



Sustainable Transportation Energy Pathways (STEPS)

**100 million plug-in electric vehicles by 2030:
How are we doing?**

STEPS Symposium
1 June, 2016

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The potential for low-carbon vehicles around the world

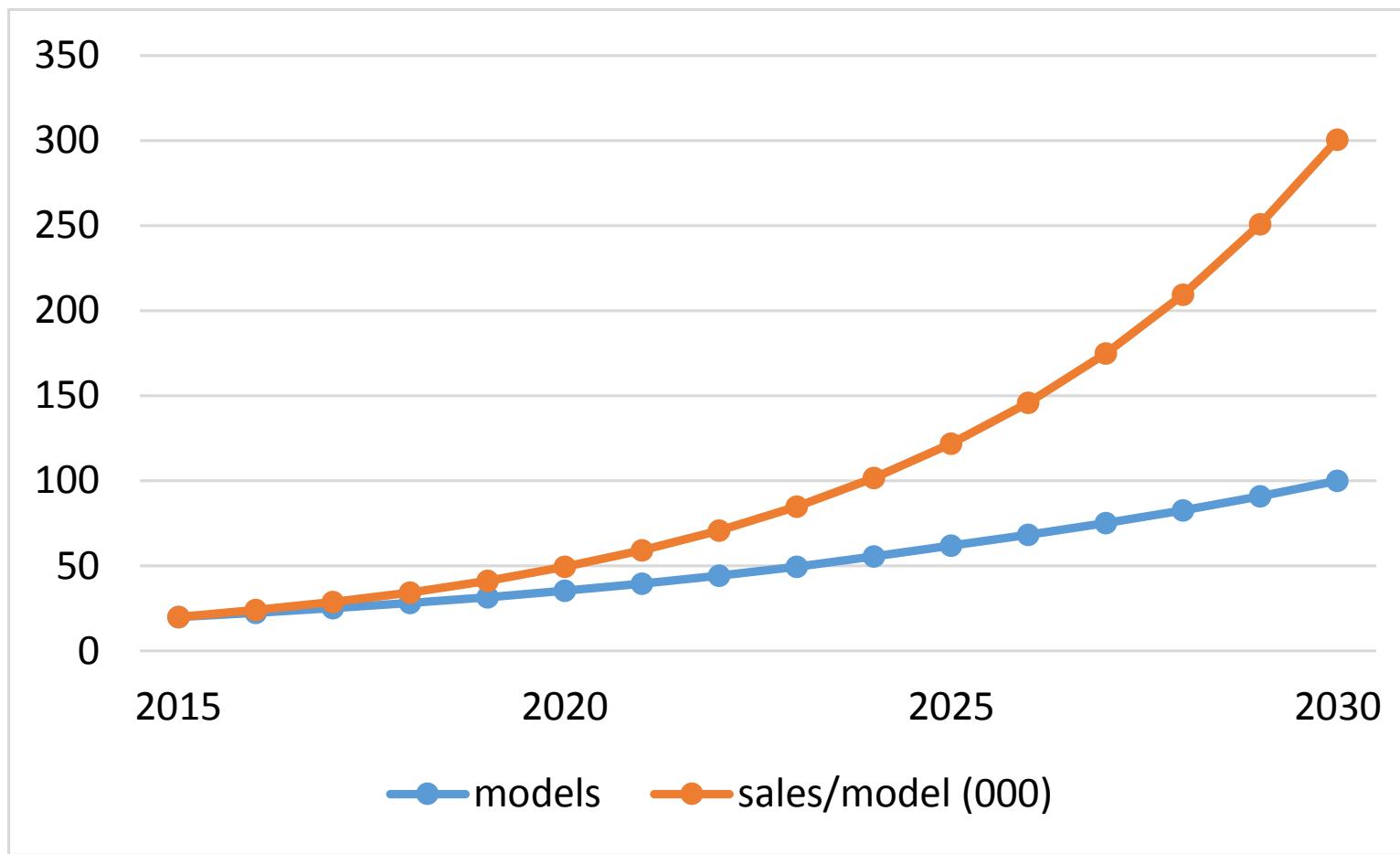
- This project is developing a new approach to projecting PEV vehicle market penetration around the world
- We are exploring what it would take to achieve various PEV targets, policy/technology-wise
- We are also estimating the energy/GHG impacts of these PEV scenarios
- First GFEI working paper is about ready for review

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 world's 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



The practical challenges of transitioning a 100 year old car industry

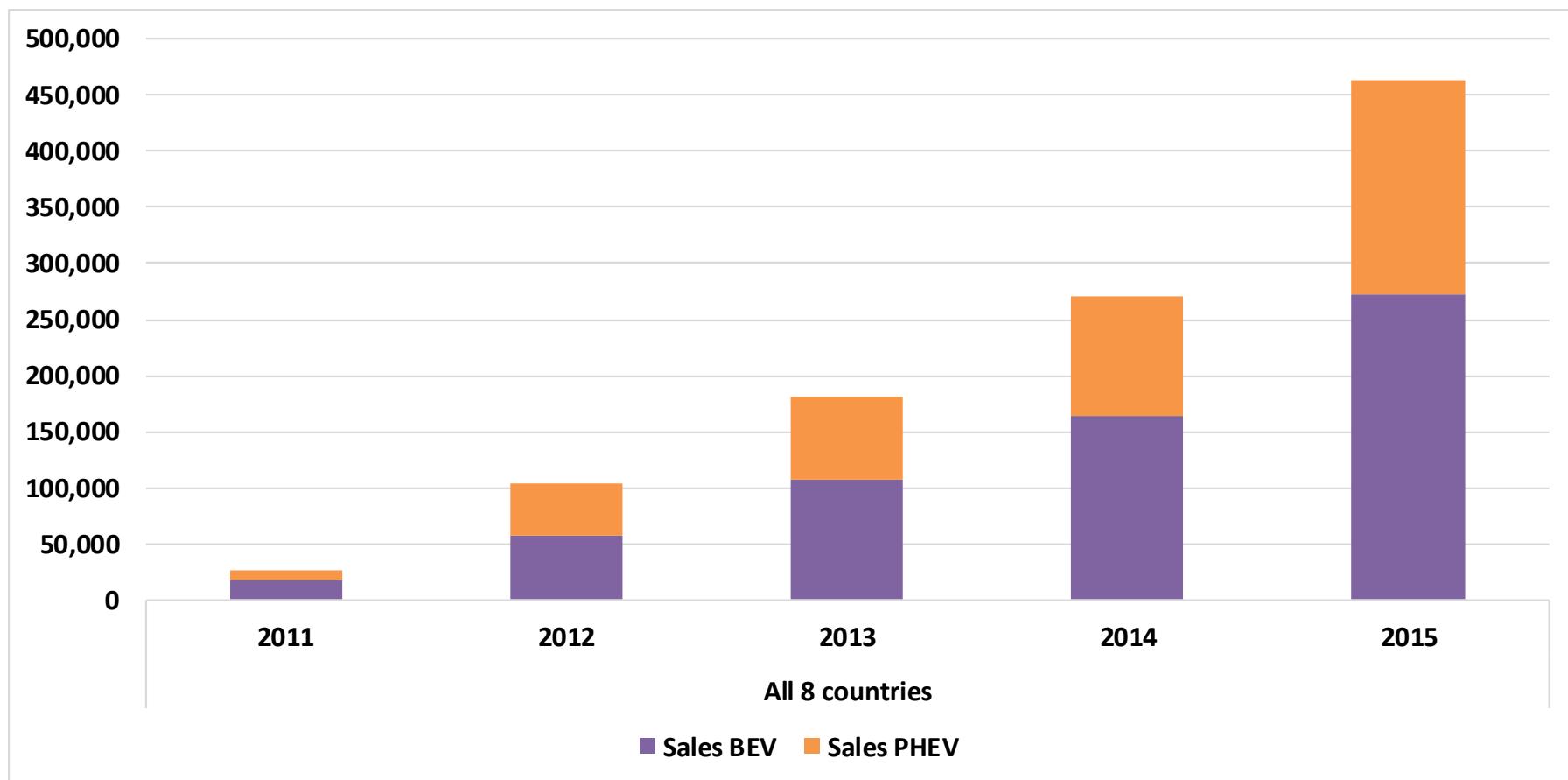
- Current high cost of ZEV & PEV technologies
 - Batteries
 - PHEV systems like Volt
- Slow turnover of fleet - 20 years (but slower in Norway)
- Low cost of gasoline
 - mainly US, still \$5-7 a gallon in most big markets around the world
 - buyers shift to larger vehicles, B & C class shrinking, “crossovers” grew 13-15%
- Rate of PEV product rollout into many vehicle classes
- Development rate of consumer awareness, knowledge, experience & product valuation
- Uneven development of charging infrastructure
 - congestion at some chargers

But optimistic notes for the PEV crowd

- Tesla - 375,000 persons putting \$1000 down for Tesla 3 & sales up for the S,X
- Norway: 30% market this year, 50% in some regions – (even in winter) but major incentives
- 2-3% markets in China, France, Netherlands, Calif., Japan with strong incentives
- But also, 2% in Switzerland & Sweden with few incentives
- 1% Germany with \$1.2 billion incentives this May PEV market will grow more rapidly

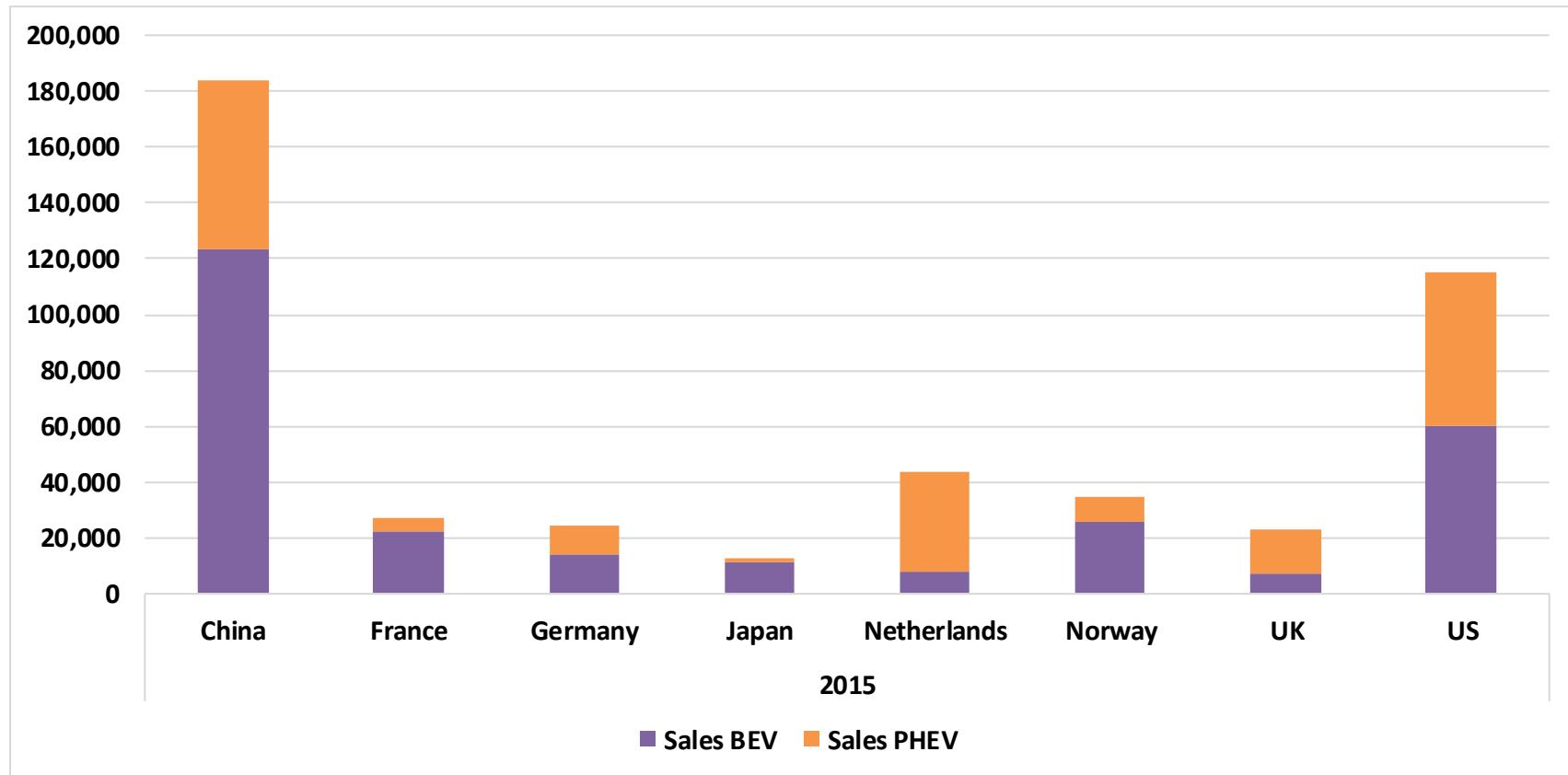
All PEV sales rising; PHEVs catching up to BEVs

- Sales of BEVs and PHEVs by year across 8 major markets

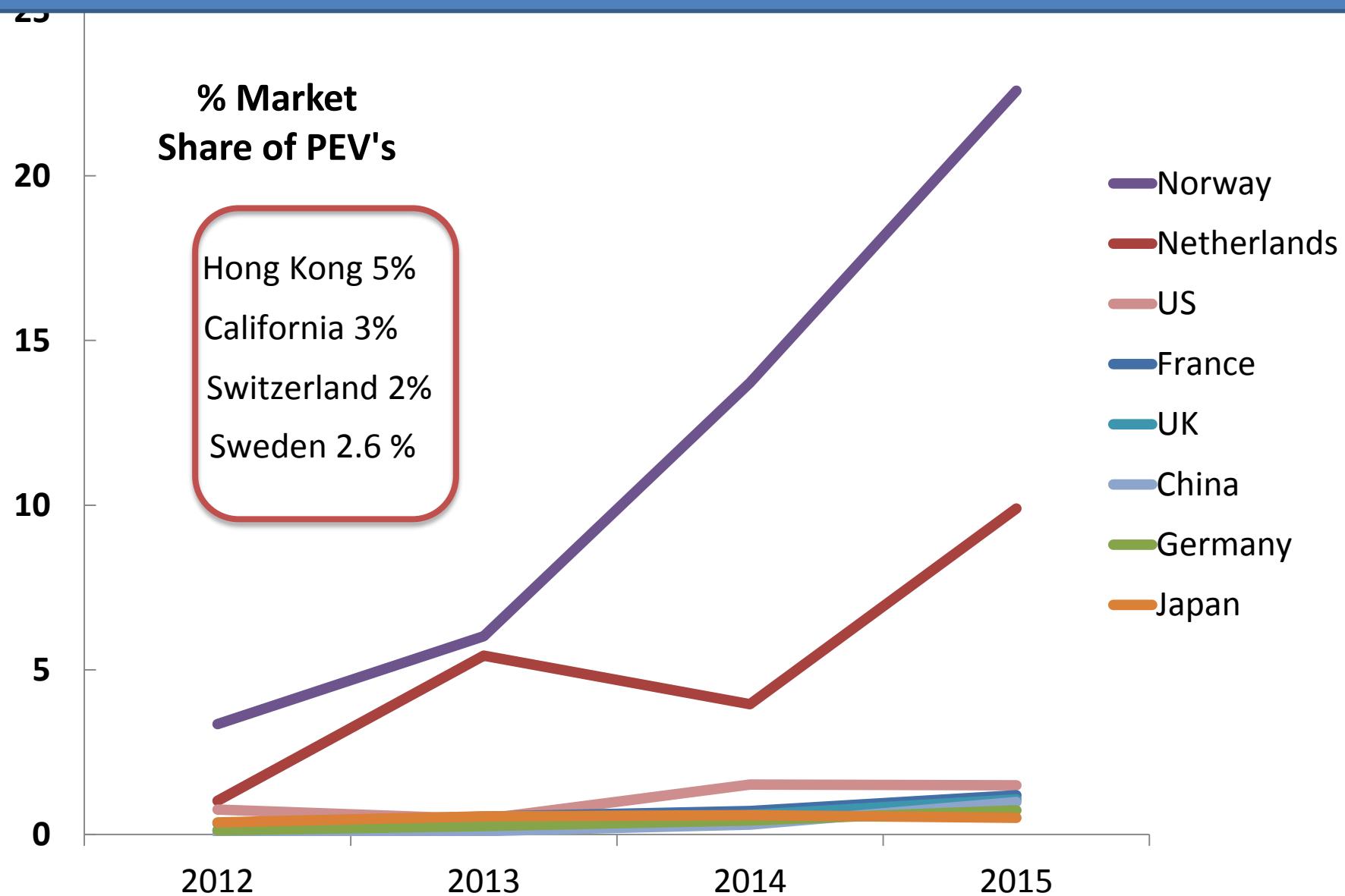


2015: Two biggest markets have most balanced BEV and PHEV sales

- Netherlands with the highest PHEV share; Japan the lowest



Norway & Netherlands achieved high PEV market shares, most other national markets around 1-2%

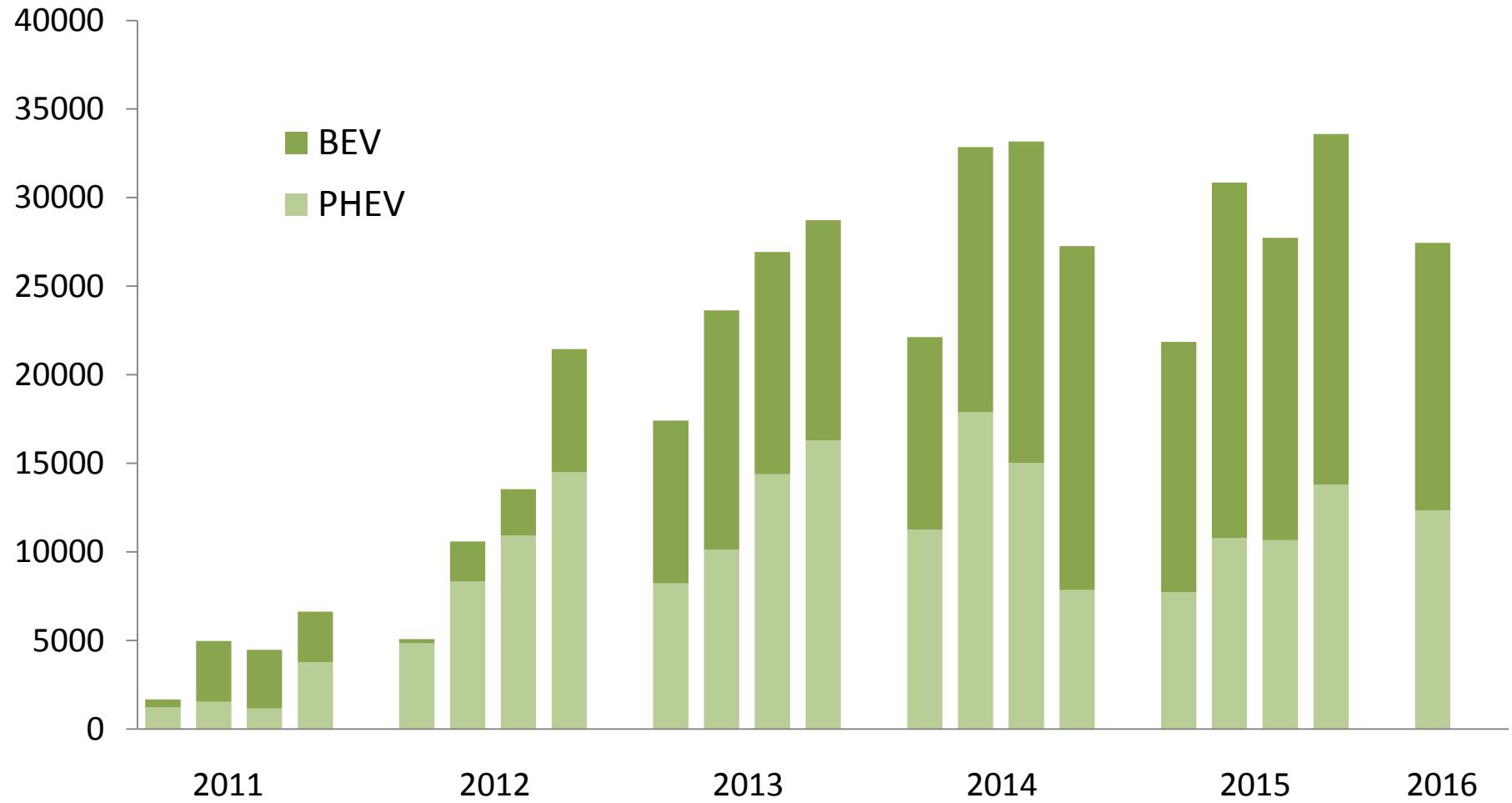


US Annual PEV Sales slowed in 2015

Total LDV vehicles in USA > 240 million

USA LDV sales 2015 = 17.5 million

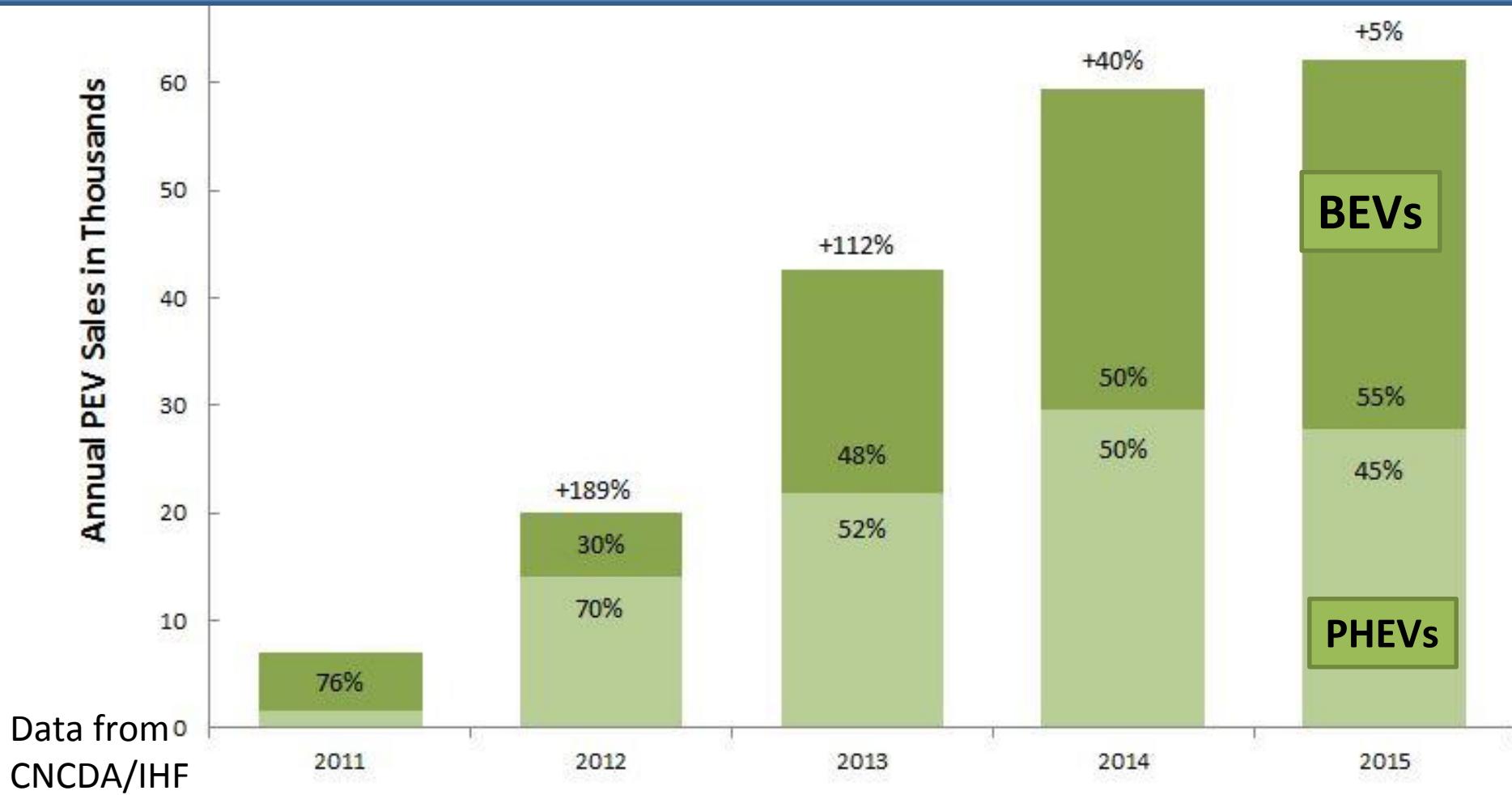
Total PEVs registered in USA > 450,000



California 2015 PEV sales growth slowing

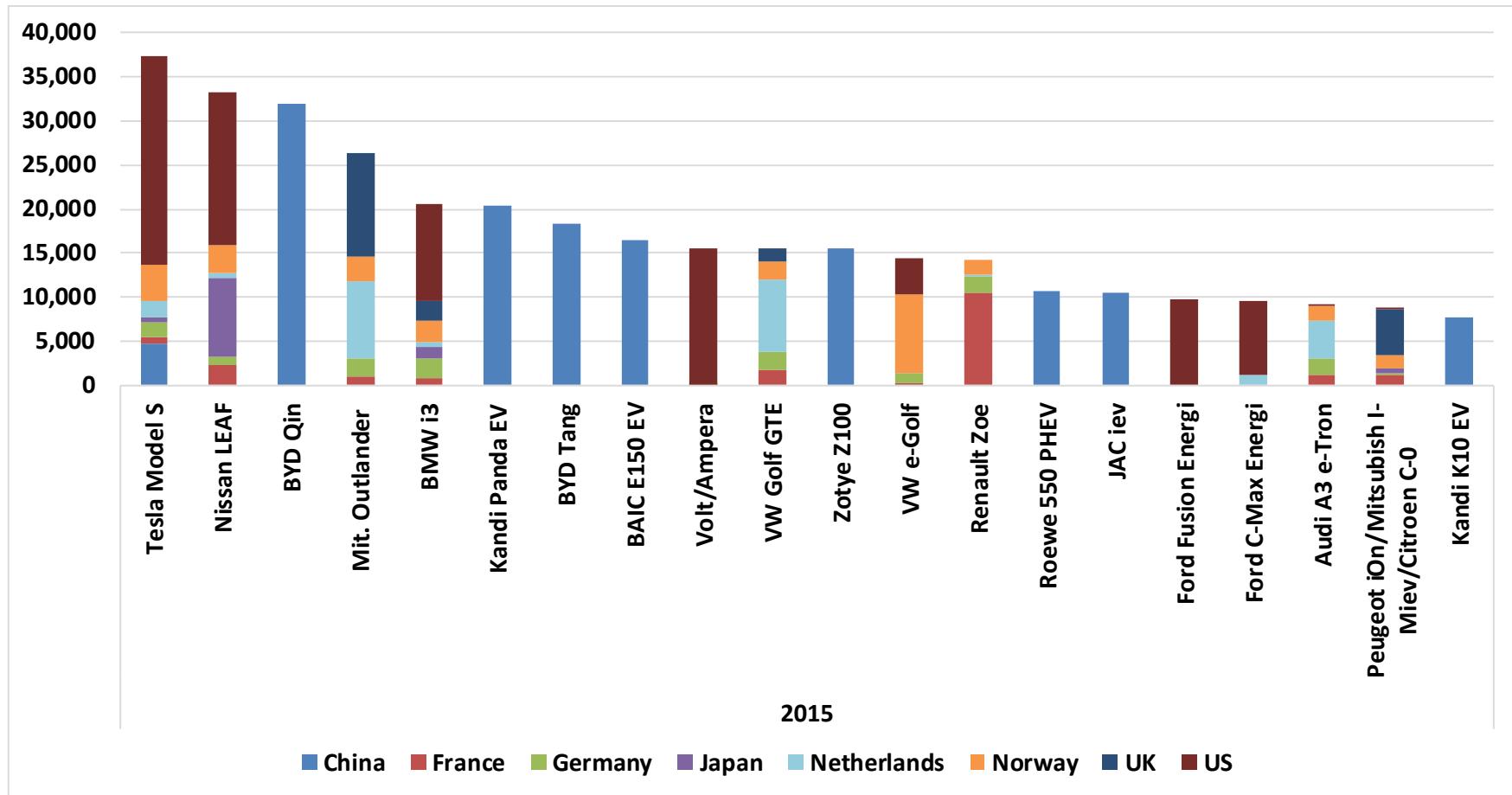
(send us your Crossover PEVs)

- Total LDV vehicles in Calif > 27 million
- Calif LDV sales 2015 = 2.1 million (France & UK size)
- Total PEVs registered in Calif. > 186,000



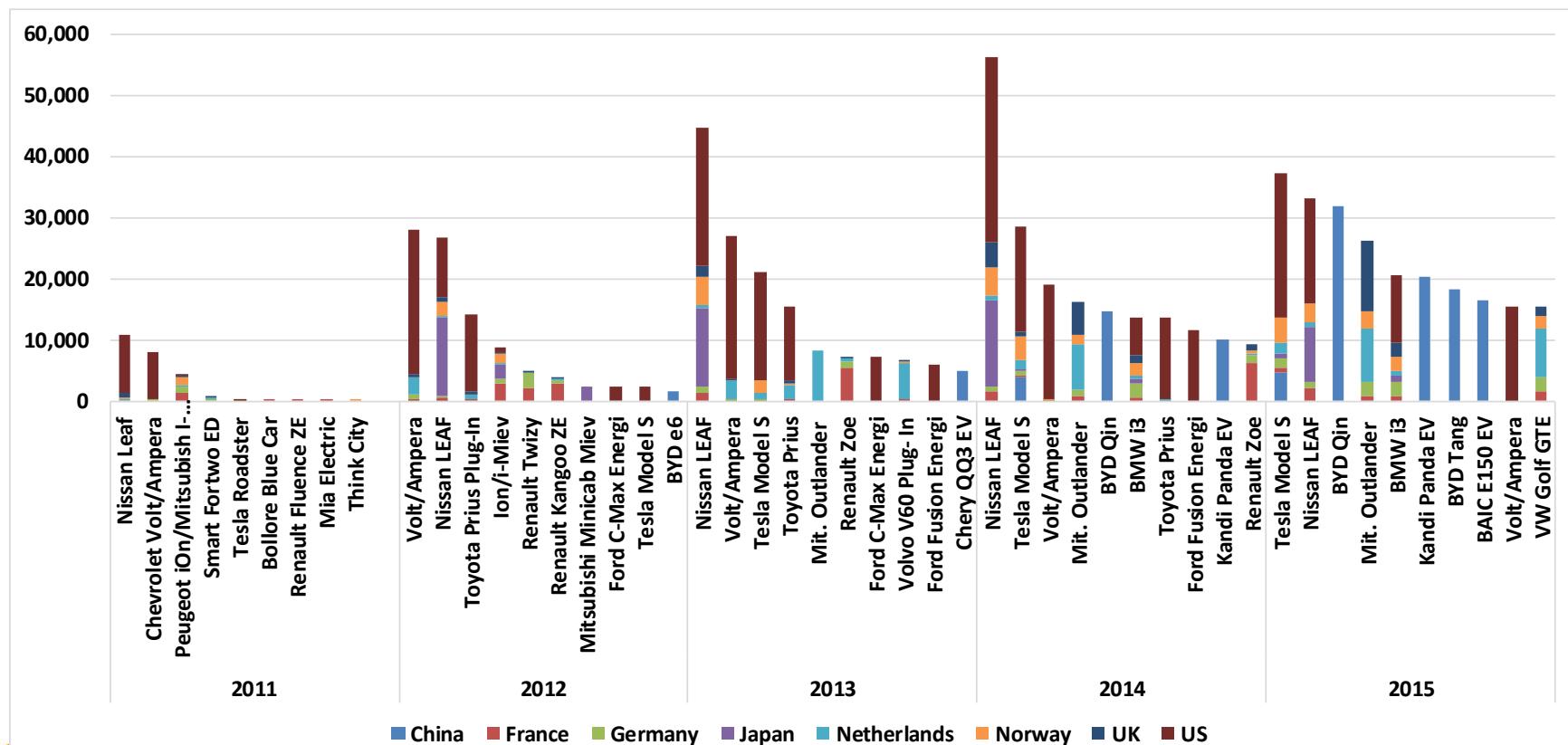
2015: Top 20 models averaged about 18,000 sales

- 8 of top 20 models sold only in China
- 4 of 5 top selling models have significant sales in multiple countries



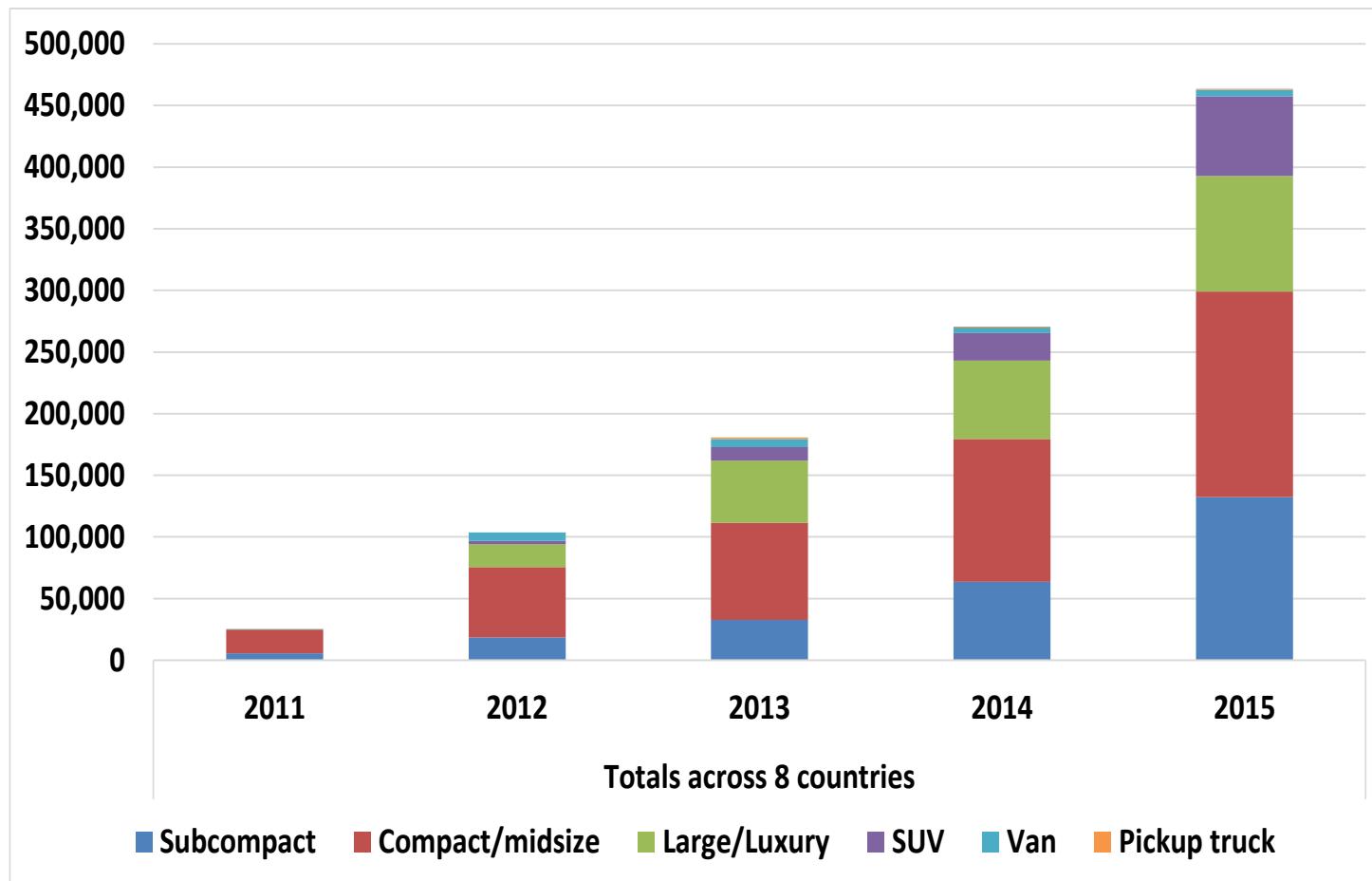
Sales of top selling models across 8 countries have increased and equalized over time

- Top 10 average sales grew from below 2,000 units in 2011 to about 20,000 units in 2015
- Top selling Leaf in 2014 gave way to a much lower peak sales number of the top selling Tesla S in 2015



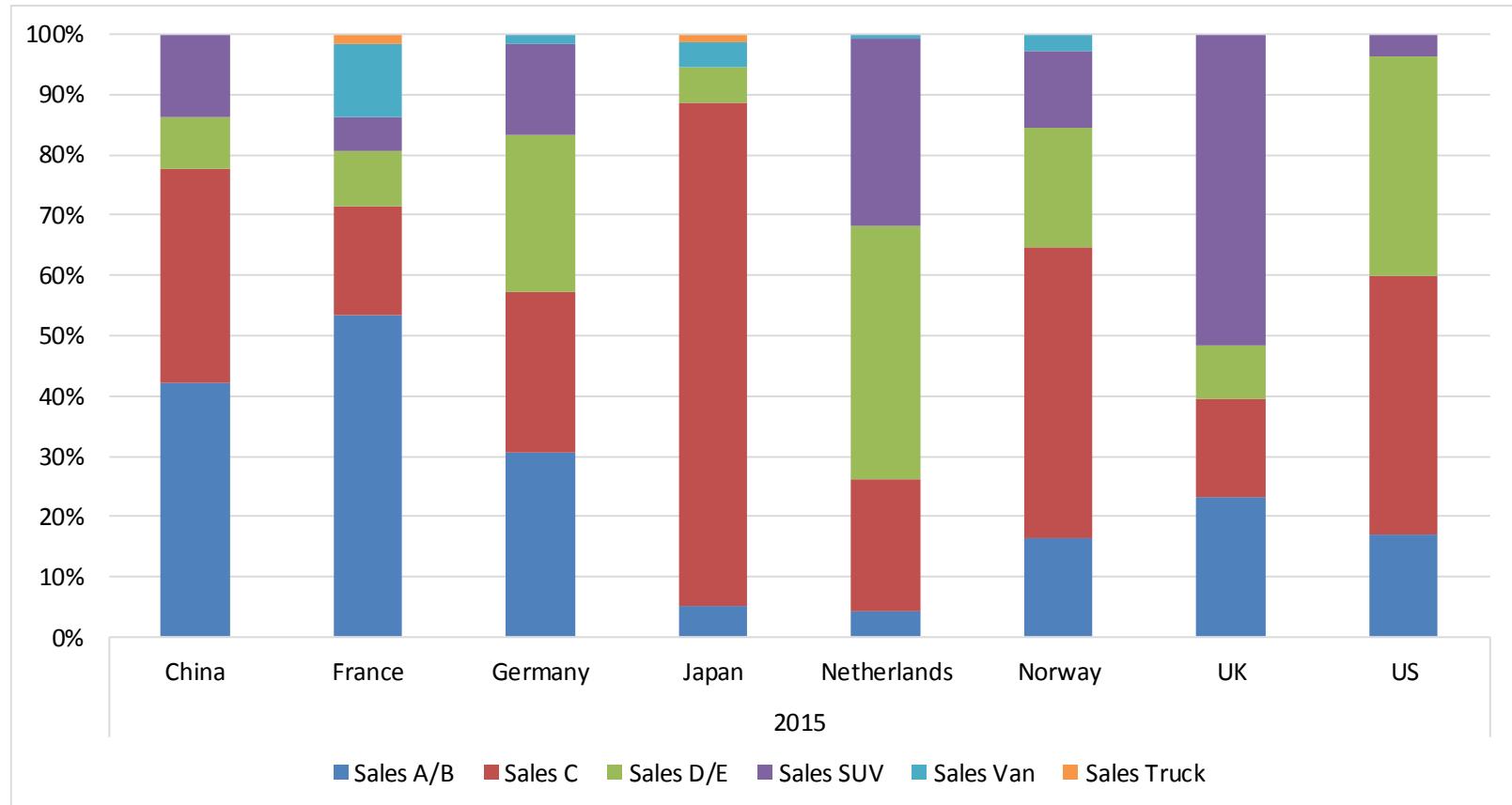
Looking at market segments – fairly diverse mix in 2015

- SUV PEV sales grew dramatically in 2015



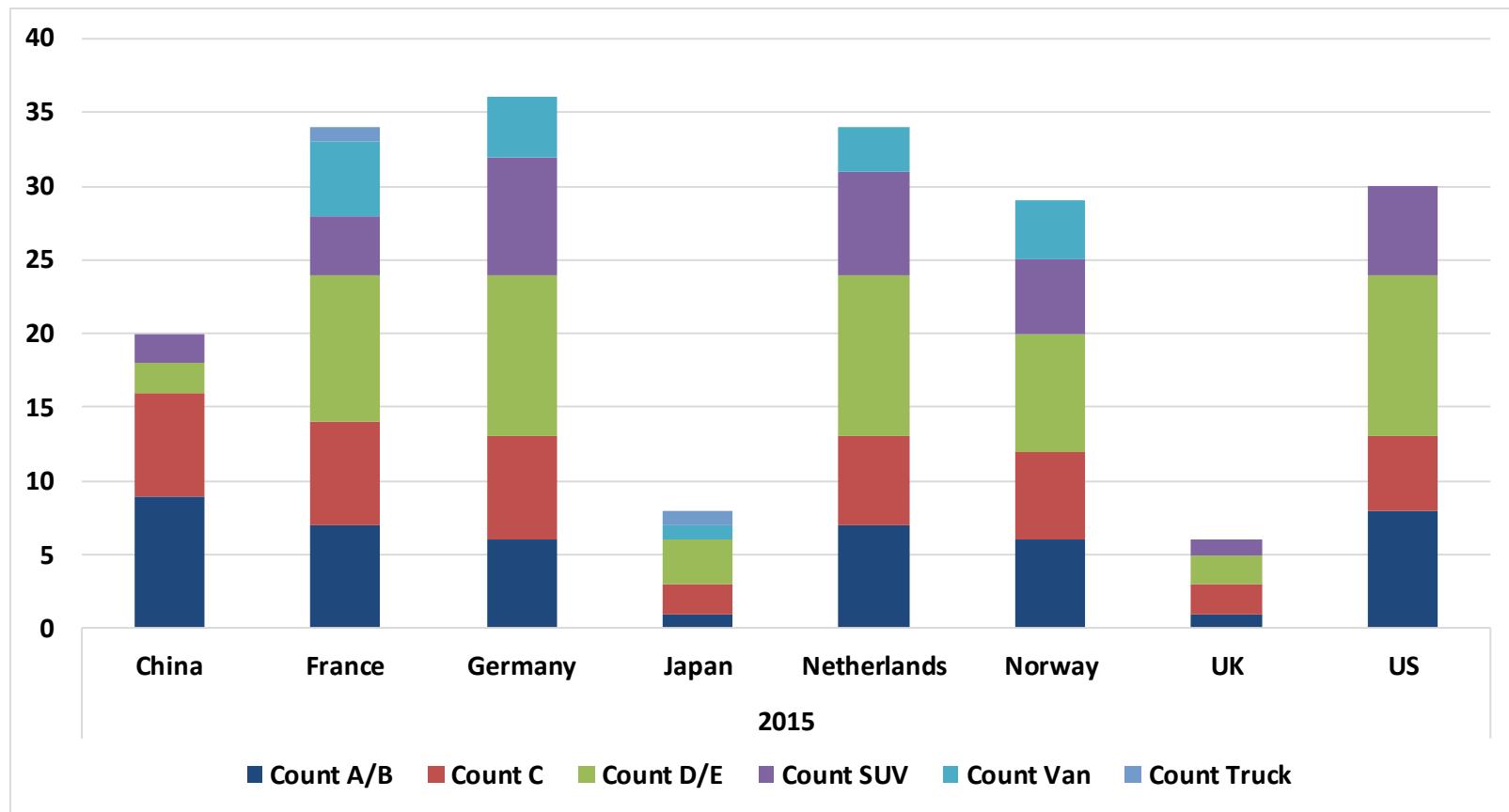
But very different market segment mixes in different countries

- 2015 sales of A/B/C class cars more than 50% of PEV sales except in the Netherlands and UK. Extremes are Japan with 88% A/B/C; UK 51% SUV
- US PEVs are 95% cars despite over 50% of all LDV sales SUV/Van/Lt-Truck



Reasonably good availability and mix of models in most market classes in most countries except Japan and UK

- 2015: the US and China have far higher sales without far higher numbers of models than in Europe
- Japan and UK have inexplicably low numbers of models on offer



Governments around the world are stating new goals for electric drive

- In Norway, a plan awaiting a vote by Parliament would require new cars, buses, and small trucks sold by 2025 to be all-electric models.
- The Austrian Ministry of Agriculture and Environment is working on a plan that would ban the sale of new gas and diesel cars by 2020.
- Lawmakers in the lower house of the Dutch Parliament approved a motion in March that would ban the sale of new gas and diesel cars five years later.

Governments around the world are stating new goals for electric drive

- In Germany, Green Party MP Dieter Janecek called for a ban on the sale of non-electric new cars by the 2020s, and Energy Ministry Undersecretary Rainer Baake said the country should implement such a ban by 2030.
- Indian Energy Minister Piyush Goyal said the government was developing a plan under which only electric vehicles would be on the road in India by 2030. “We don’t need one rupee of support from the government. We don’t need one rupee of investment from the people of India,” said Goyal.
- In China, officials decided to accelerate the rollout of Euro 6 emissions standards, requiring them not in 2020 but next year in major cities.

Conclusions

- A transition to electric mobility has begun
 - Lots of competition & investment, new products, improving technology, increasing markets
 - Faster decline of battery prices than many expected
- Are we on a trajectory to 100 million by 2030?
 - Too early to tell, but current rates of change must continue
- Durable, stable policies must be in place during these next two decades to attract buyers – and manufacturers