



## Sustainable Transportation Energy Pathways (STEPS)

# STEPS/PH&EV study on PEV global projections

Dec 10, 2015

Lew Fulton, Gil Tal, Aria Berliner, Tom Turrentine

# The potential for low-carbon vehicles around the world

- Lew Fulton, Gil Tal, Aria Berliner, Tom Turrentine
- This project is developing a new approach to projecting PEV vehicle market penetration around the world, and create a low and high scenario for PEV sales through 2030
- We will also work with the IEA to estimate overall energy use/GHG impacts of these PEV scenarios
- Draft report by early 2016

## Our idea...

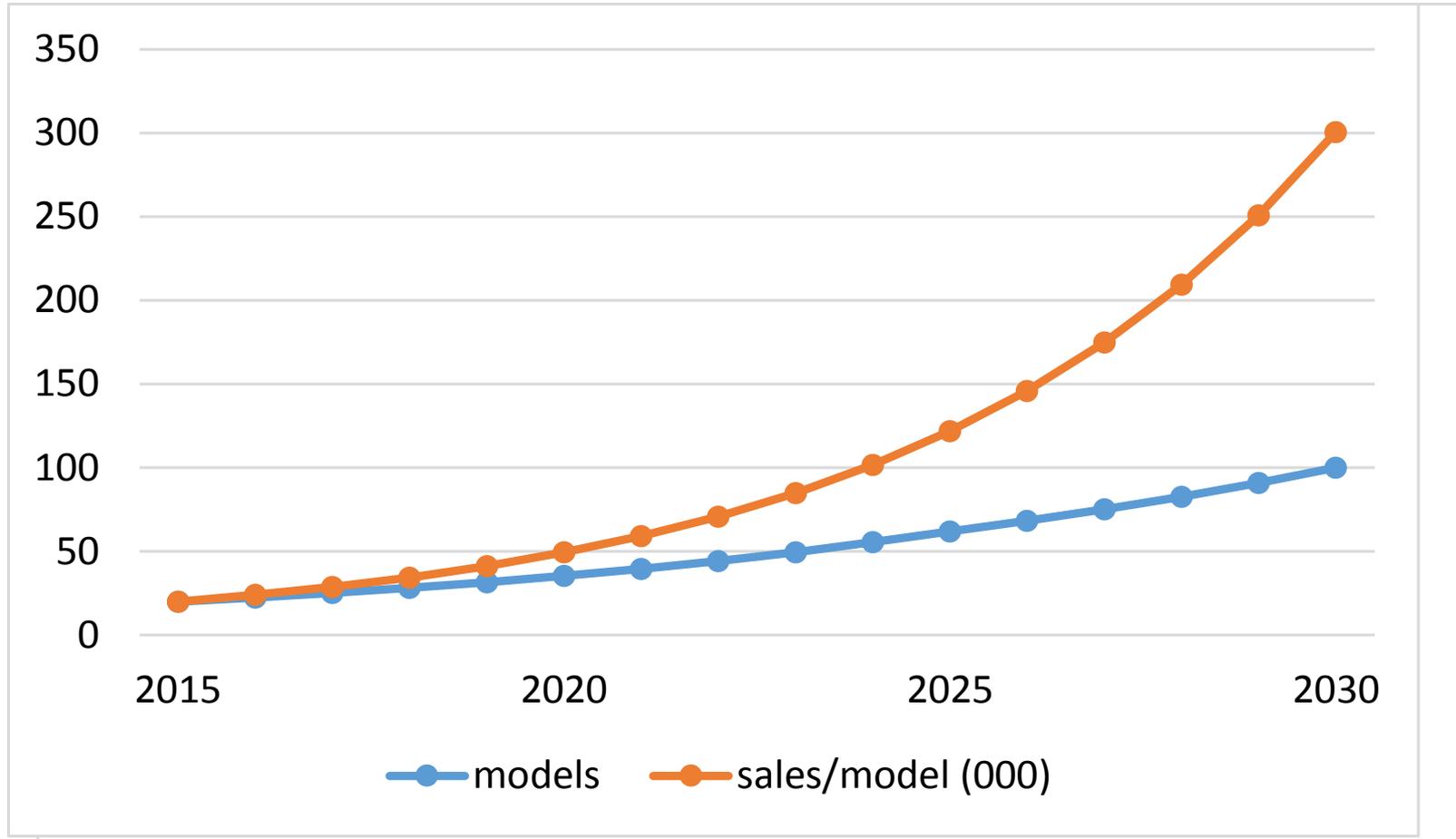
- Is not to “predict” or “forecast” the sales of PEVs, but explore what factors may matter in determining the trajectory, such as:
  - Consumer awareness, interest in different countries
  - Rate of new model appearance; manufacturer investments in new models/facilities and production ramp-up rates
  - The size and nature of different market segments in different countries, where PEVs are likely to appear, and how this may evolve
  - Diffusion rates of models across countries
  - Policy overlays – the PEV-relevant policies in major markets and their impacts on market development
- We are developing a model to combine these concepts into a quantitative framework that allows us to project PEV sales to 2030, using a scenario approach

# COP Announcement – Paris Declaration on E-mobility

- Released at COP 21, December 5 2015
- Signed by UN Agencies, IEA and many governments
- Commits to “more than 100 million electric-driven cars” on the worlds roads by 2030 as part of achieving a 2-degree target.
- IEA roughly estimates that electric vehicle sales will need to be 25% (~30 million) world wide in 2030 to achieve this target.
- Is this possible? Plausible? What would be needed to achieve such a target?

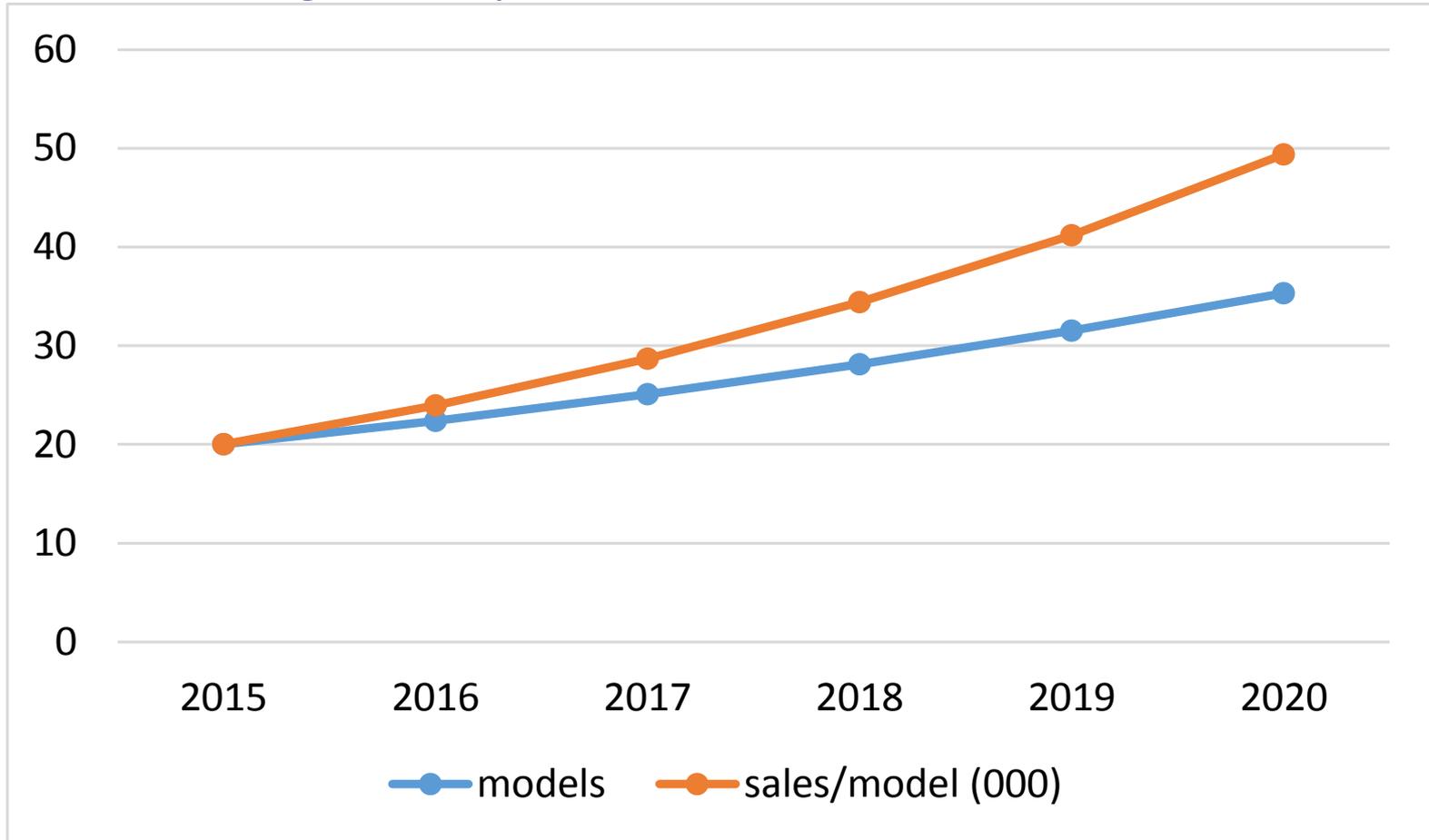
# What does achieving the Paris Declaration targets look like?

- One possible way: 100 models selling 300k/yr each in 2030



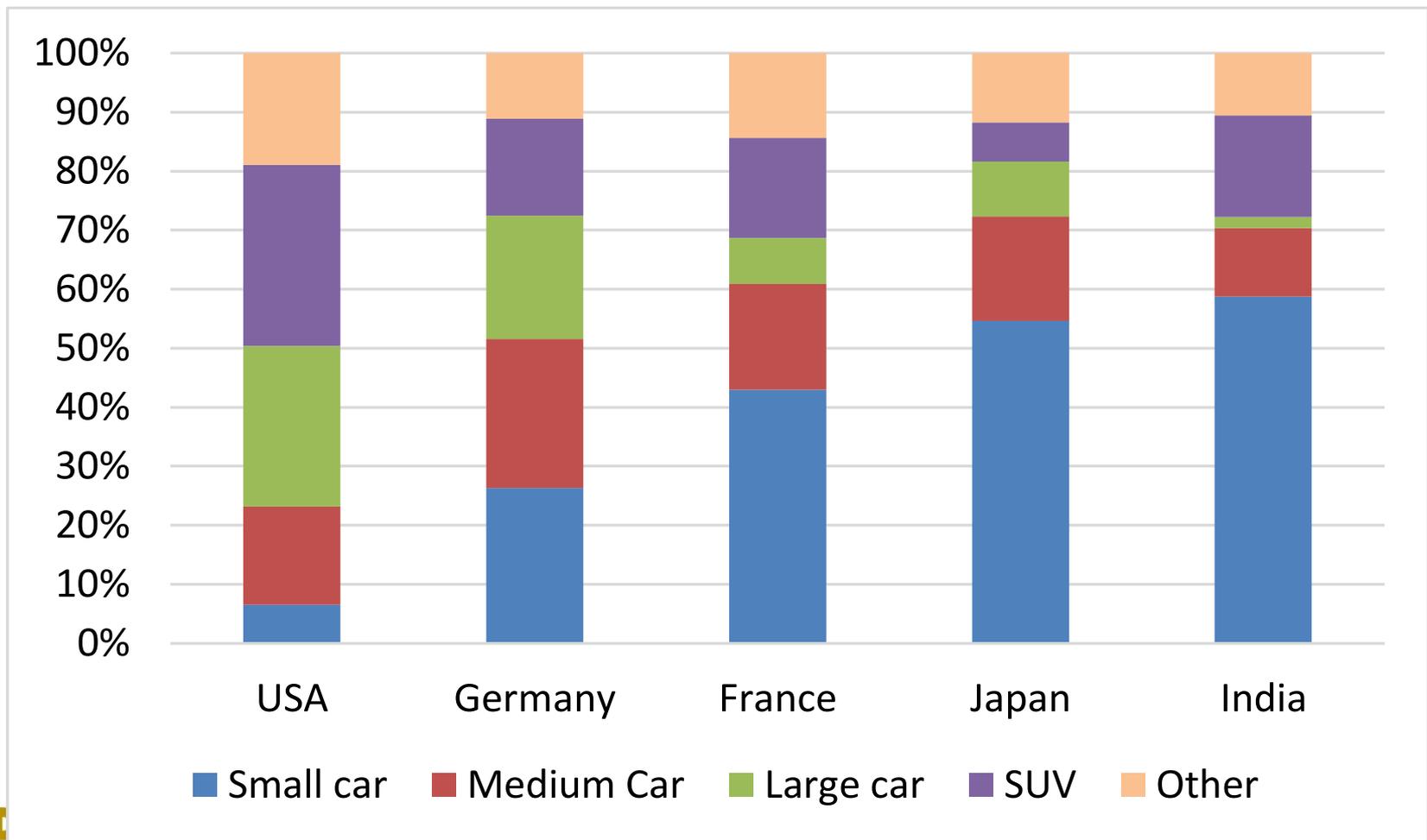
## Zooming in to the next 5 years...

- About 3 new models per year, and 6000 units increase in world average each year

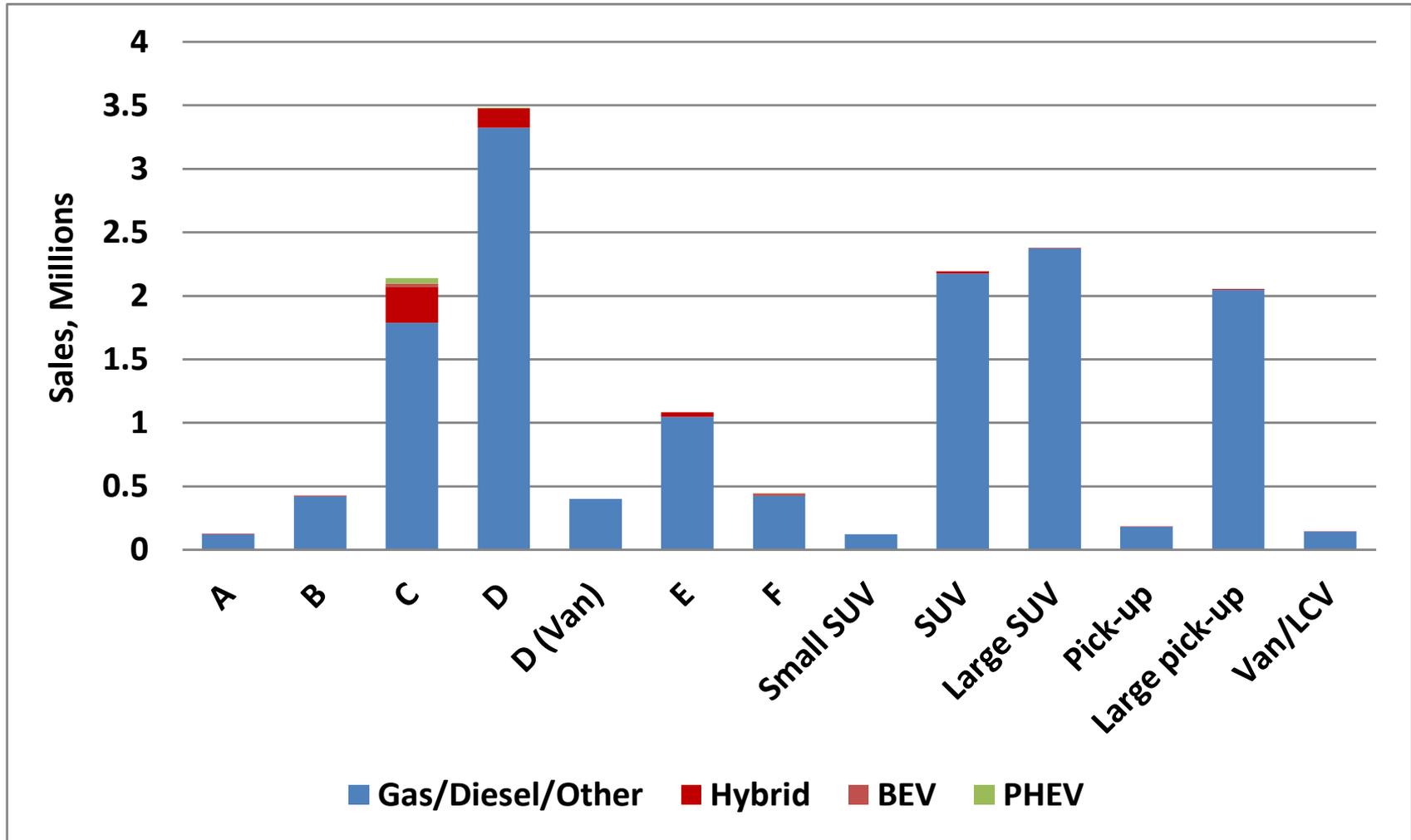


# Countries are different...

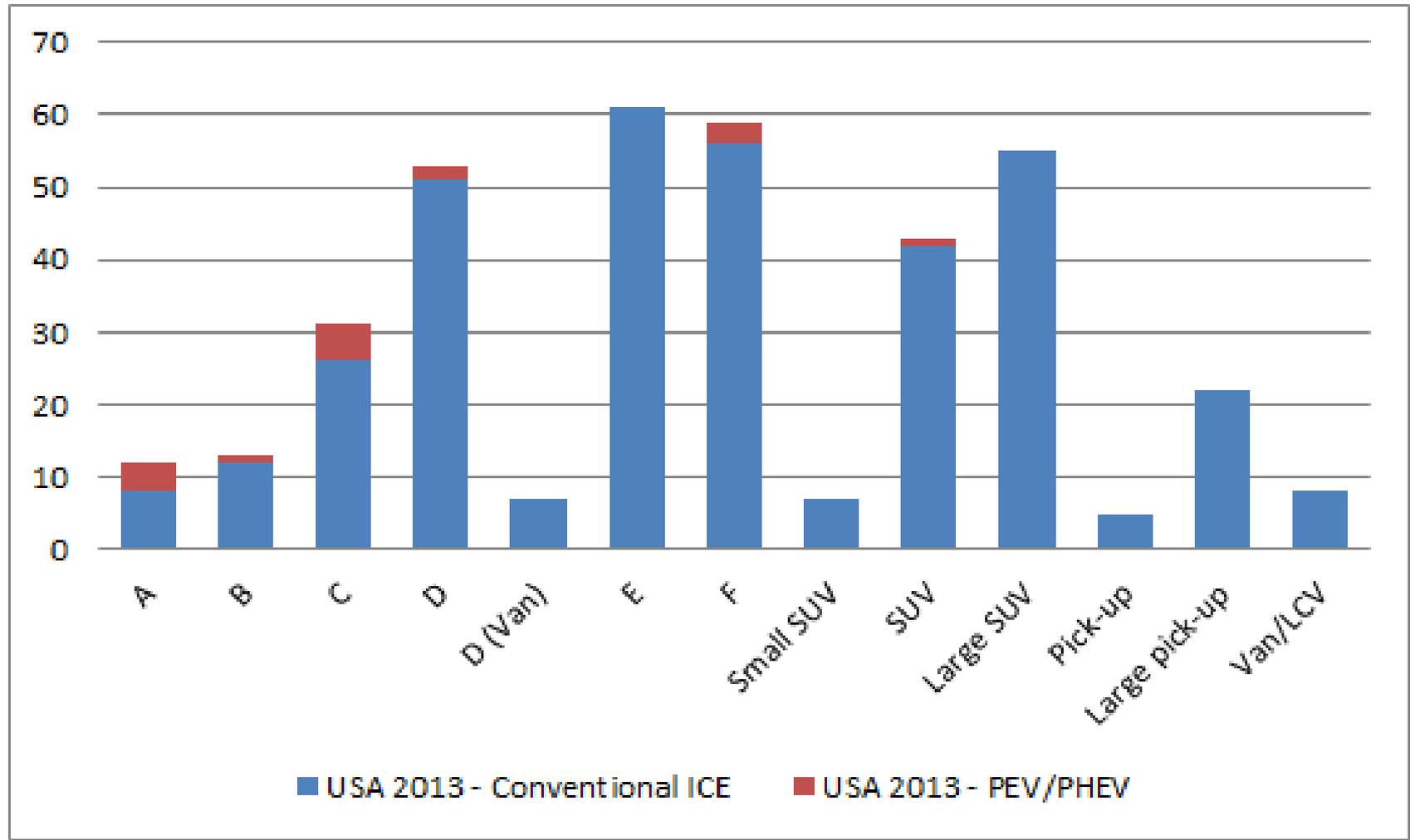
- 2015 Sales by market class vary considerably by major market



# USA: BEVs and PHEVs hard to spot as market share by market class



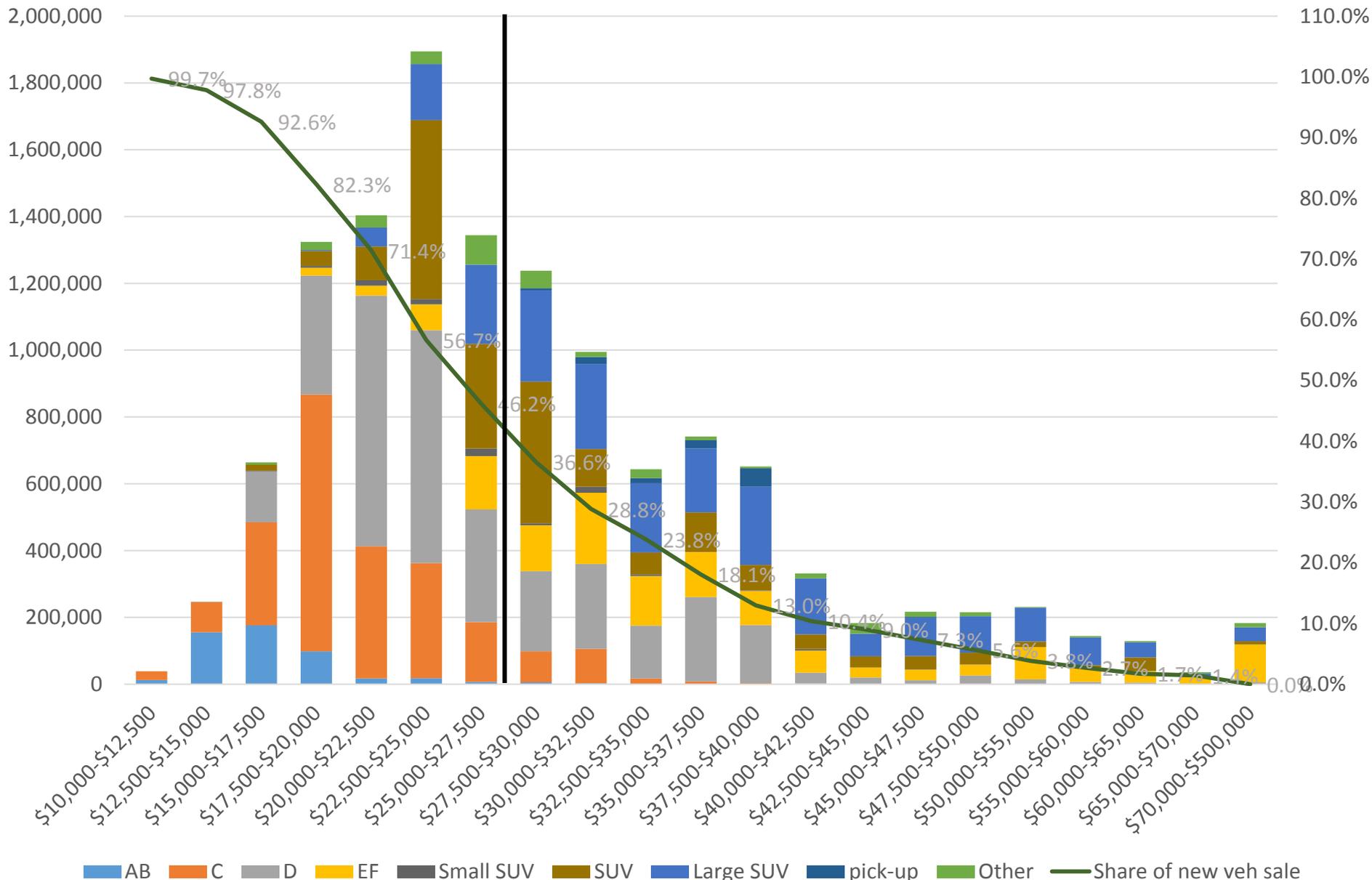
# PEVs v conventional models available by market class



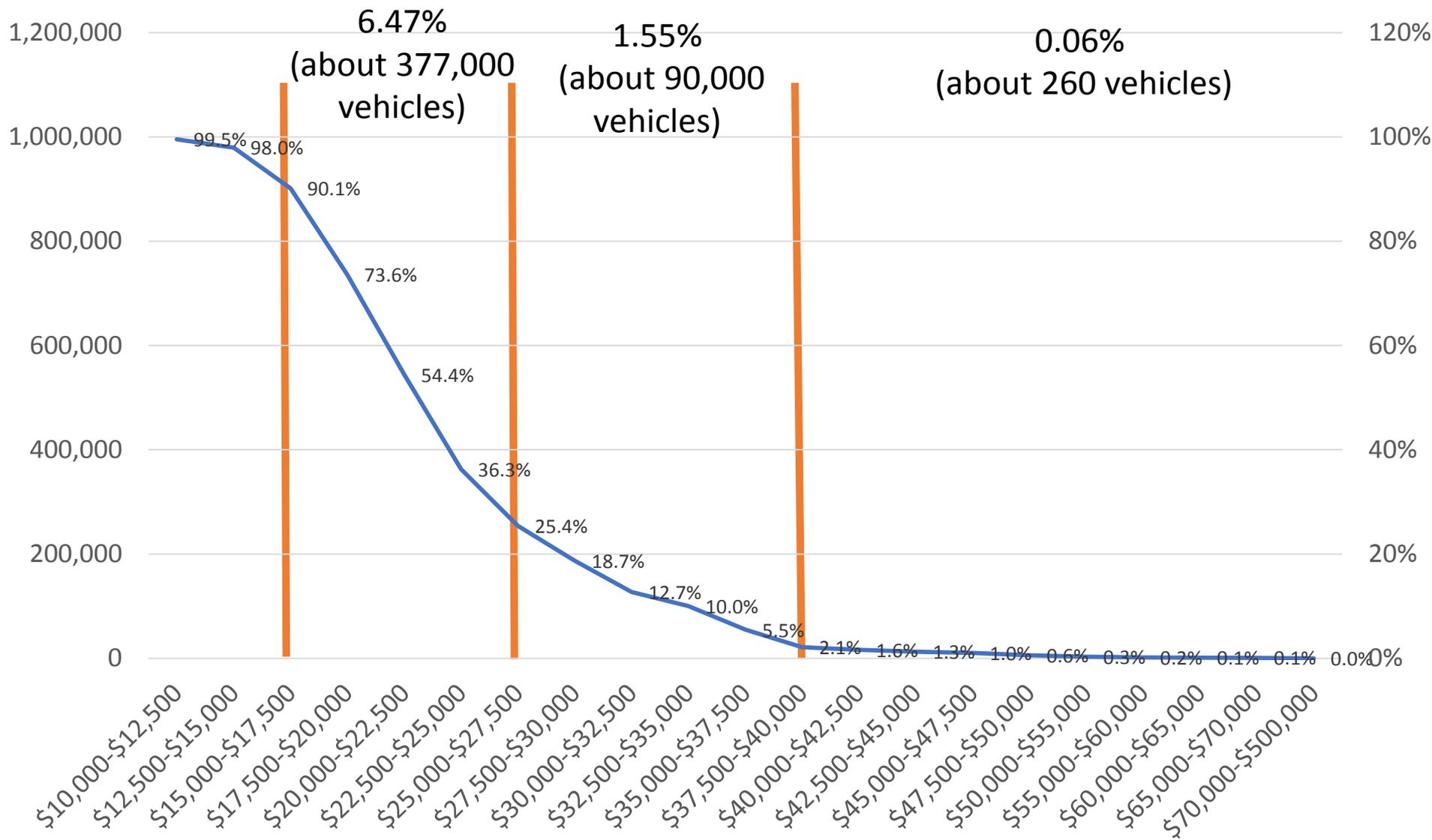
## In USA, 10 models accounted for vast majority of PEV sales, all with MSRP \$29,000 or above

2013		
Vehicle	MSRP	Market Share
Volt	\$ 34,185	0.95%
Leaf	\$ 28,800	0.94%
Model S	\$ 57,400	4.05%
Prius PHEV	\$ 29,990	0.49%
C-Max	\$ 32,920	0.30%
Fusion Energi	\$ 34,700	0.24%
Fiat 500e	\$ 31,800	1.29%
Ford Focus Electric	\$ 35,170	0.07%
Rav4 EV	\$ 49,800	0.06%
i-Miev	\$ 29,125	0.82%

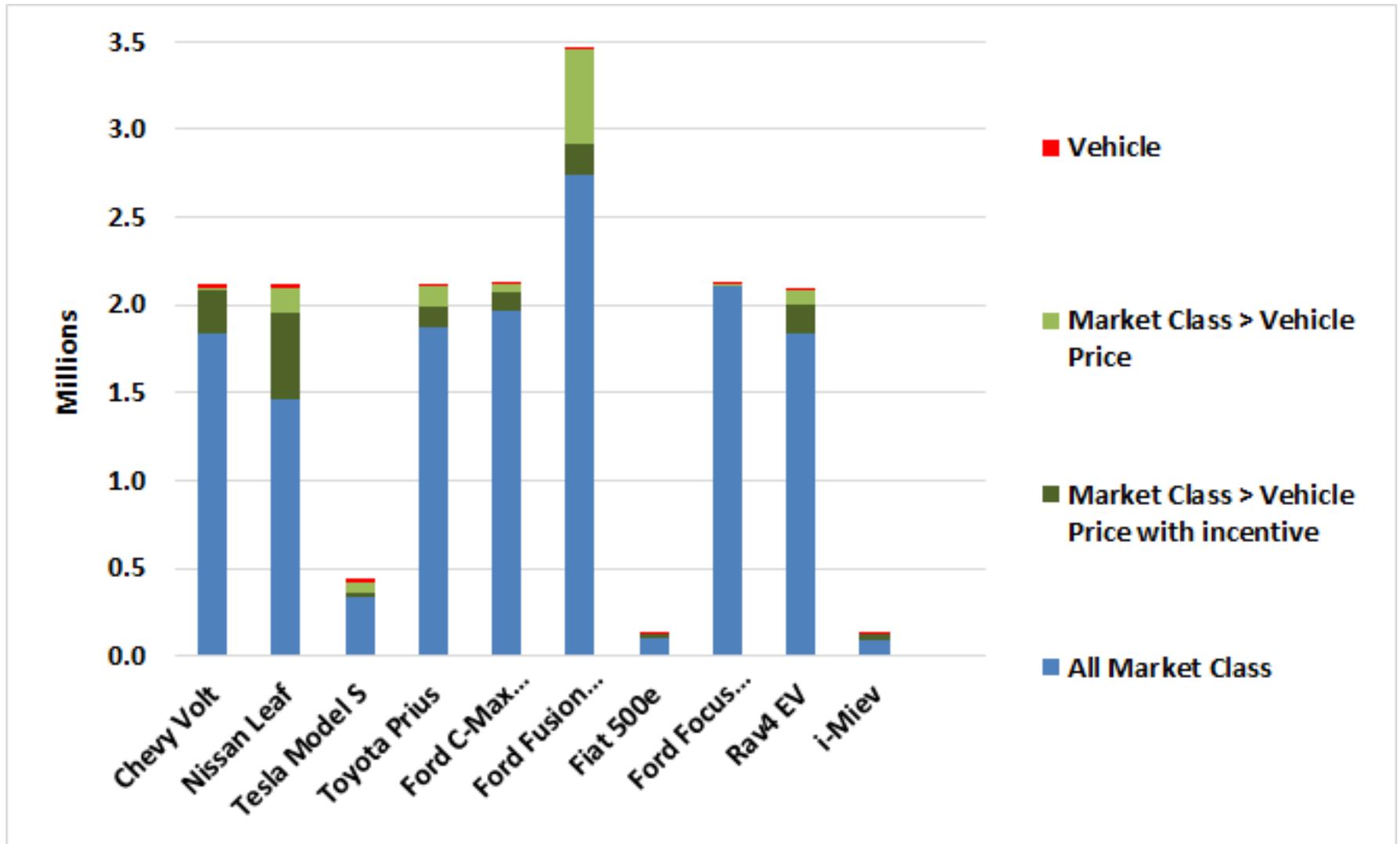
# 2013 US Market by Segment and Price



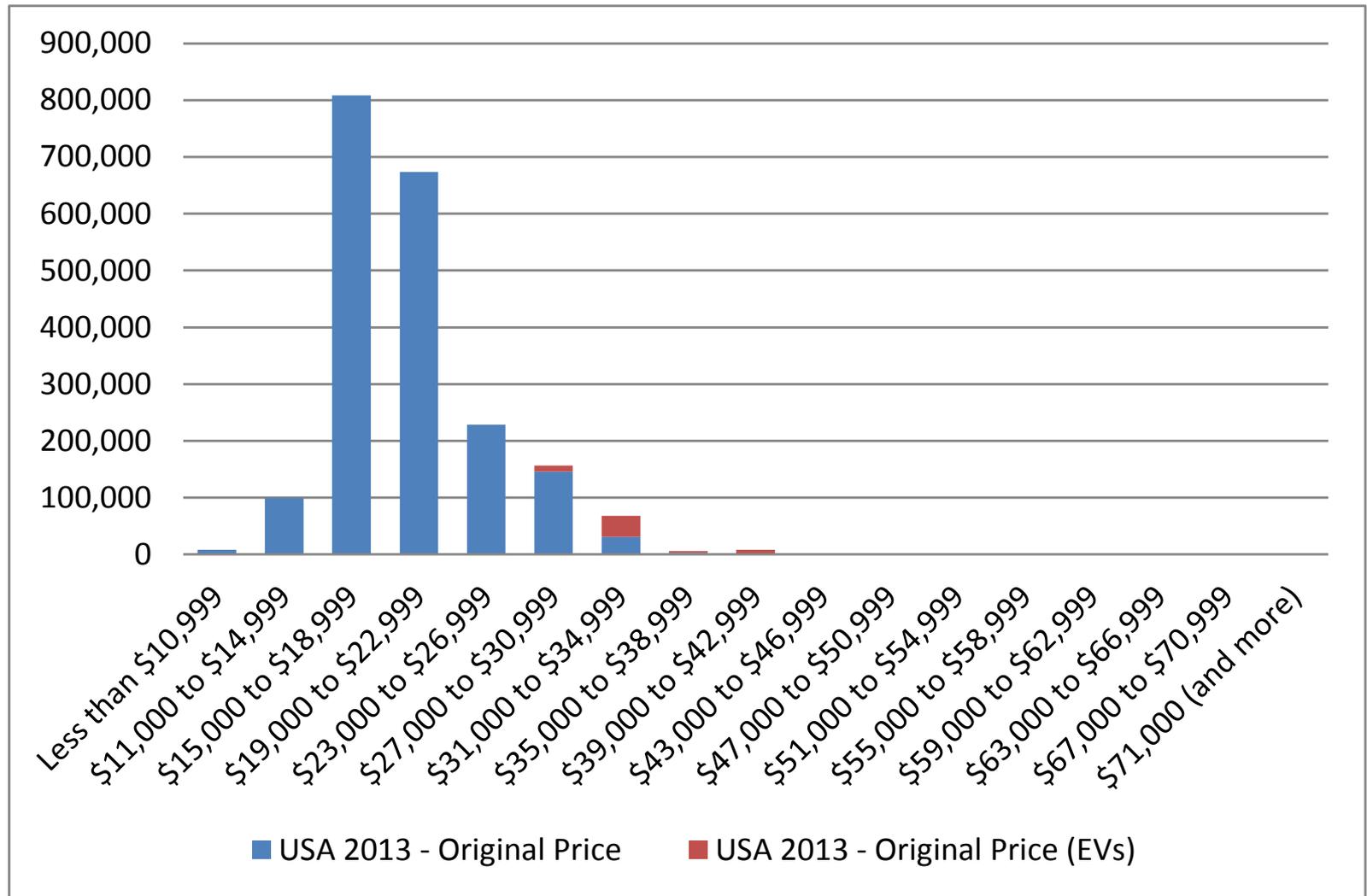
# The Impact of \$1000 price Change on the Potential Market



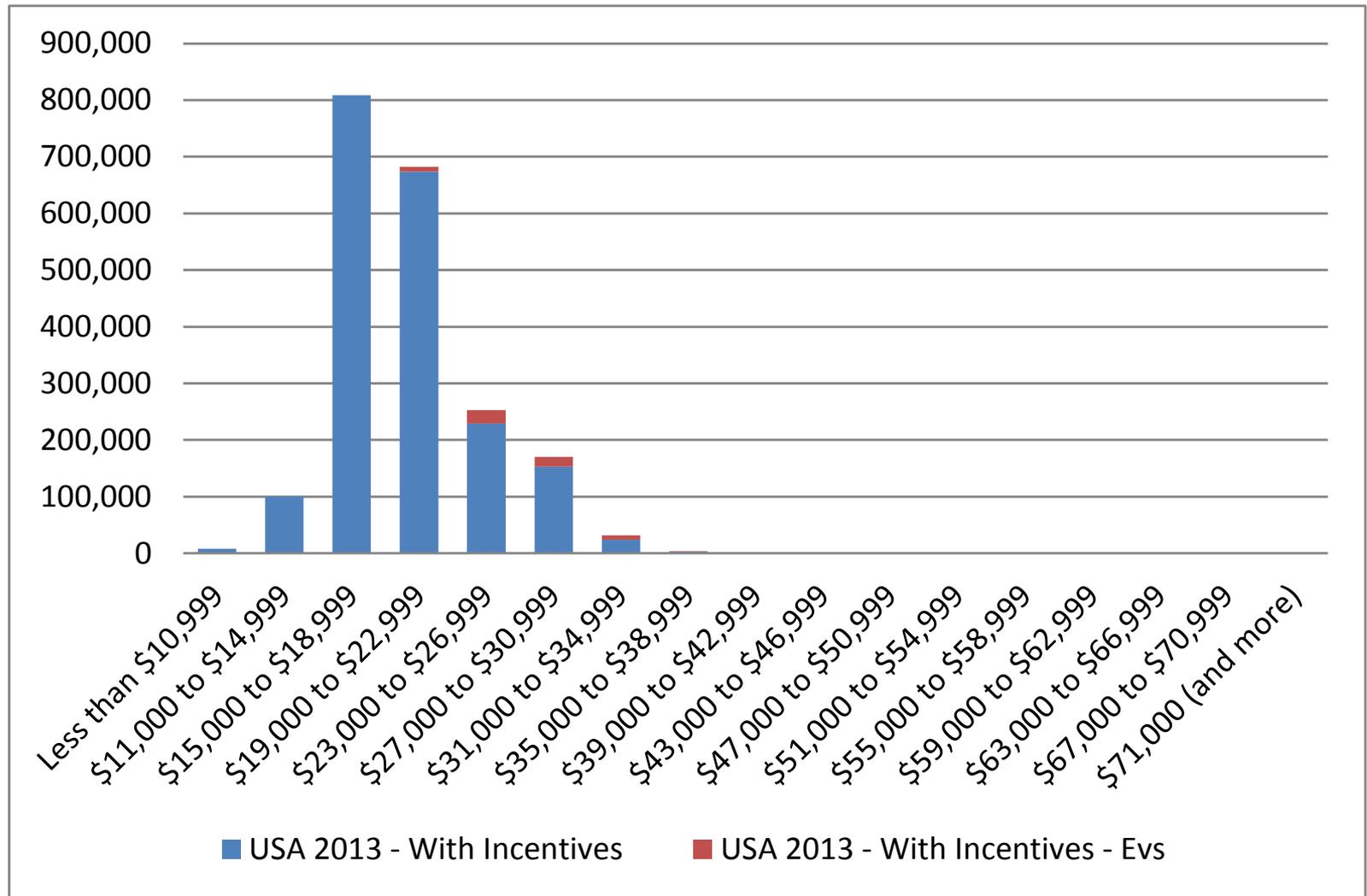
# Specific model sales as a share of segment



# PEV sales by price category - C class cars



# PEV sales by price category - C class cars



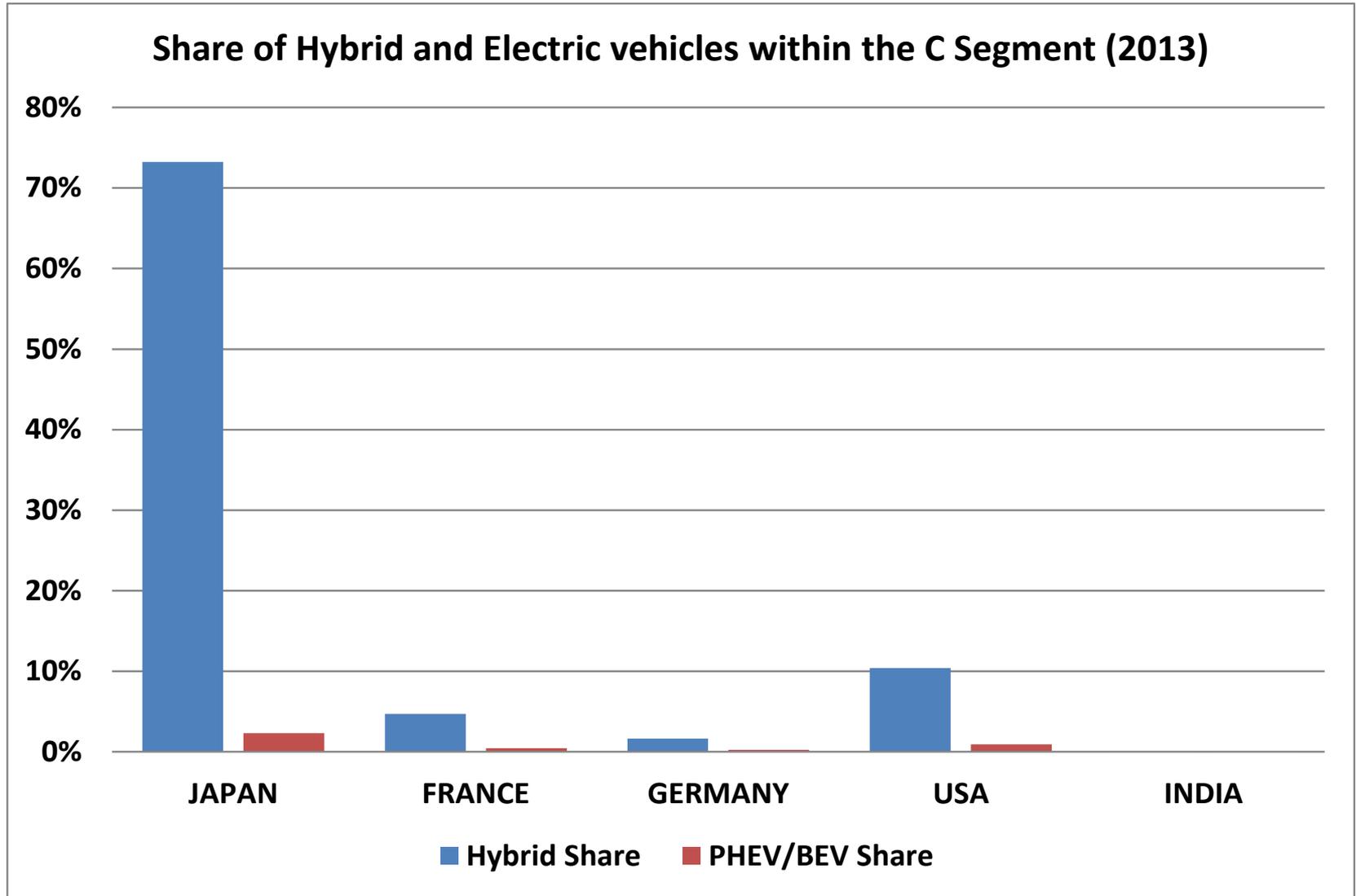
# Why is most of the PEV market (80%) in the C Segment?

- AB segment price is too low
- Hybrid market is dominated by the Prius
- Consumer awareness?

The correlation between the ZEV mandate and the federal incentives

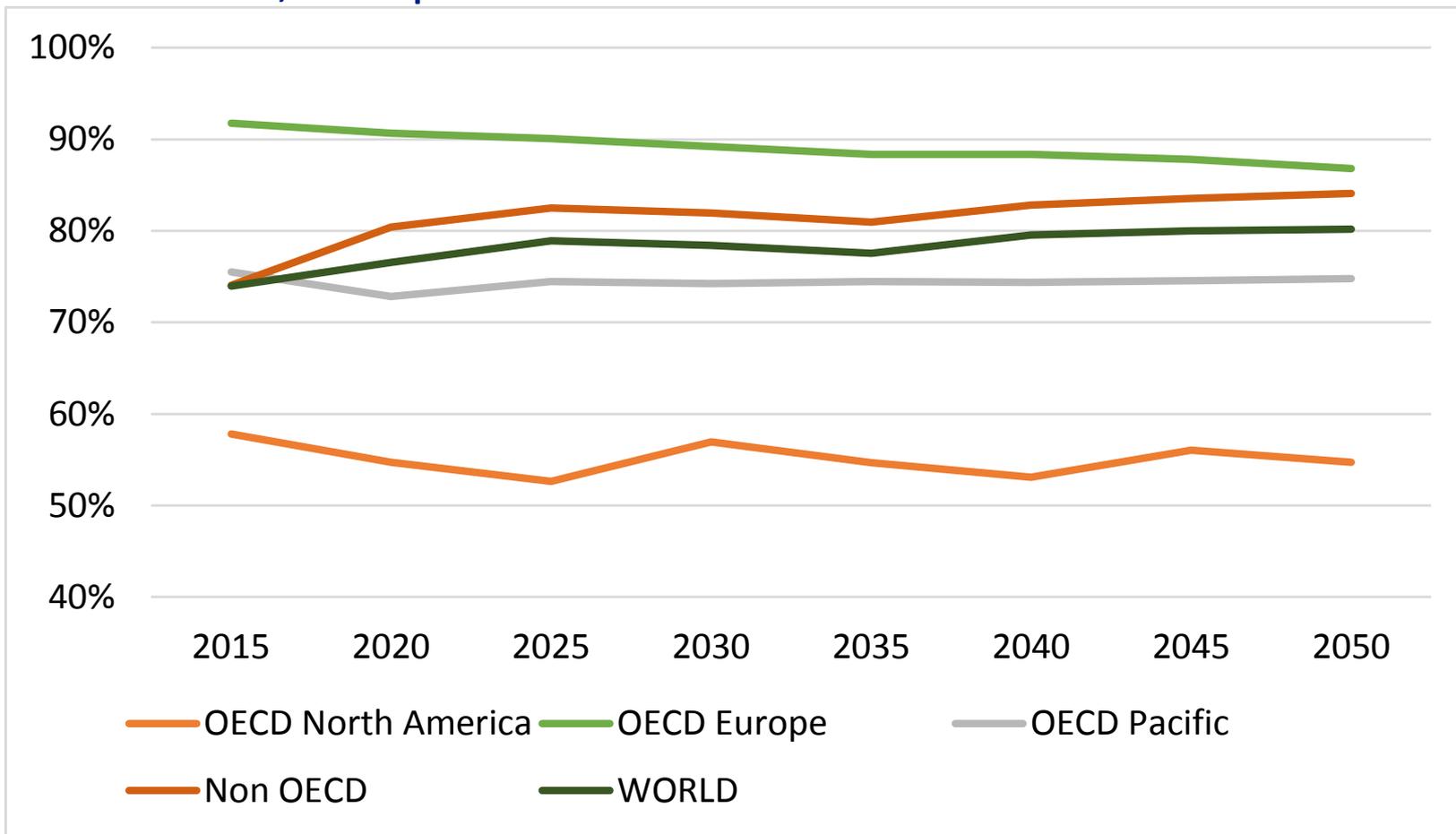
- **ZEV mandate**
  - Range based regulation favors light/small vehicles
    - 100 miles and 200 miles thresholds
- **Federal tax credit**
  - Battery size based credit
    - 5kWh-17kWh range

# HEV and PEV shares vary by country



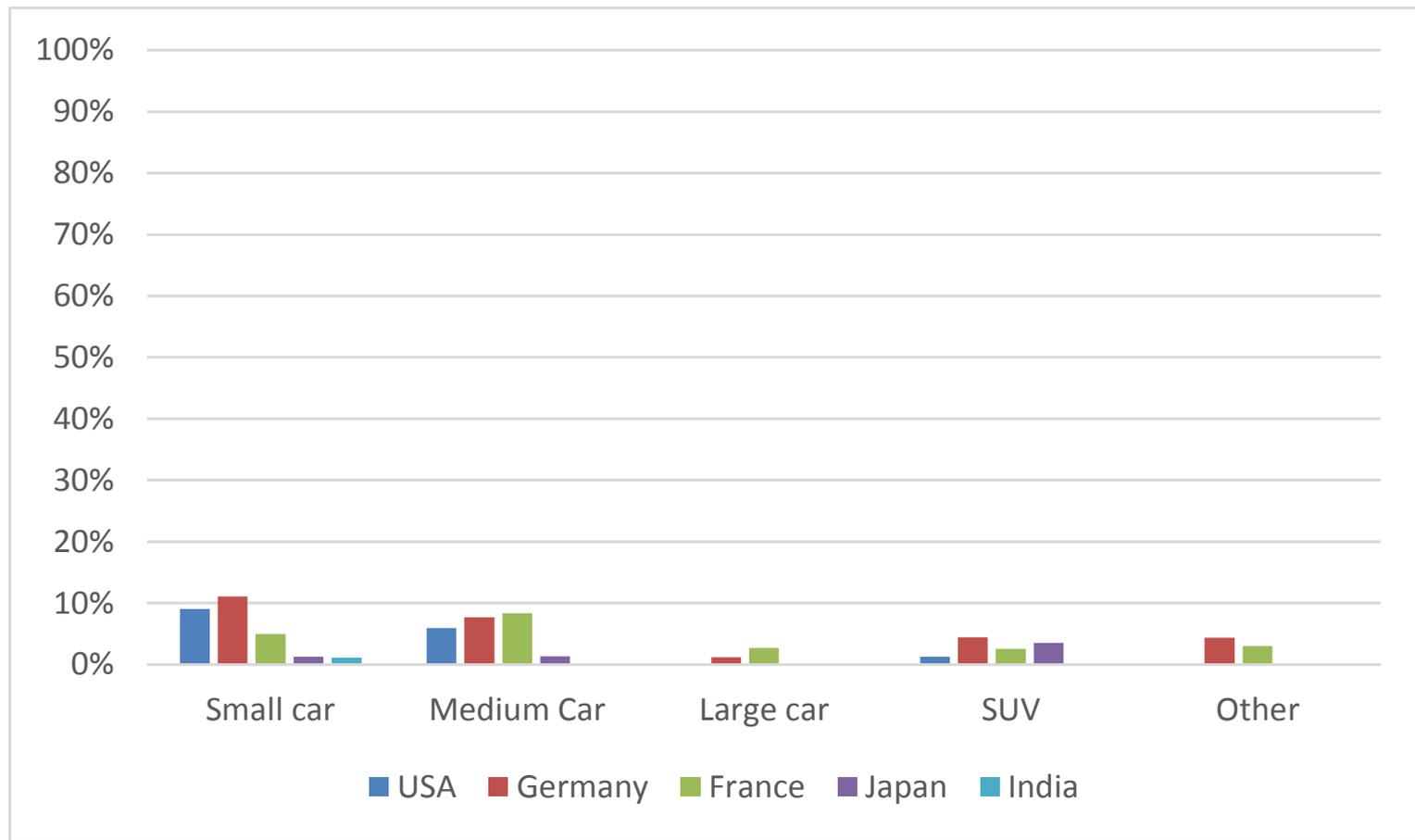
# How will car markets evolve?

- According to IEA, Cars remain a high share of LDV sales into the future, except in North America



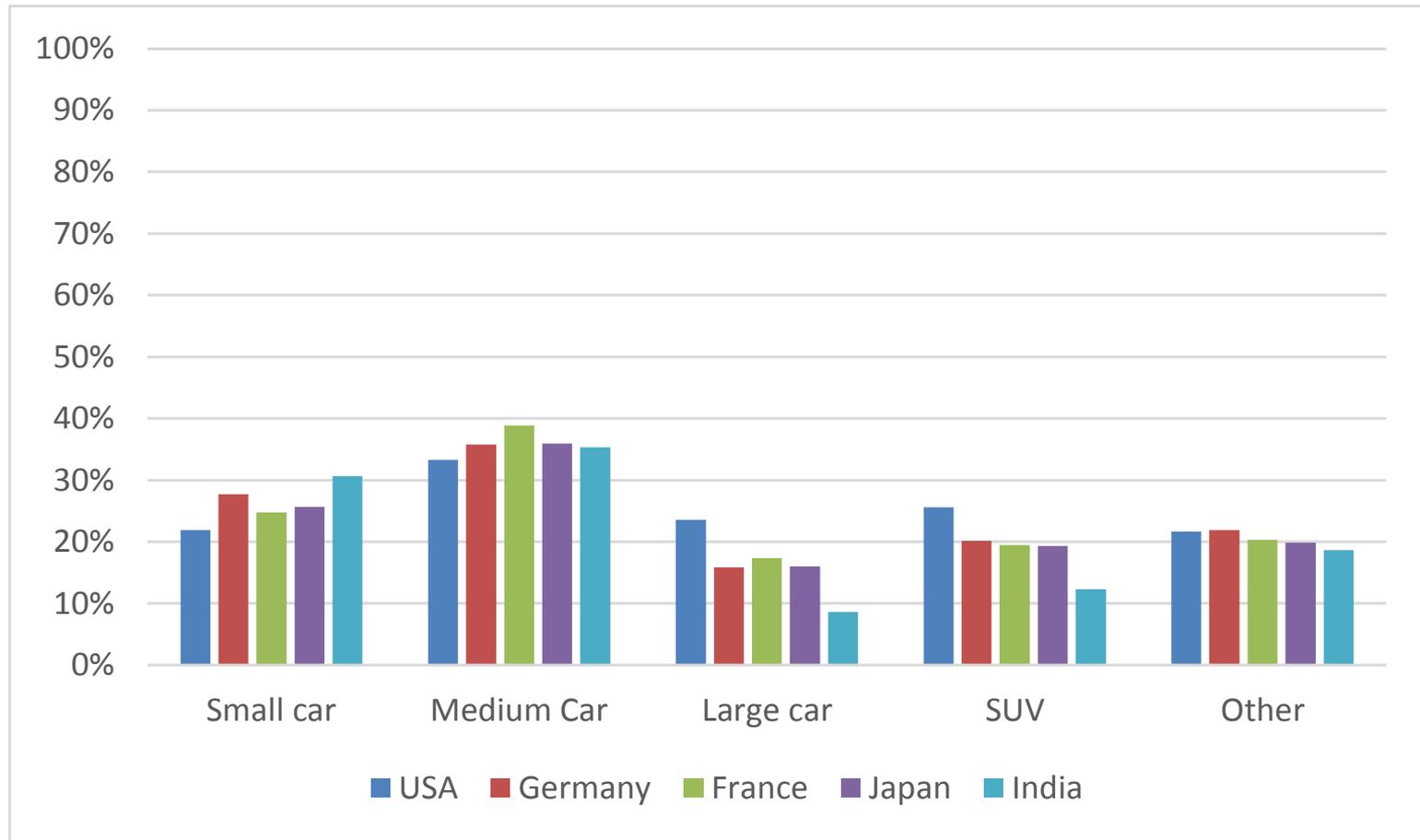
# How will car markets evolve?

- Current shares of plug-in models by market class and country



# How will car markets evolve?

- One possible mix of models in 2030



## Next steps

- Develop low and high scenarios for PEV global/regional sales by country, PEV type, through 2030
- Feed this into IEA Mobility Model to generate impacts in terms of electricity use, other energy use, CO2 emissions across transport. Might use this model also to apply diffusion to other countries beyond the major markets we characterize in our main study
- Show the contribution of PEVs through 2030, describe what factors will be most important, how changes in policy could change trajectory
- Draft report Spring 2016