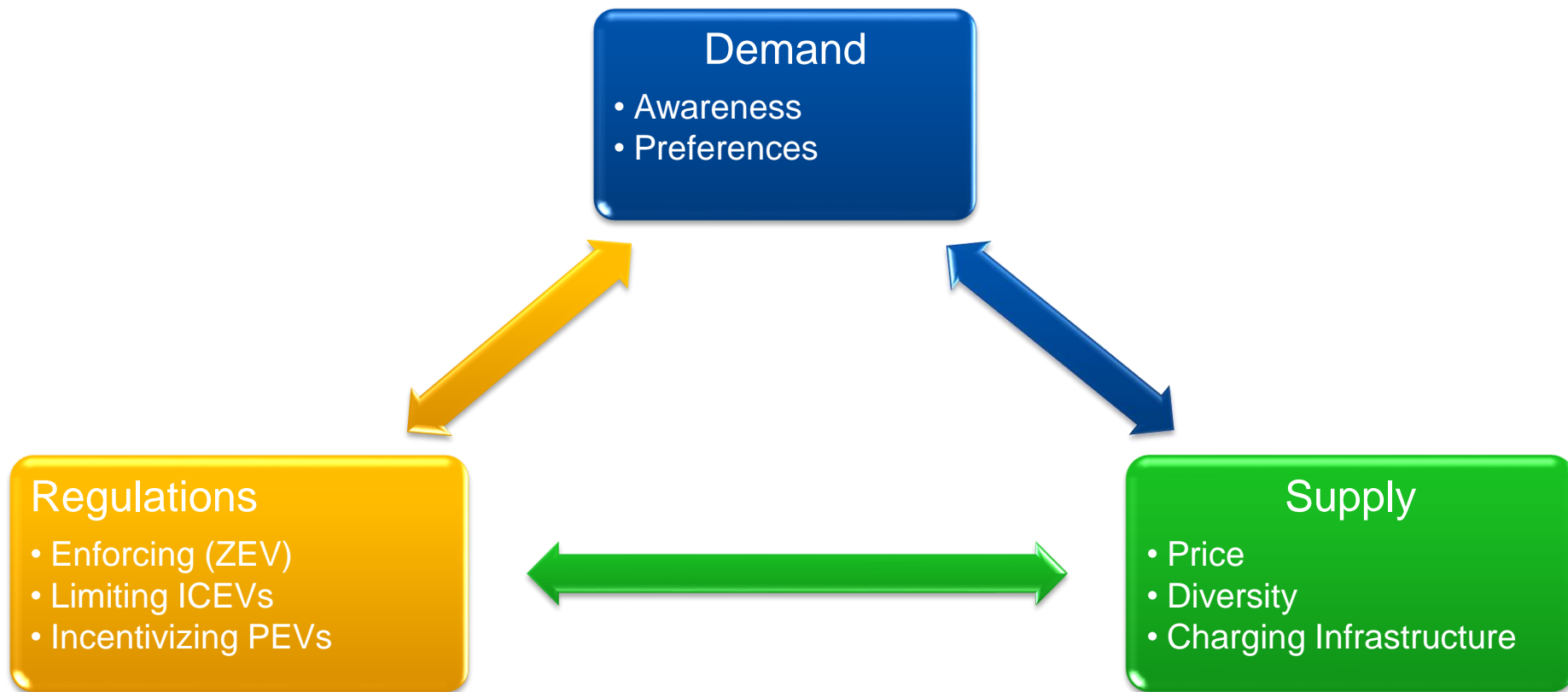
US Infrastructure Charging data 2012-2018

- 9,000,000 Level 2 charging events
- 2,500,000 DC fast charging events (3 main providers)
- Vehicle reported charging events

Global EV Sales 2012-2017

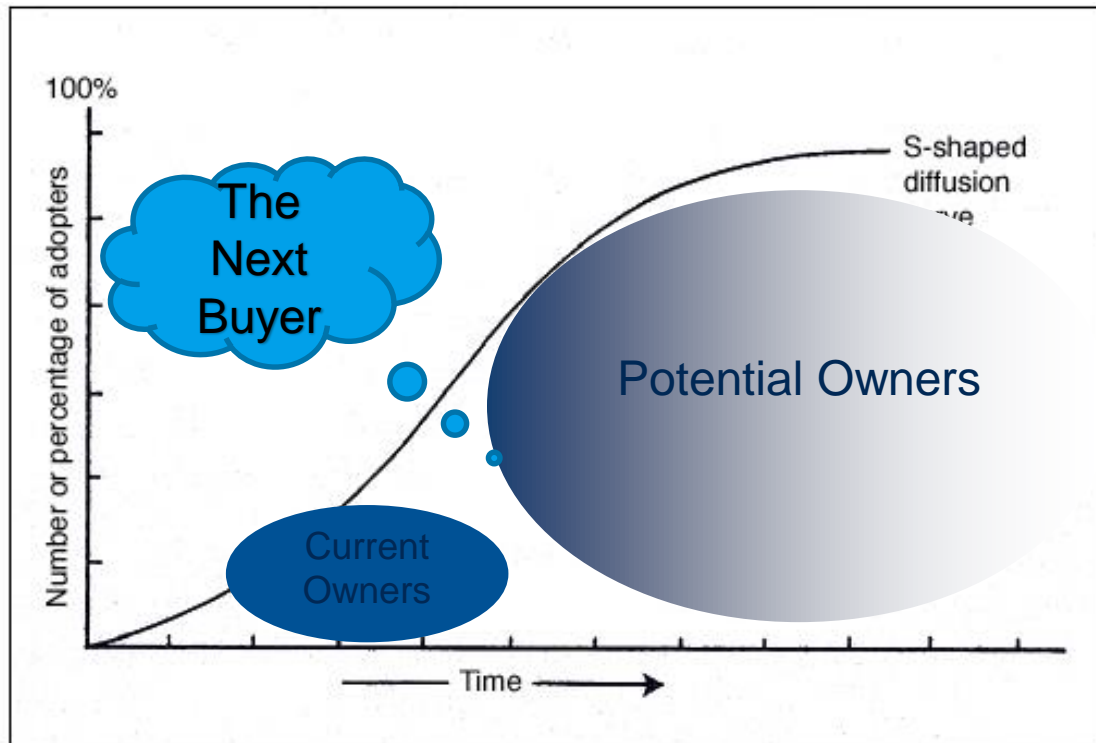
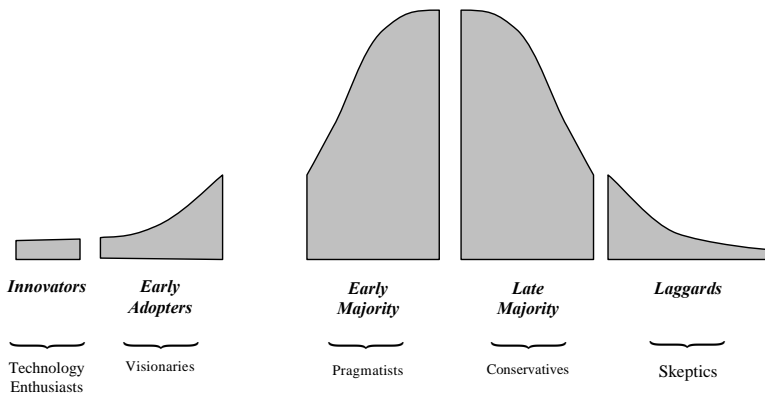


Factors Dominate the Plug In Electric Vehicle Market



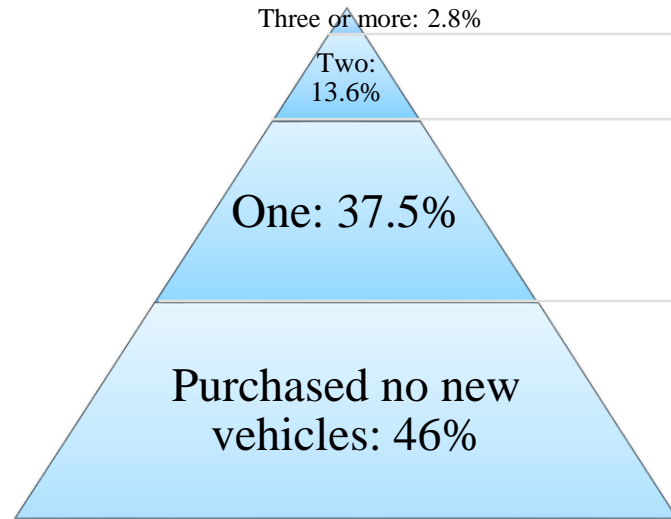
This talk will focus on the Demand: One Conceptual Slide

Diffusion of Innovations

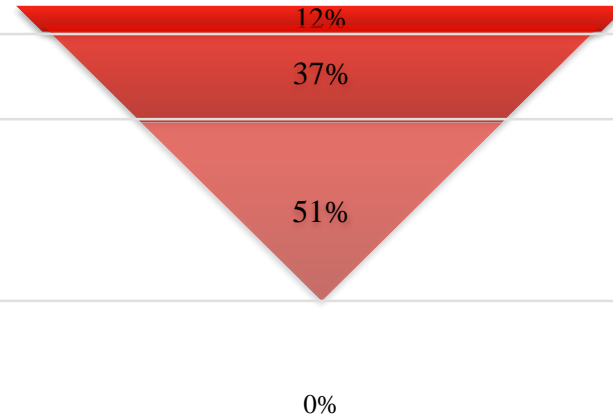


Who Bought New Vehicles in California 2010 to 2017?

Households purchasing 0 to 2+ new vehicles

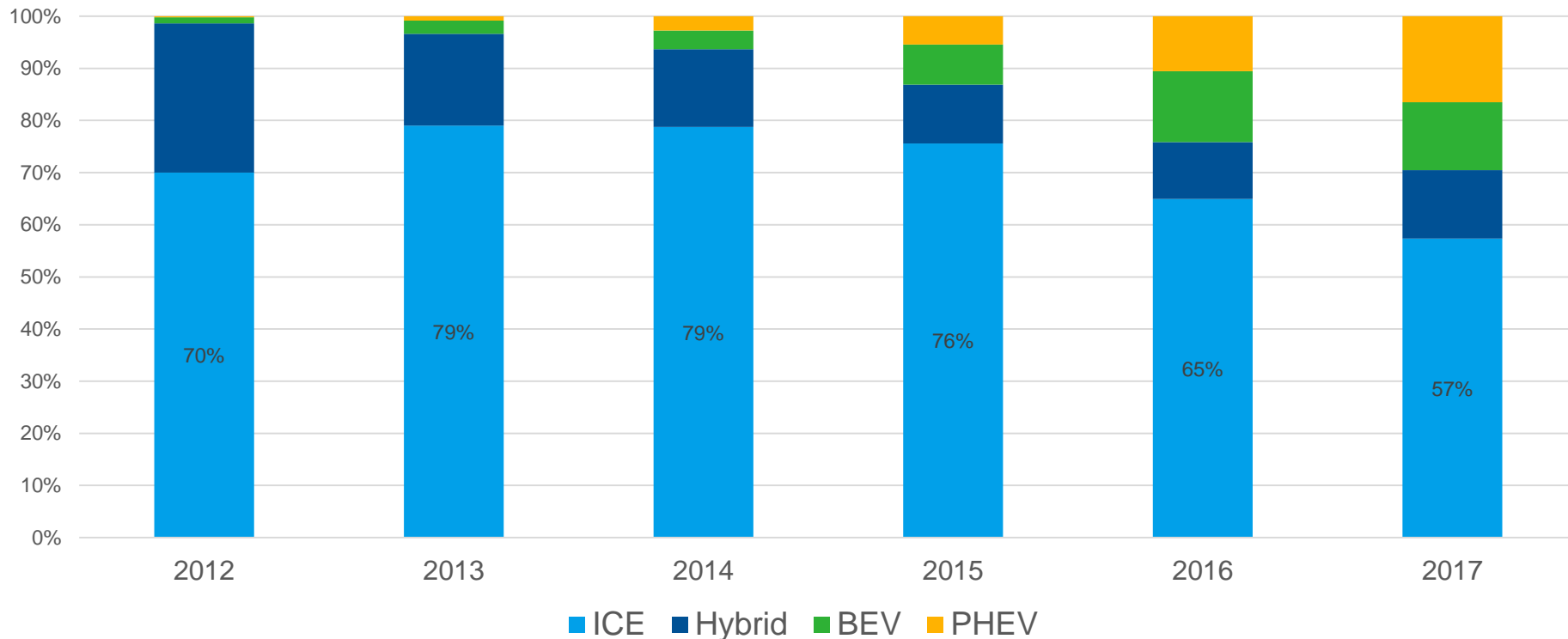


Share of New Vehicles Purchased



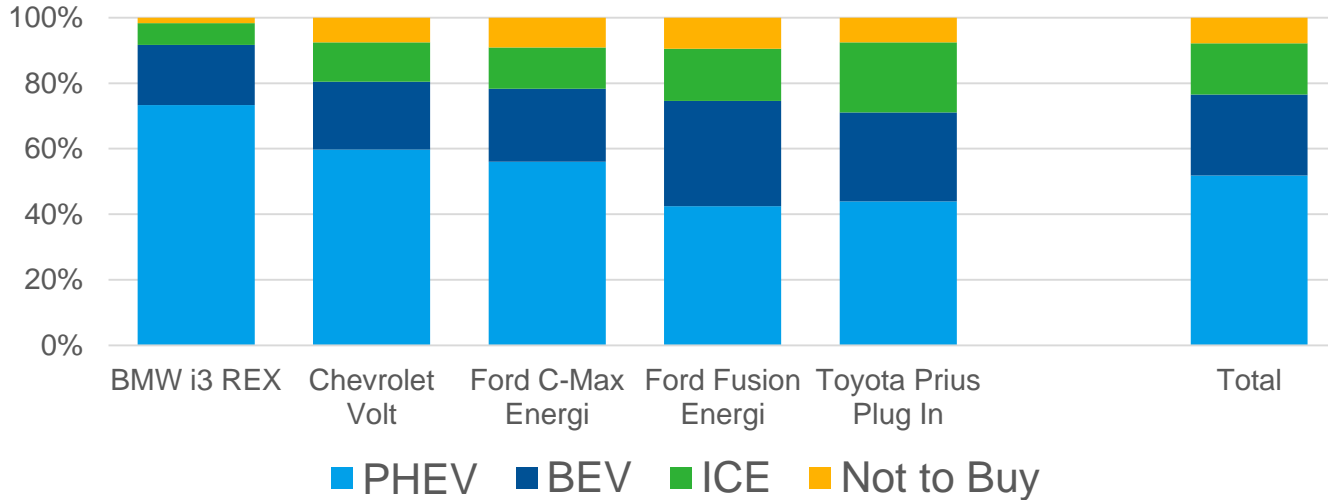
Only two thirds of the new PEV buyers in California 2017 are “Early Adopters”

Vehicle Replaced by PEV between 2012-2017

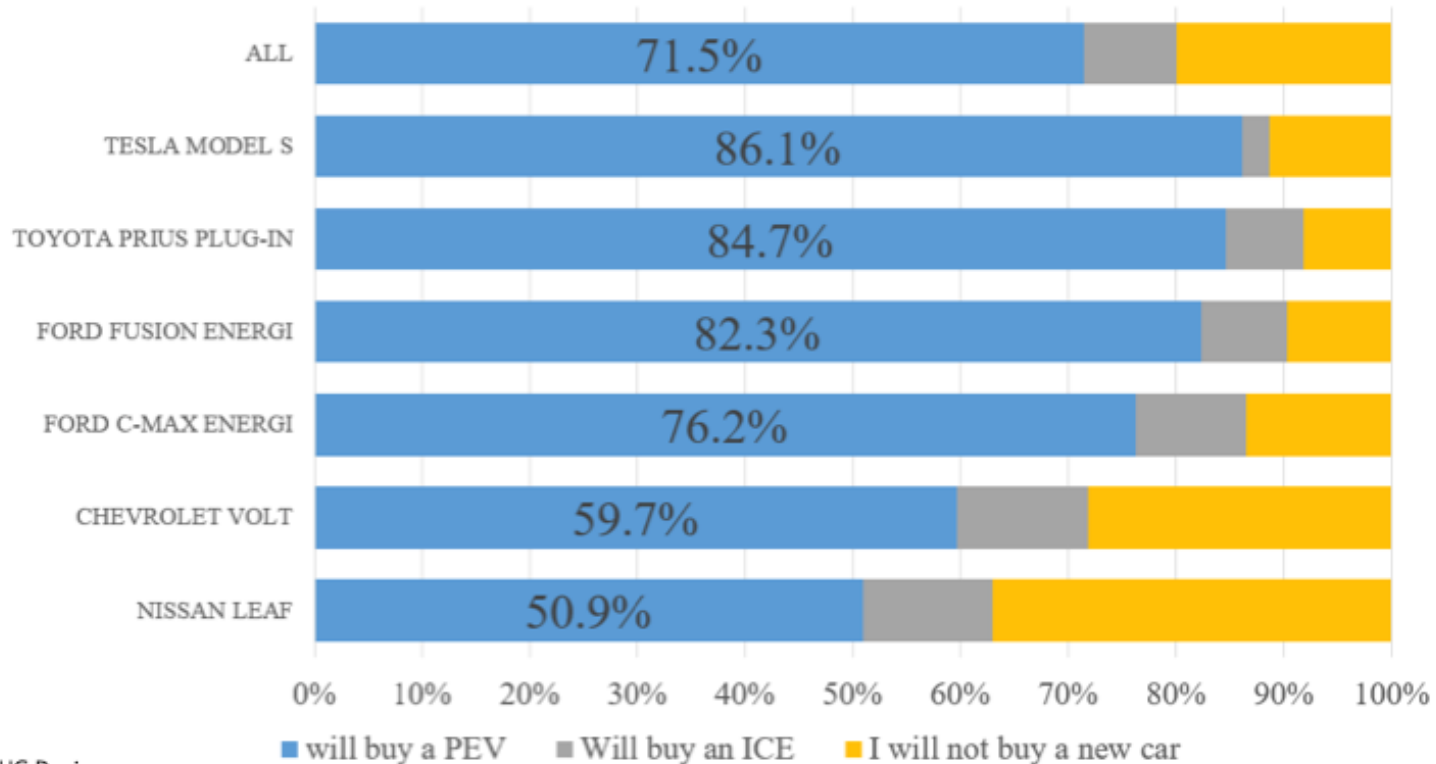


ESTIMATING THE IMPACT OF INCENTIVES ON PEV BUYERS

What Will a PHEV Driver Buy Without the Green Sticker?



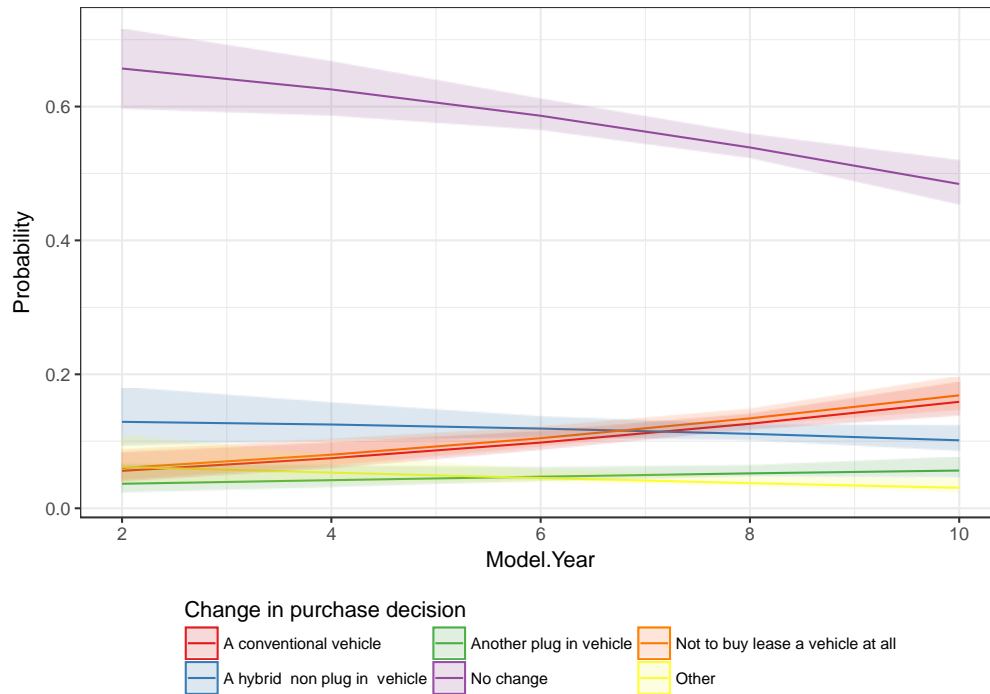
Vehicle Choice Without the Federal Tax Credit (2015)



Incentives Are More Important For New Generation of Buyers

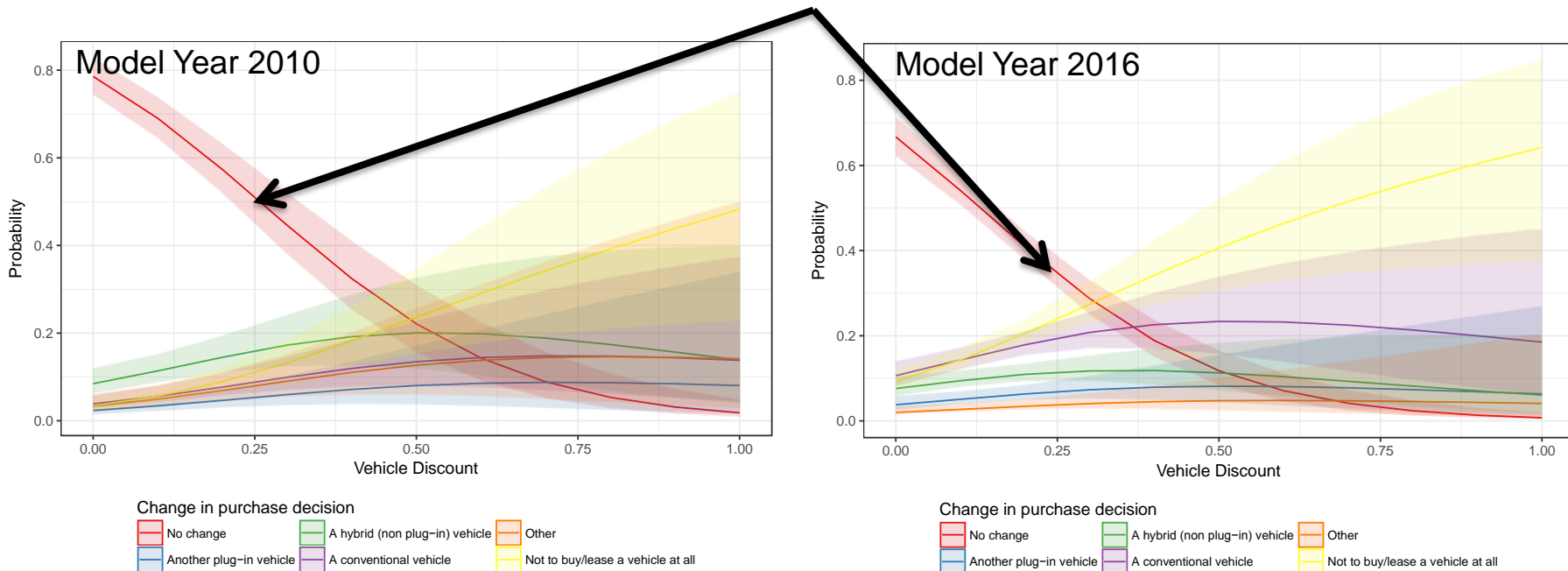
Newer generations of buyers are more likely to change their decision about purchasing a PEV without the federal tax credit

Respondents are increasingly likely to “buy a conventional vehicle” or “not buy/lease a vehicle at all” as time passes



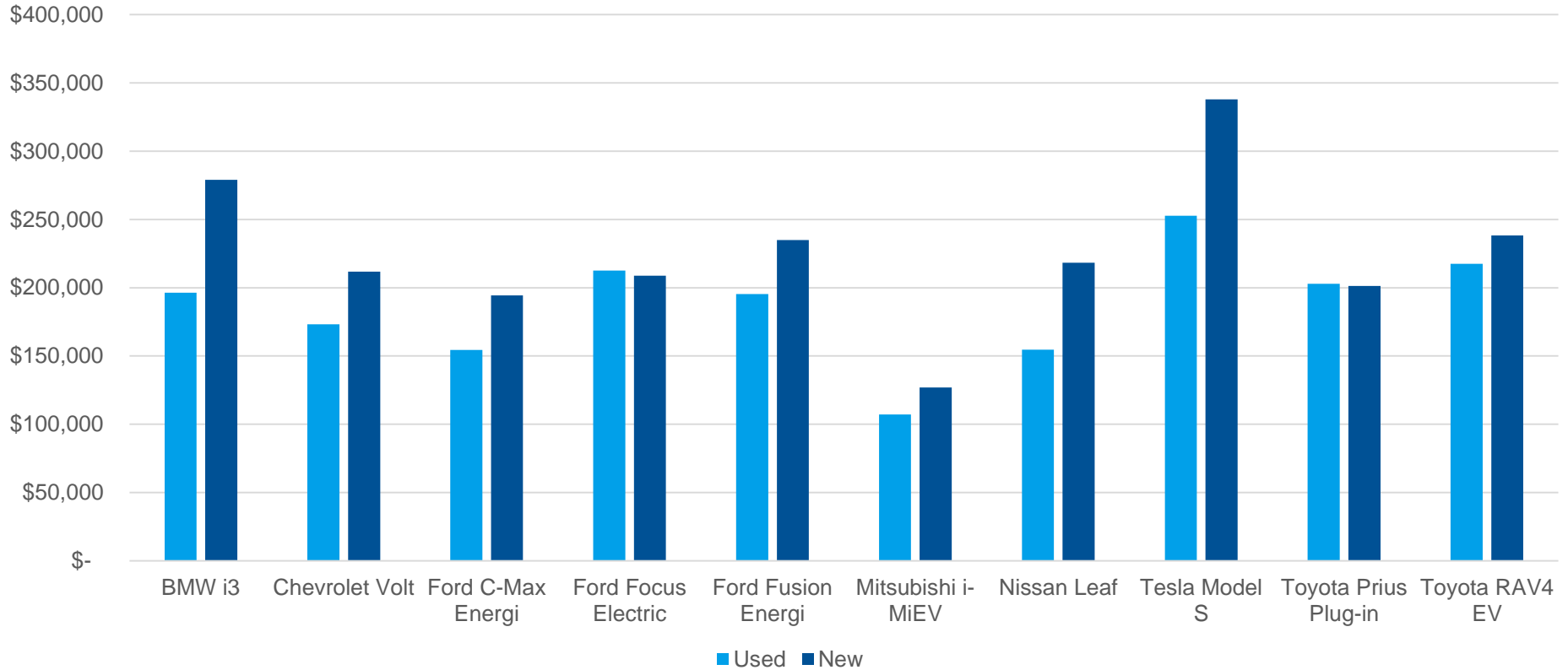
Incentives are becoming more important over time

~25% discount for Leaf/Volt, take the incentive away:
In 2010 50% don't change their minds
In 2016 35% don't change their minds



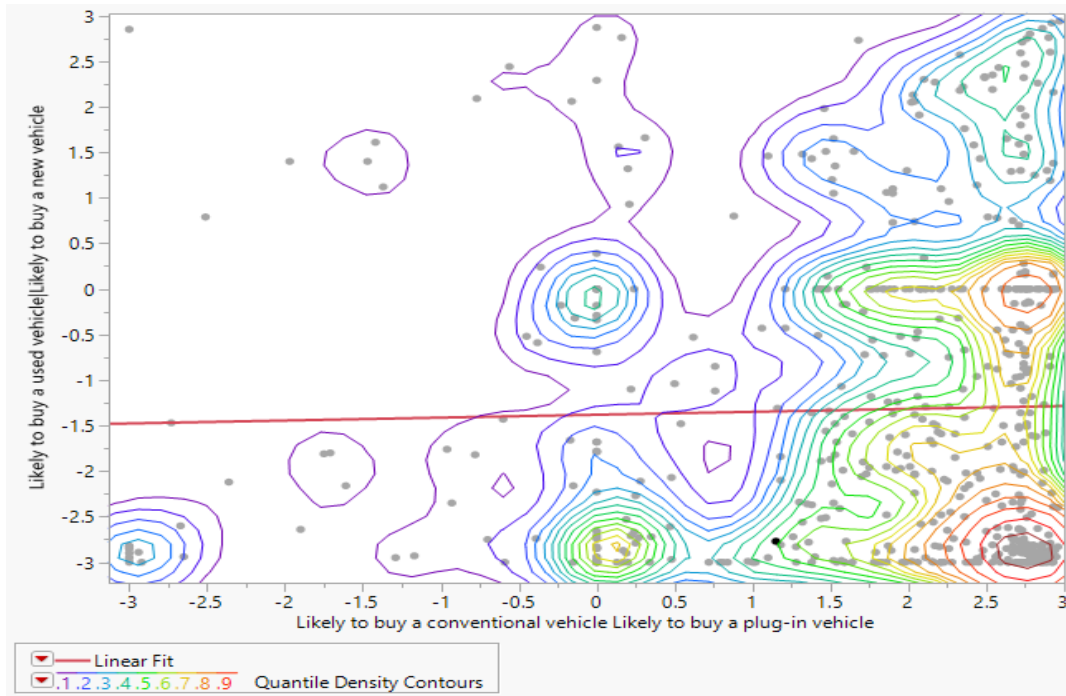
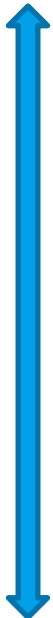
FIRST LOOK AT THE USED PEV BUYERS

Household Income of New and Used Buyers



No Potential Buyers Of ICEs (Used or New) Bought Used PEVs

"Likely to buy a PEV"



"Likely to buy an ICEV"

"Likely to buy used"

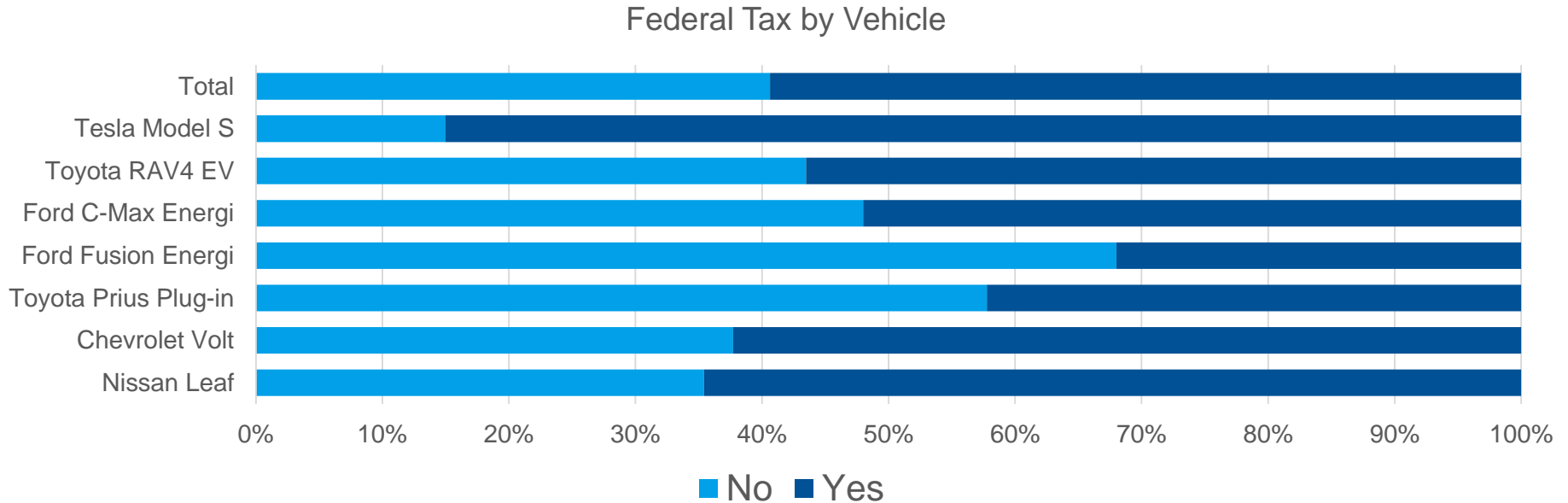


"Likely to buy new"

Used PEV Buyers Have Lower Knowledge Of Opportunities and Incentives Than New Buyers

When buying or leasing a new Nissan LEAF, or a similar new plug-in car you may (or may not) be eligible for different incentives that may reduce the price of the new vehicle in your area.

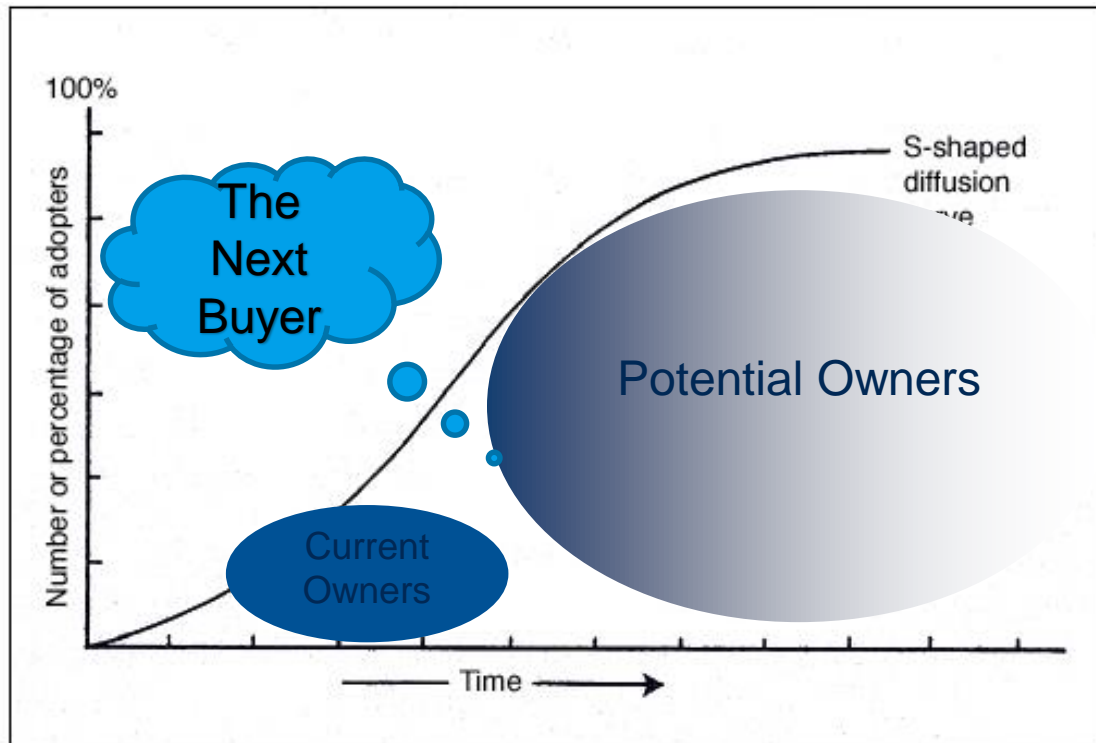
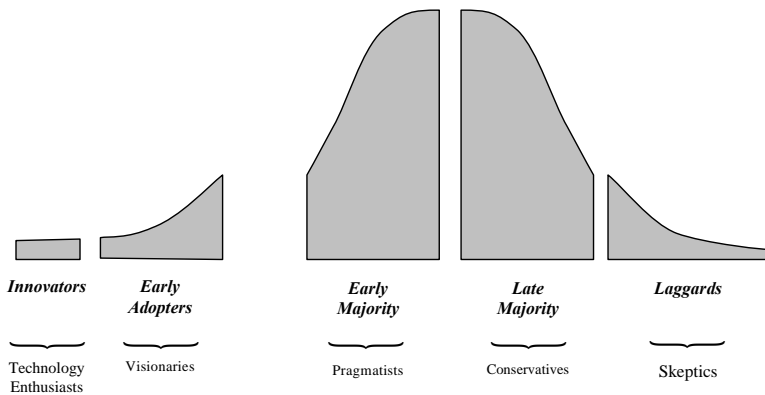
When buying your vehicle were you aware of the "Federal Tax Credit"



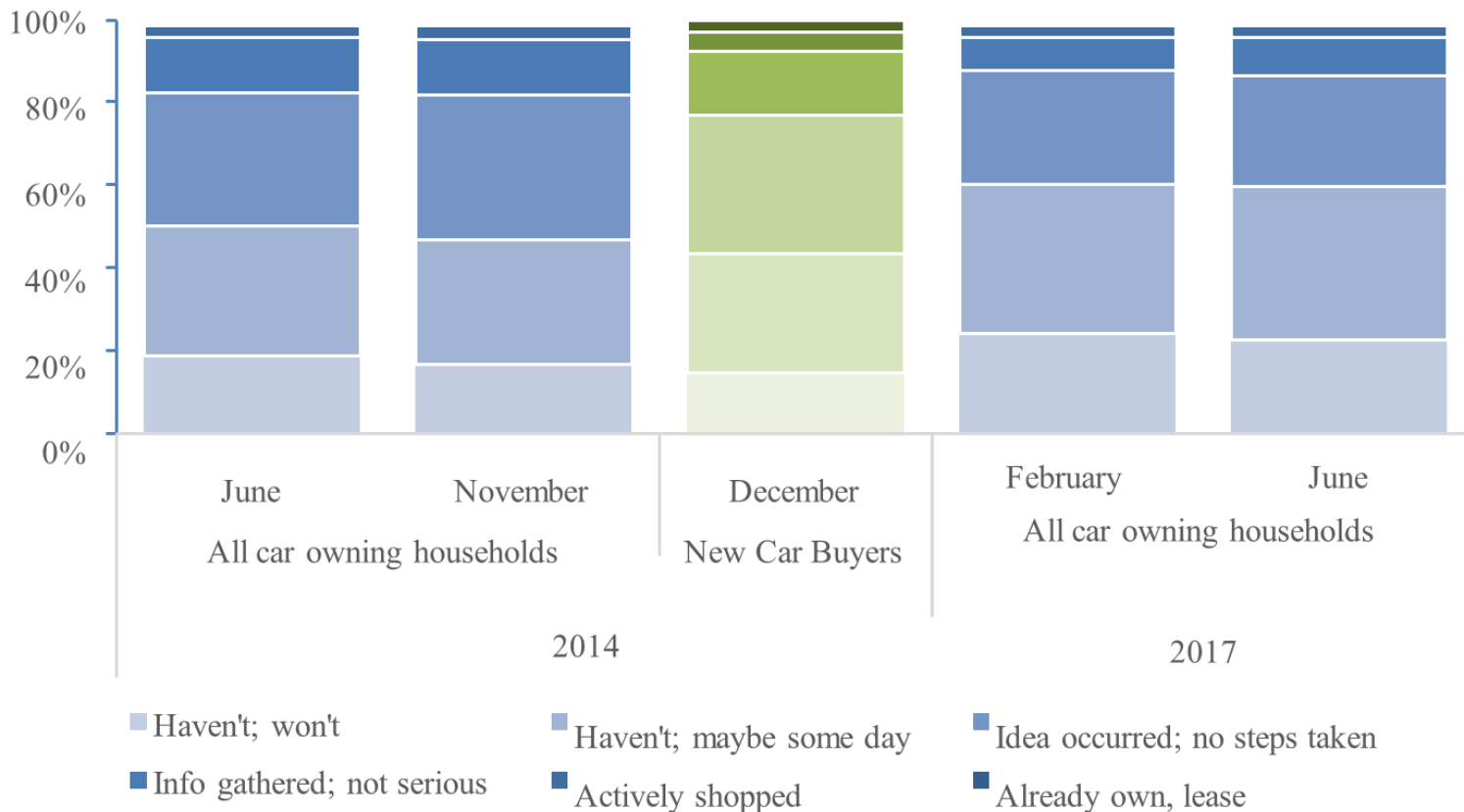
Exploring the “Next Generation Adopters” Perspectives

This talk will focus on the Demand: One Conceptual Slide

Diffusion of Innovations

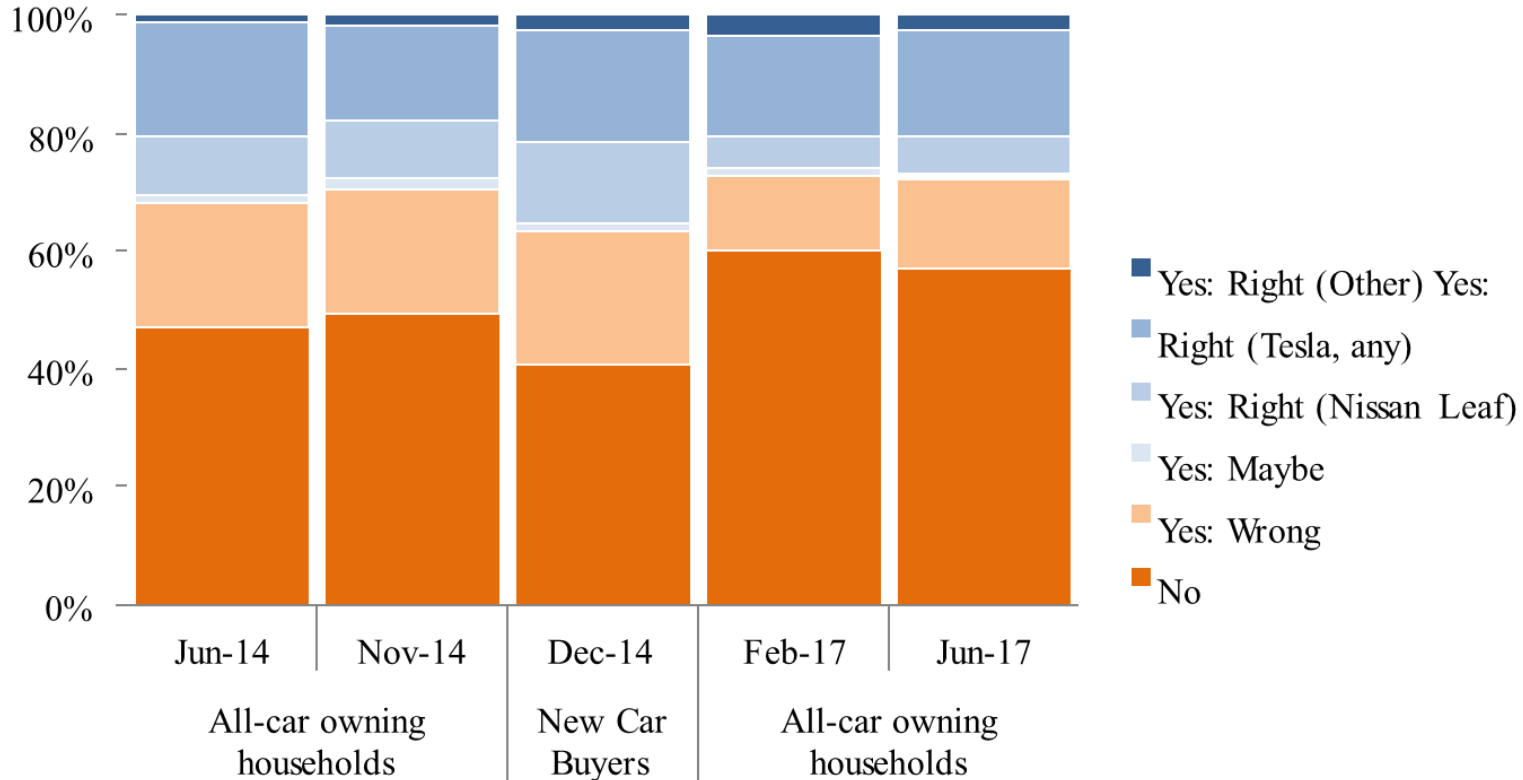


How many of the ICEV Buyers Considered PEVs?



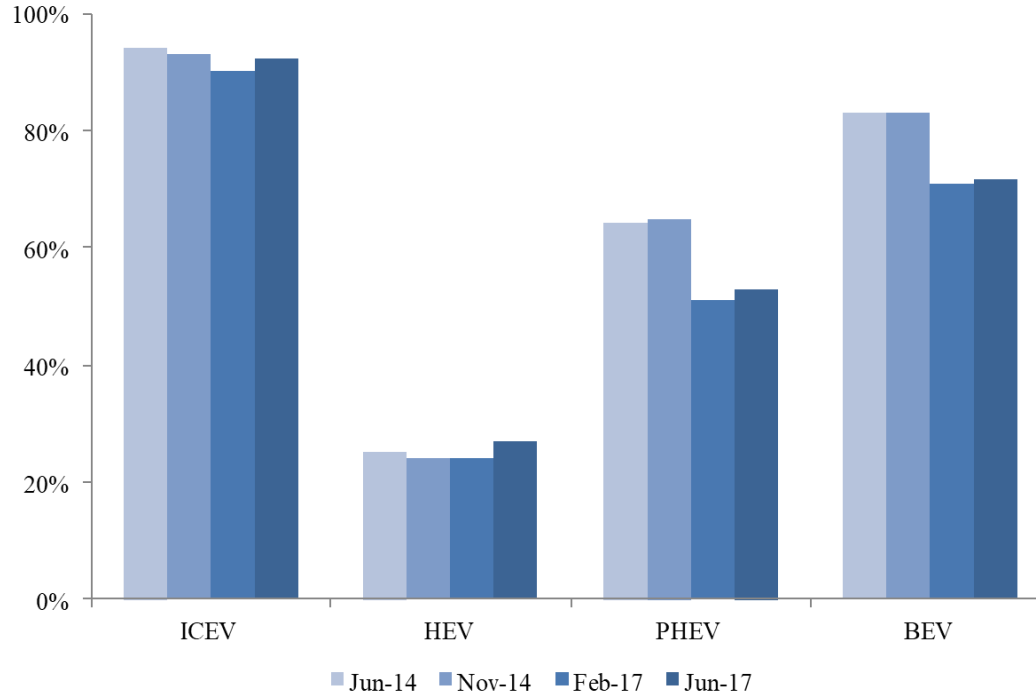
Do They Have the Knowledge to Consider a PEV?

“Can you name a BEV that is being sold in the US?”



Do They Have the Knowledge to Consider a PEV?

“From what you understand, which of these vehicles are fueled with gasoline and which are plugged in to charge with electricity?” Percent correct.



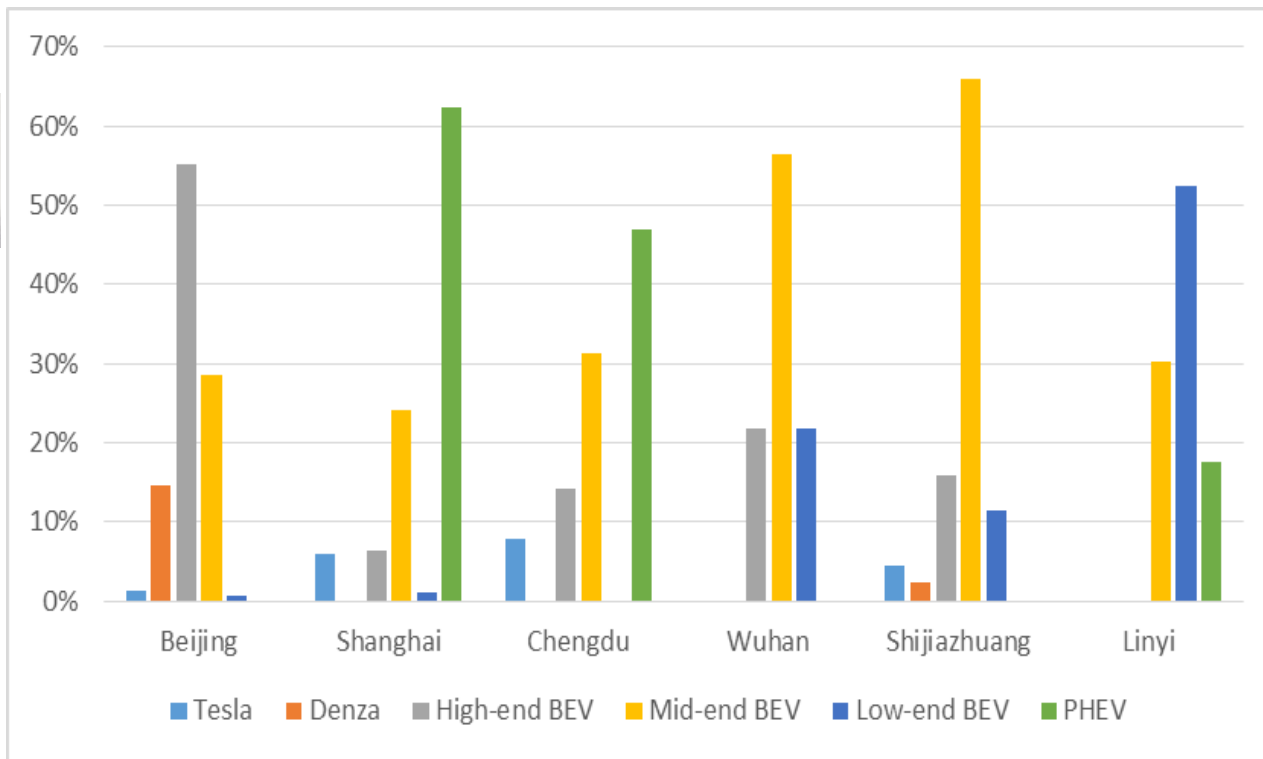
China

- Based on the research of UCD, Tsinghua University and ERI's estimation, China's total vehicle population could grow to 400-600 million by 2050.
- 2017 sales 28-30 millions about 25% of the global market
- 580,000 PEVs

Diverse Market at the first second and third tier cities: Different mobility needs, Policies and Purchase Motivations

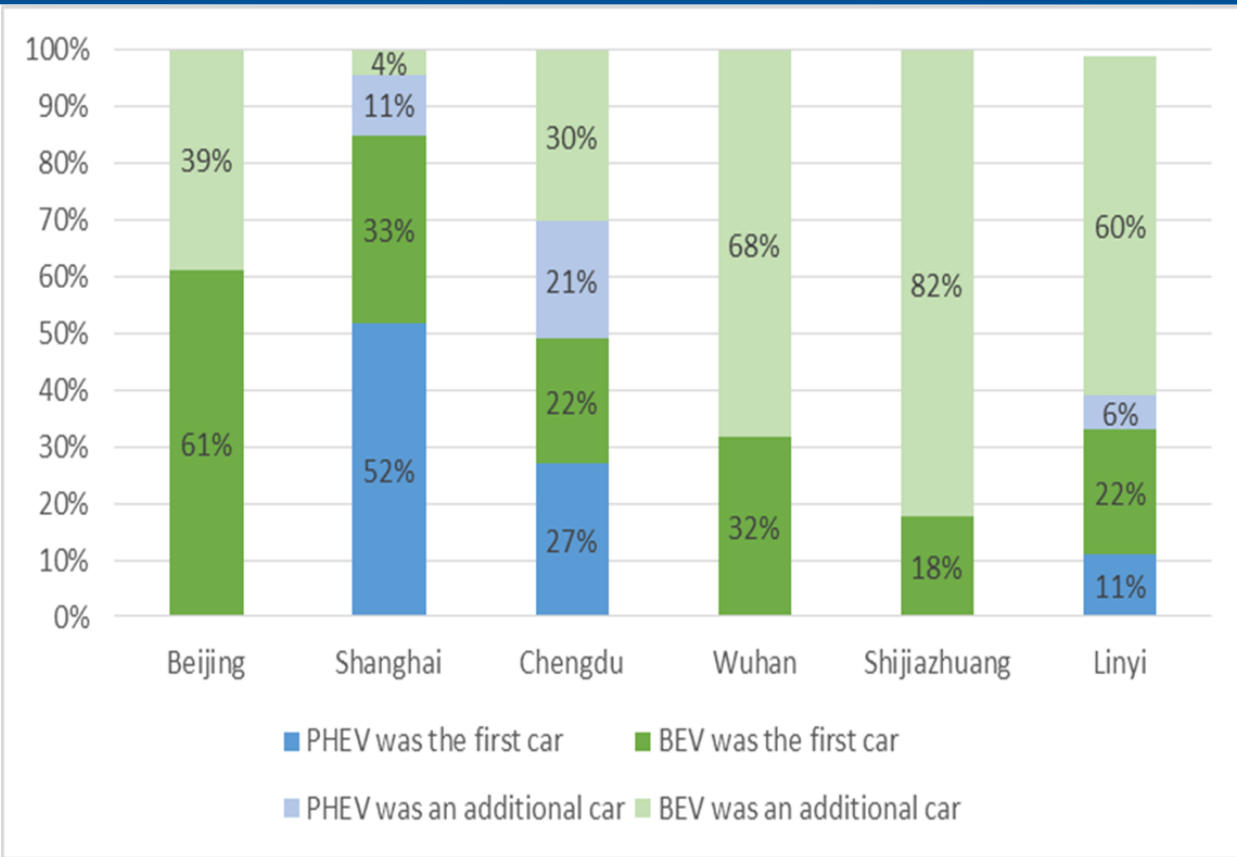


\$100,000
High-end
BEVs

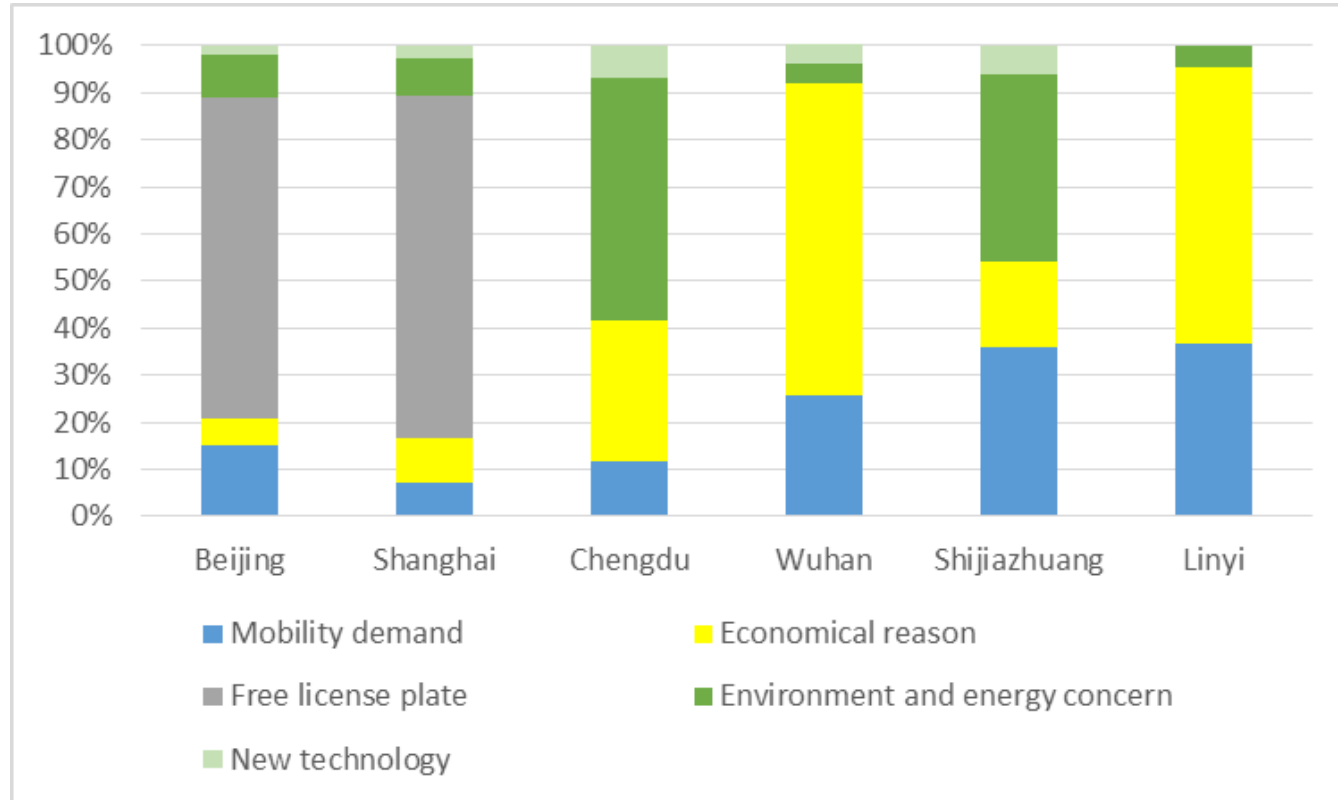


\$6,000
Low
speed
BEVs

PEV Buyers purchasing their first or second car (China)



Motivation of PEV Purchase By City



Take-away Messages

- **Majority of consumers are unaware of and unengaged with EVs**
 - They may know what it is but are not motivated enough to gather the knowledge needed to decide if it's a good choice for their needs.
- **Households who buy many new cars are important for market growth**
 - 30% of the PEVs sold in California in 2017 purchased or leased by second time buyers.
- **Current used PEV market is based on highly motivated early adopter**
 - With most likely less knowledge than new car buyers
 - Higher risk factor
 - Low/No incentives
- **Monetary and non-Monetary incentives are very important for growing the market**
 - The relative impotence of monetary incentives is growing over time.
 - Non-Monetary incentives in California and China have strong impact on total sales and technology choice (BEV/PHEV)

Thank You!

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