

Engineering Trust:

Consumer Perceptions of Autonomous & Electric Vehicles



June 1, 2017

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Product Planning Team

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Autonomy: A Matter of Trust

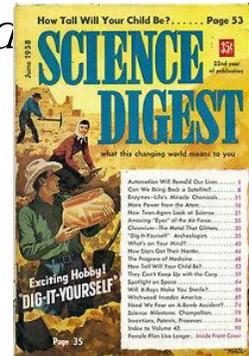


What's Past is Prologue: Science Digest 1958



“Some day in the future when you drive onto a superhighway, you'll reach over to your dashboard and push the button marked "Electronic Drive." Selecting your lane, you'll settle back to enjoy the ride as your car adjusts itself to the prescribed speed. You may prefer to read or carry on a conversation with your passengers-- or even to catch up on your office work. It makes no difference for the next several hundred miles as far as the driver is concerned.

Fantastic? Not at all.”

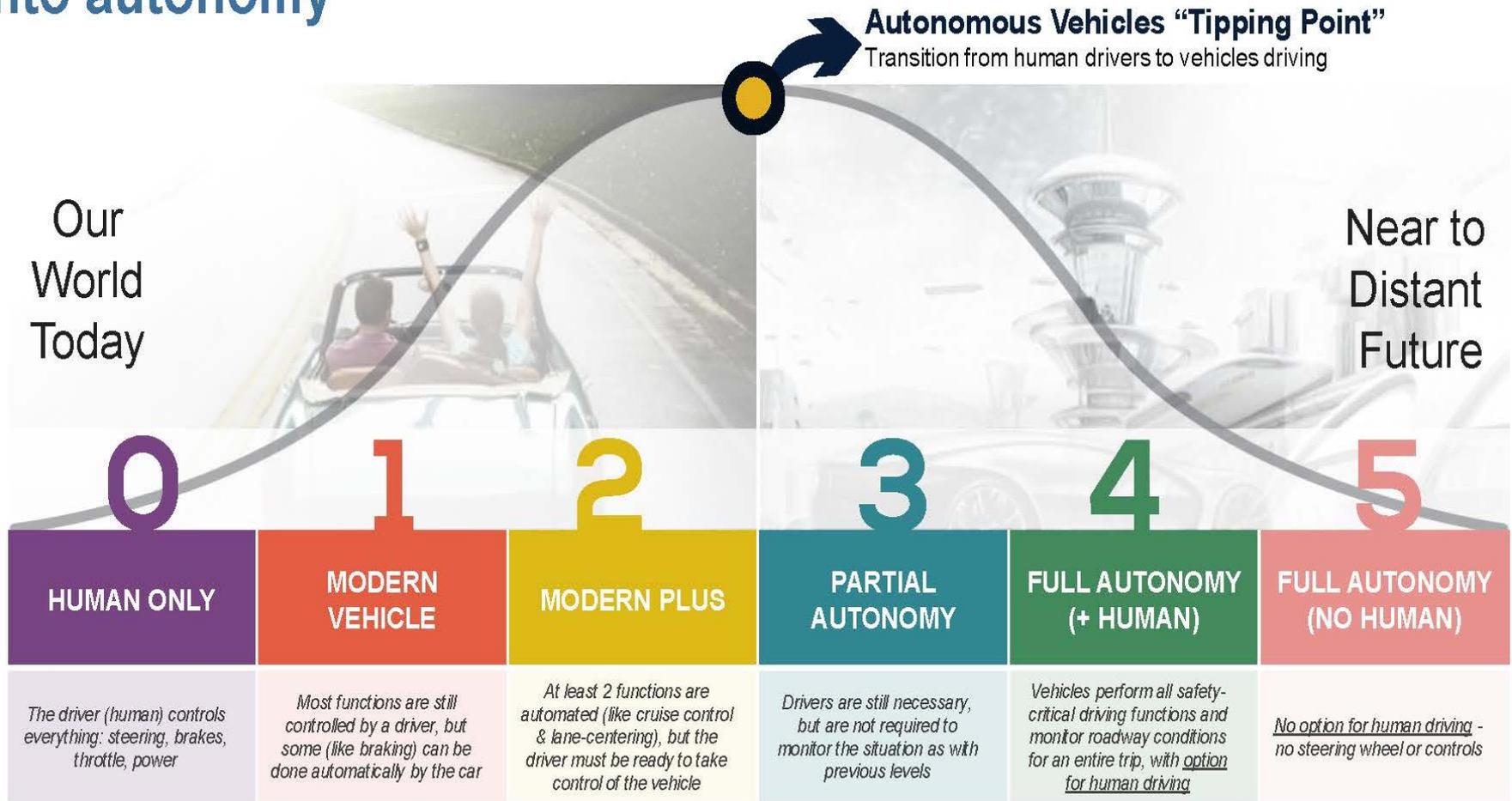


Science Digest (1958)

Autonomous Tipping Point



➤ Level 3 Partial Autonomy adoption is when the market "tips" into autonomy



Headlines: Impending Autonomy, but Fear



2017 U.S. Tech Choice Study: Consumers Fear Technology Failures with Autonomous Vehicles

BY JOSEPH DOBRIAN, APRIL 19, 2017



Hackers Describe How Hard It Is to Protect Autonomous Cars

April 13, 2017 - Written By Alexander Maxham



Autonomous vehicles

Who's self-driving your car?

The battle for driverless cars revs up



The Self-Driving Dilemma

Autonomous vehicles could spark a cleaner, cheaper urban mobility revolution—or they could make it tougher to combat sprawl, congestion, and climate change.



ANDREW SMALL | @ASmall_Word | May 4, 2017

The Race for Autonomous Vehicles Picks Up Speed

by PAUL A. EISENSTEIN



The Ethics of Autonomous Cars



Tesla's Self-Driving System Cleared in Deadly Crash

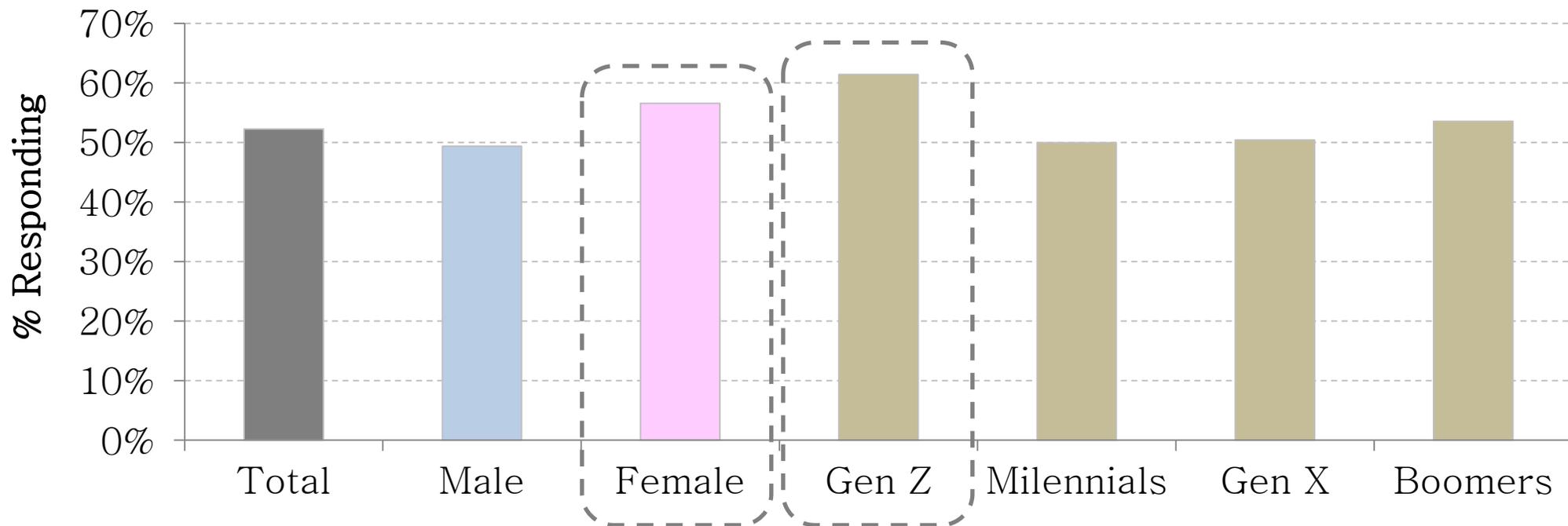
By NEAL E. BOUDETTE JAN. 19, 2017



Women / Gen Z Skeptical of Autonomous Safety



I Would Not Buy a Self-Driving Vehicle Due to Safety Concerns



“We’re calling (Gen Z) ‘the throwback generation,’...behavior is completely unexpected, and they are really pushing back from what Millennials were about.”

- Center for Generational Kinetics



Generation Z – Frugal, Brand-Wary, Determined



6

“We’re seeing similarities between Gen Z and those that emerged after the Great Depression.”



Rejection of Big Brands

- Grown up in era when information was available at all times
- **Less trusting** of brands – authenticity and transparency valued
- Occupy Wall Street Movement caused skepticism of big corporations



Financially Cautious

- Aware of Millennials living at home due to high debt
- Saving far earlier
- Realistic, but more optimistic than other generations
- Relate to technology as a tool vs. an obsession



Competitive, but Accepting

- “Survival mode:” Fight for what they want
- Feel lucky to get a job vs. Millennial entitlement
- Not judgmental and very accepting

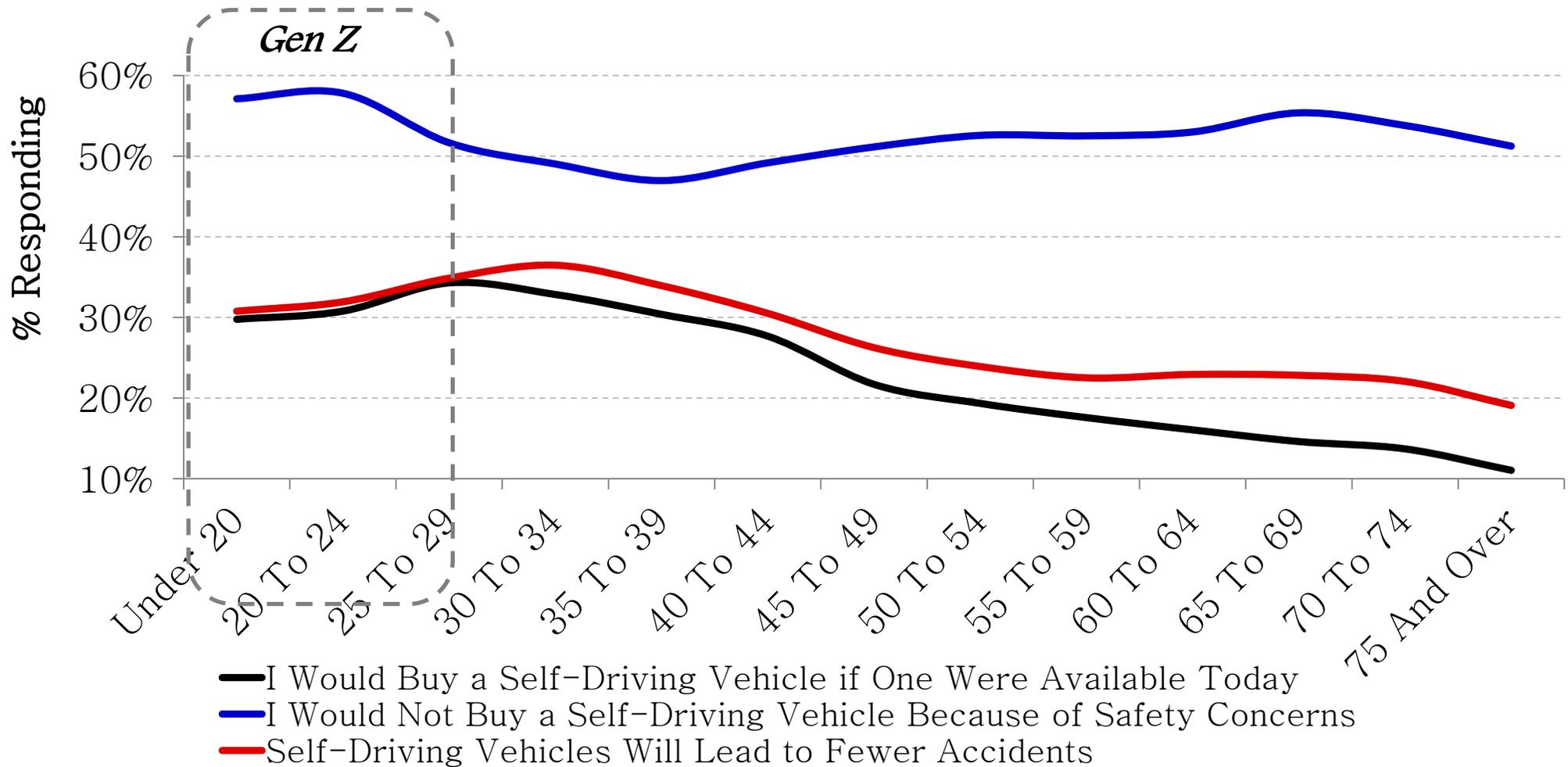


Source: FastCompany “Your Guide to Generation Z: The Frugal, Brand-Wary, Determined Anti-Millennials.”

Millennials Most Optimistic – Followed by Gen Z



Autonomous Vehicle Perceptions by Age

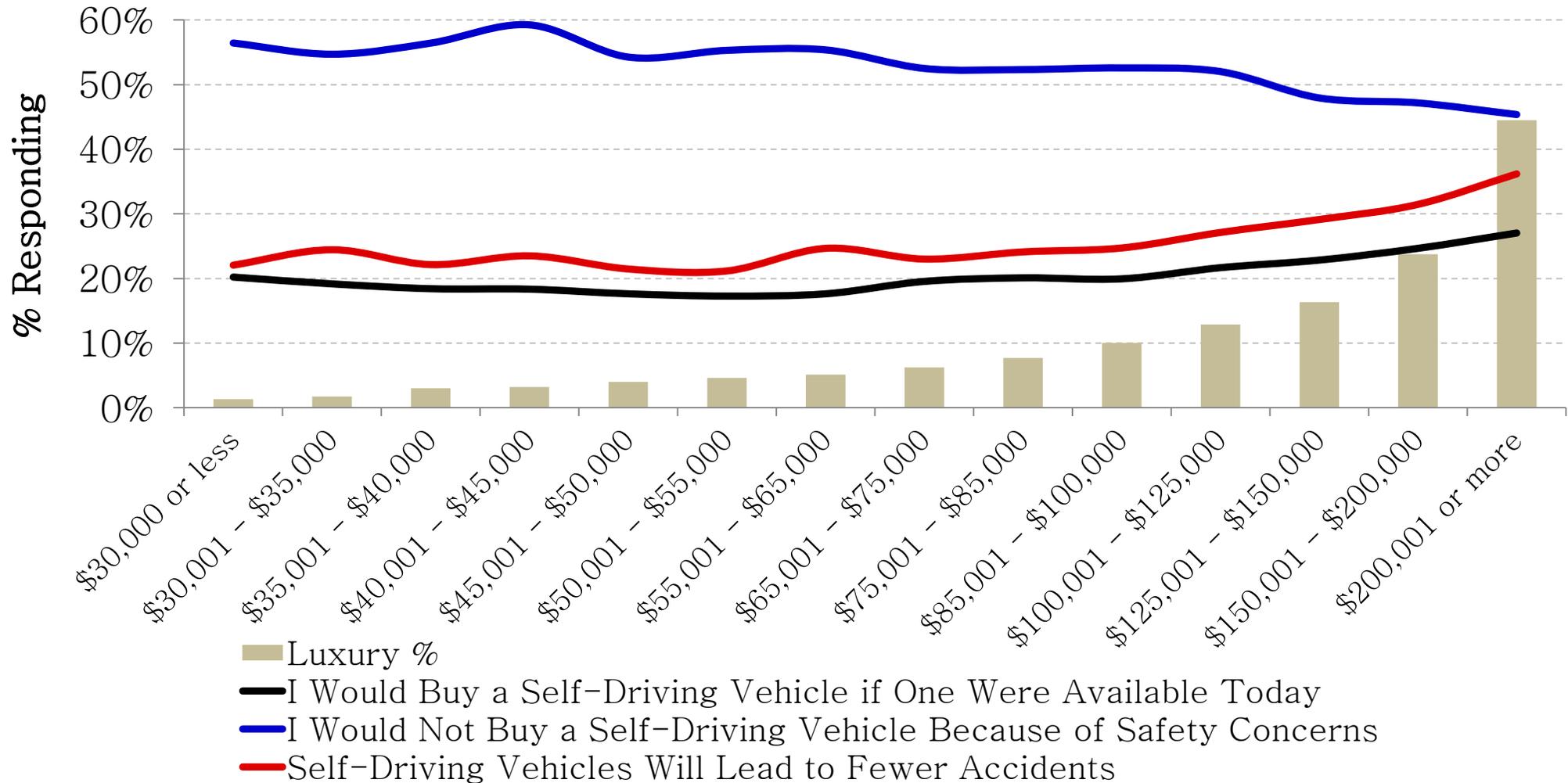


Source: 2016 Maritz NVCS

Optimism Increases with Higher Income

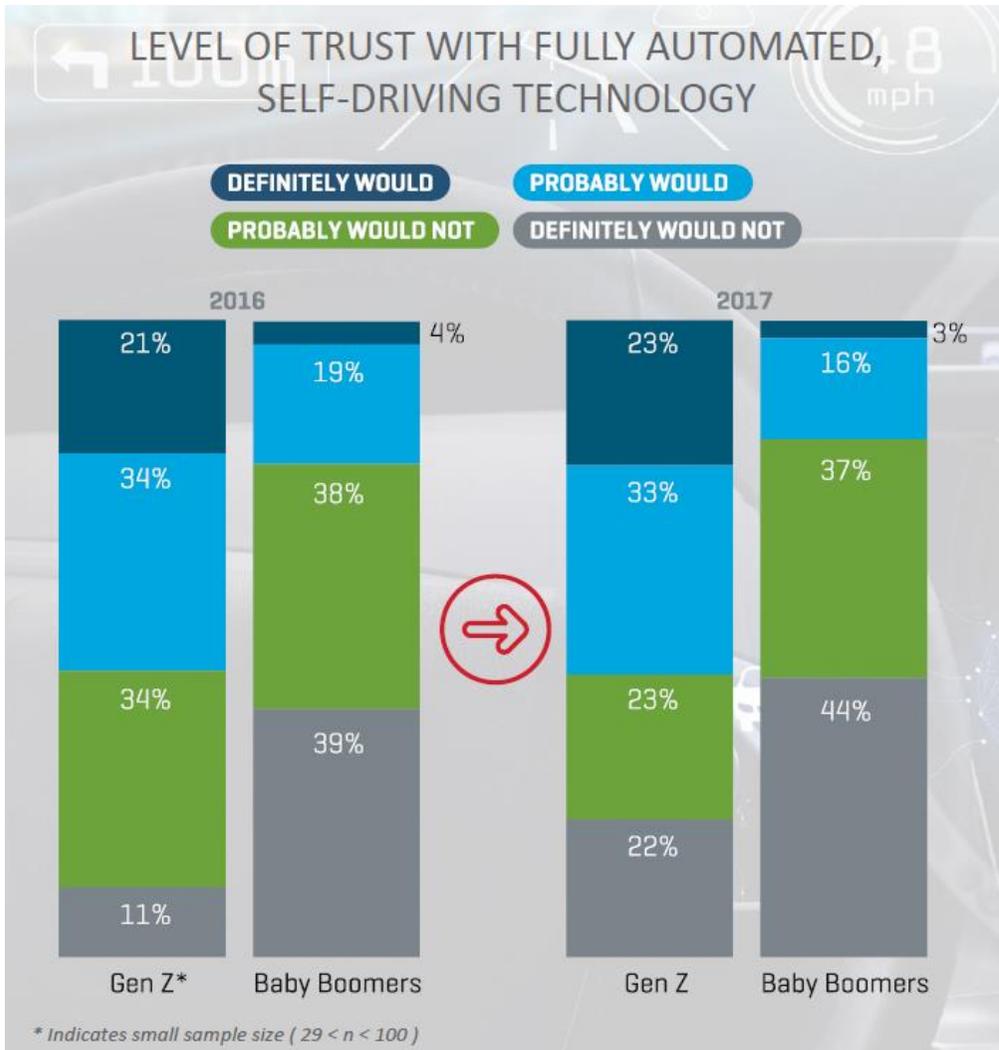


Autonomous Vehicle Perceptions by Income



Source: 2016 Maritz NVCS

Level of Trust in Autonomy Declining...for Most



“With the exception of Gen Y, all other generational groups are becoming more skeptical of self-driving technology, which poses a new challenge to car manufacturers and technology developers...”

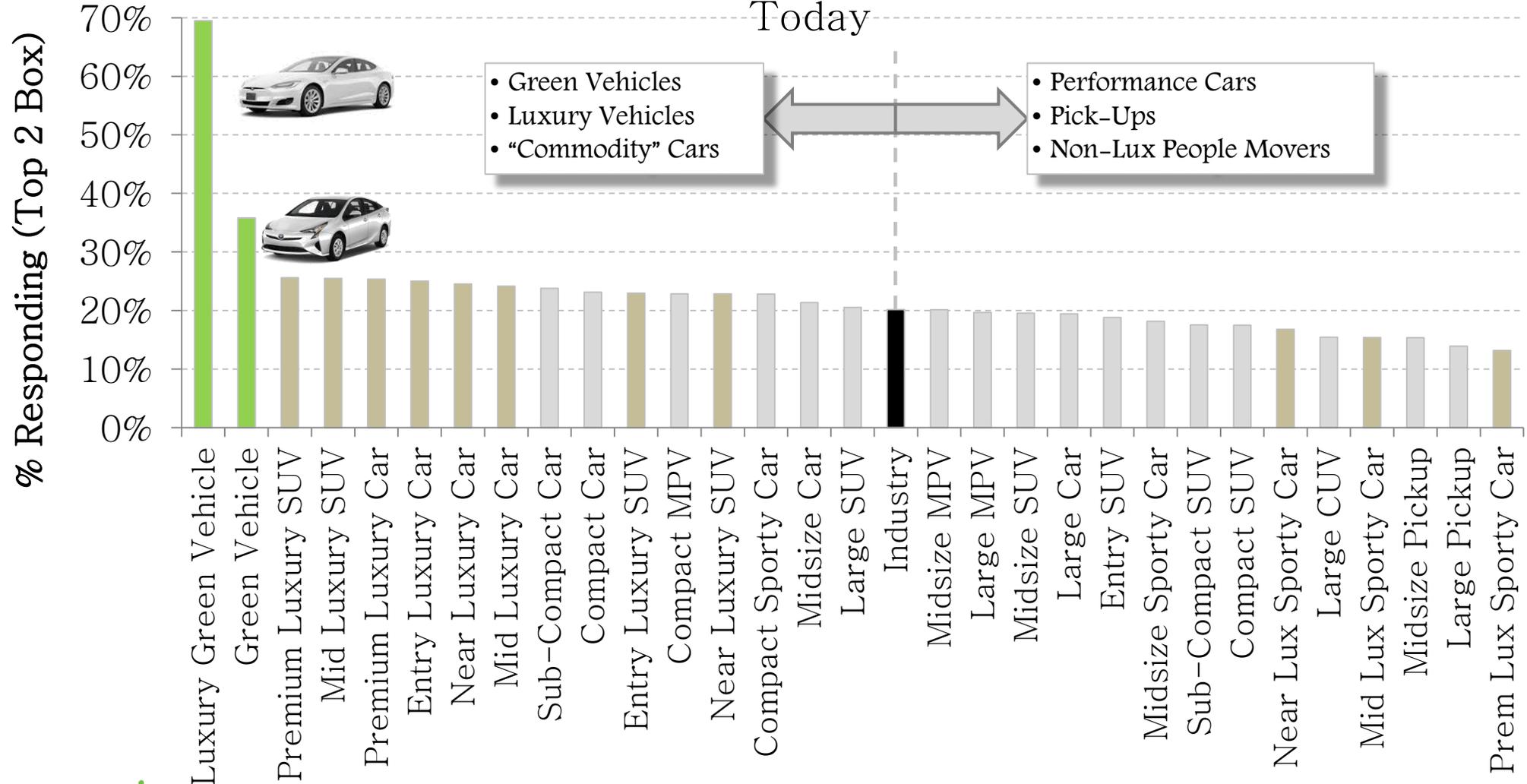
... we see a pattern where trust drives interest in the technology and right now, the level of trust is declining.”

J.D. POWER

Challenge to win over SUV/Minivan buyers



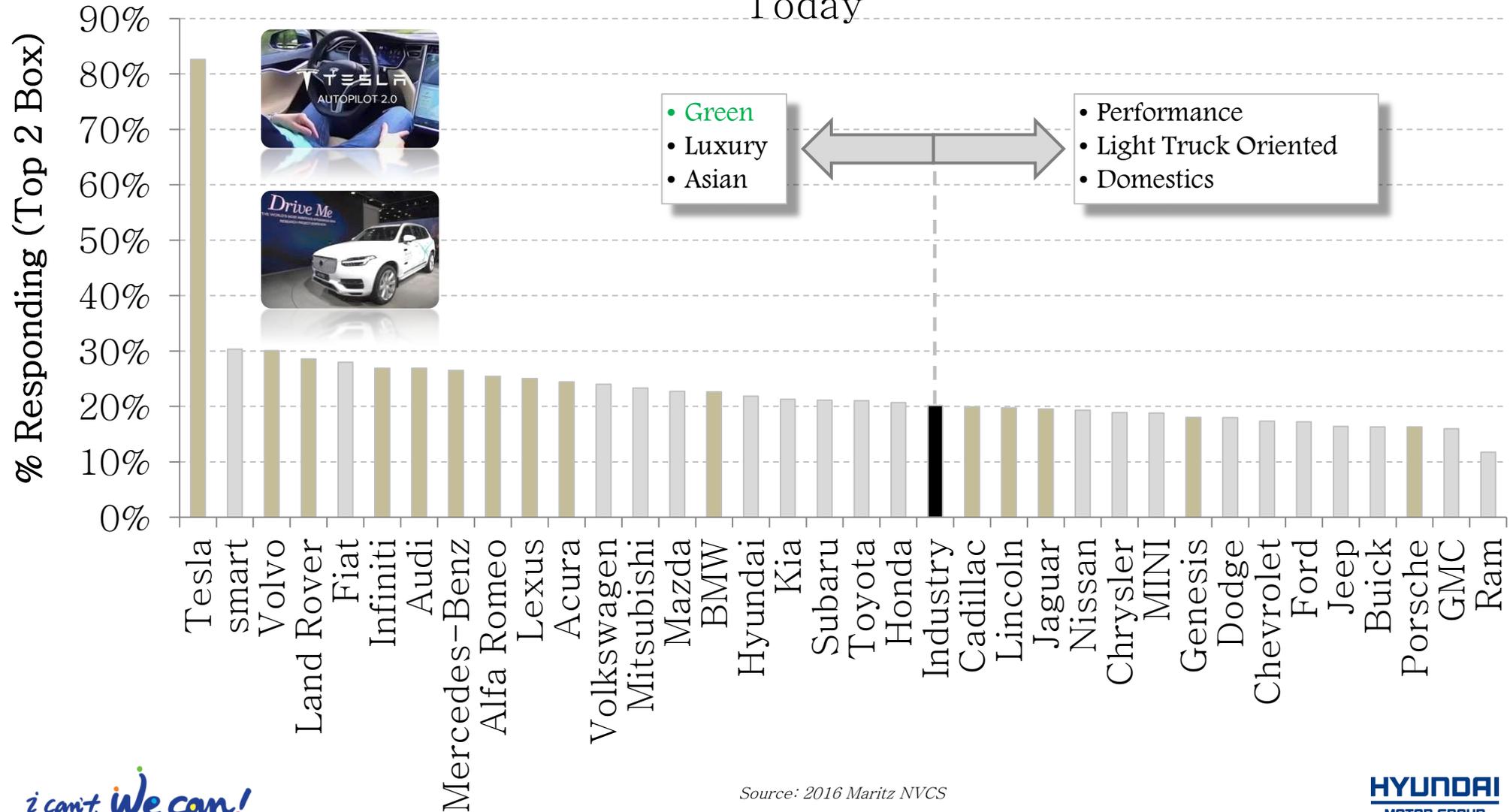
I Would Buy a Self-Driving Vehicle if One Were Available Today



Brands Tell an Interesting Story



I Would Buy a Self-Driving Vehicle if One Were Available Today

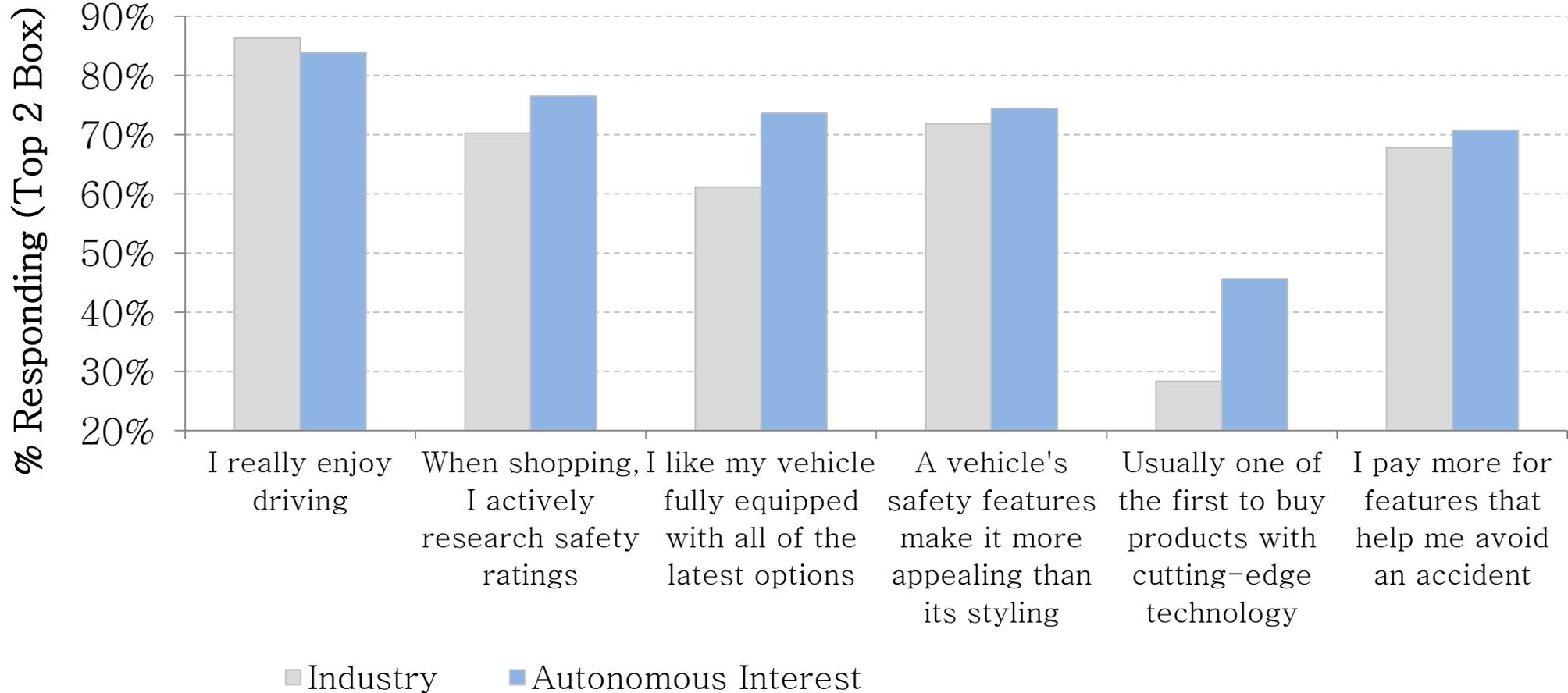




A safer, higher tech possibility – in theory

- Consumers with higher interest in autonomy are more sensitive to safety, attracted to options/technology and may enjoy driving slightly less

Self-Driving Vehicle Buyer Attitudes

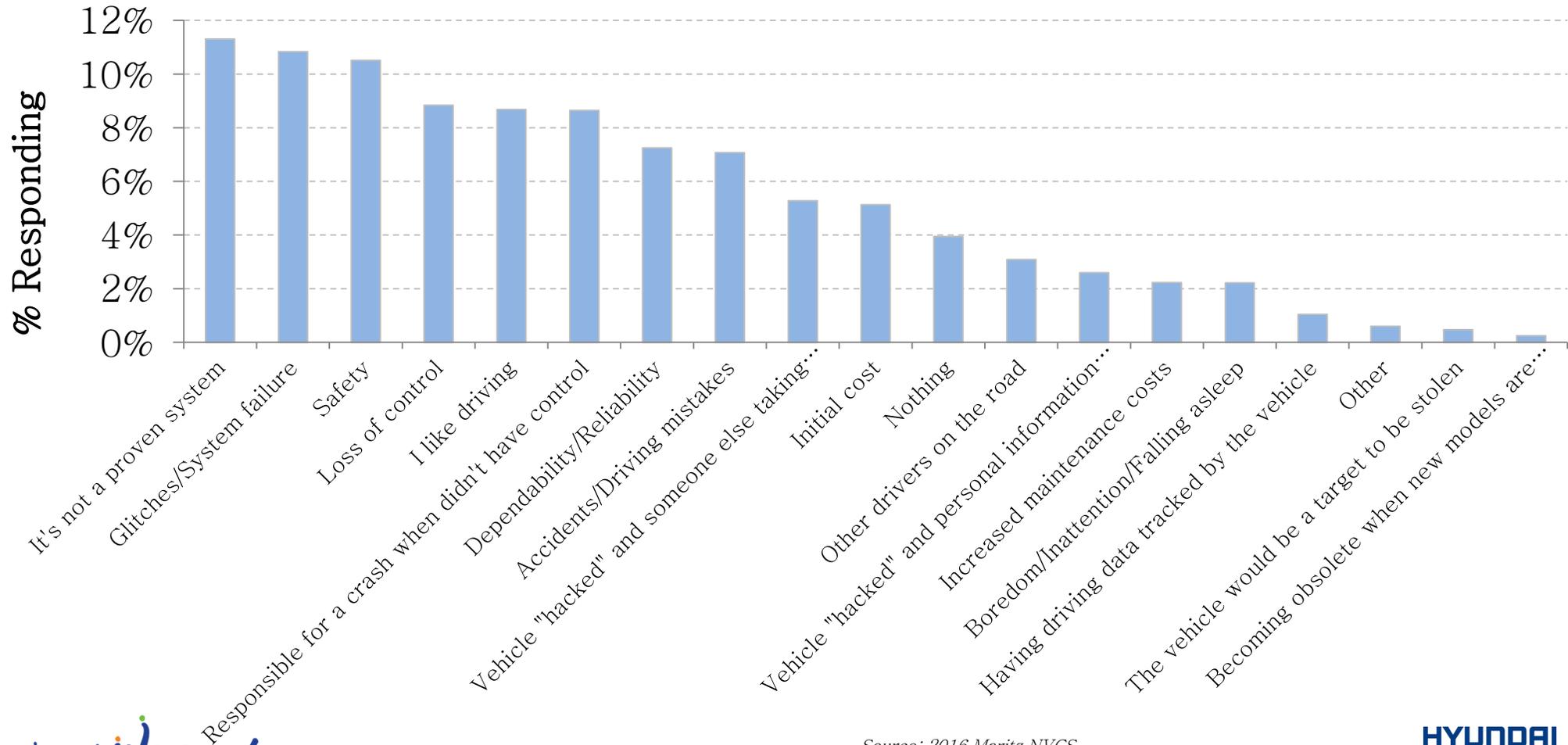


Safety paradox: largest opportunity and worry



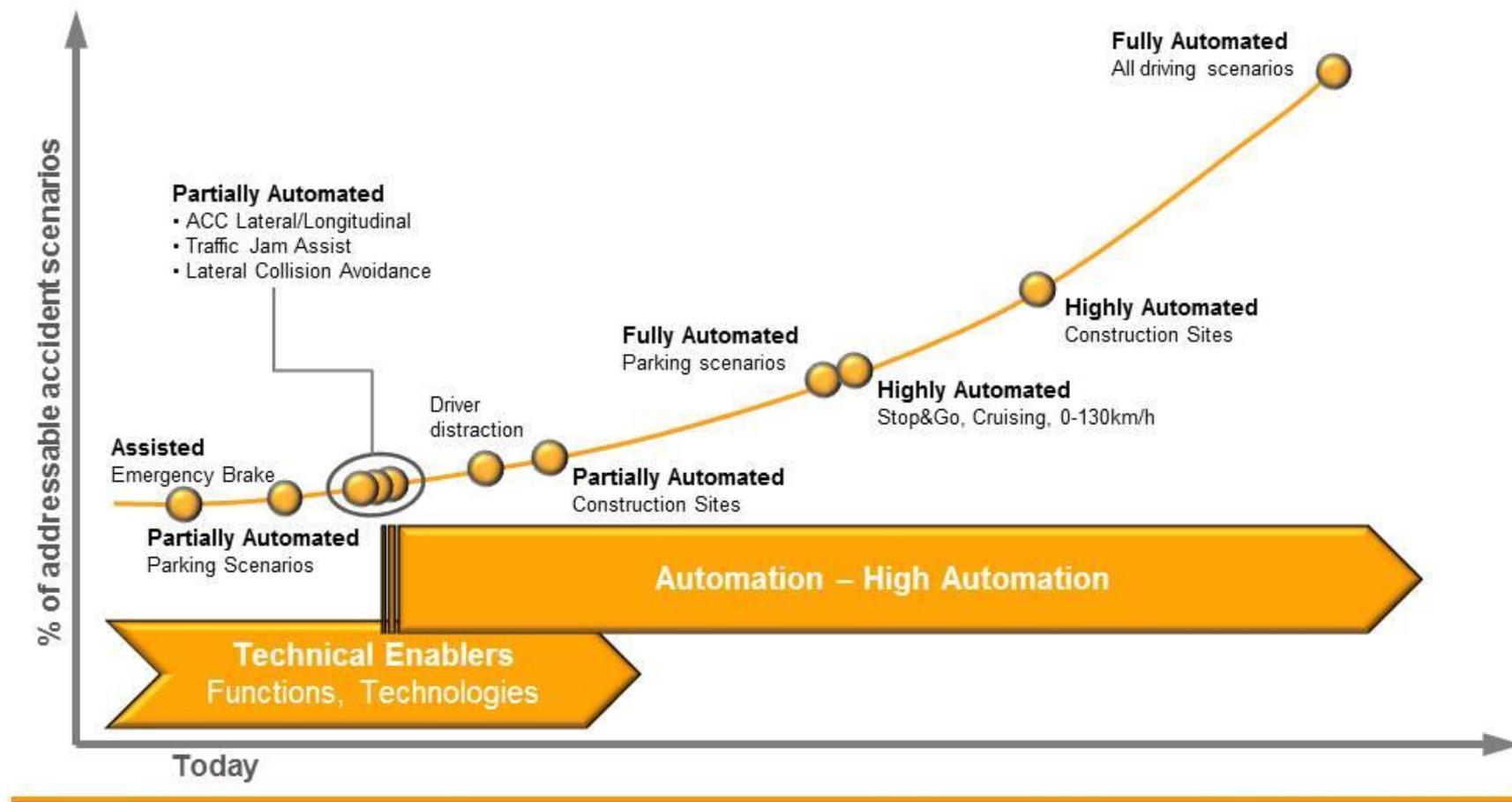
- **Primary autonomy concerns: Safety/loss of control, hacking, reliability, cost**
- **In addition, up to 10% express an interest in driving themselves**

What Concerns You Most About a Self-Driving Vehicle?





The Roadmap to accident free driving From assisted to automated driving



A Matter of Trust – Consumers



| PRO | CON |
|---|---|
| <i>“... protects my poor decisions in the car.”</i> | <i>“I don` t want to have the control of a car out of my</i> |
| <i>“More automation to reduce human stupidity while awesome.”</i> | <i>“I think I am a better driver than a machine.”</i> |
| <i>“It is an added safety feature to all the distracted</i> | <i>“I want full control of the vehicle. No surprise am not expecting.”</i> |
| <i>“Any function that will help me keep a car-to-car excellent. I think this should be installed on all new Motorists drive to close to one another.”</i> | <i>“Autonomous cars are still new, so some people still to the idea of having their car drive for them. It` d people uncomfortable.”</i> |
| <i>“I` m personally looking forward to this technology. break every now and then from driving will be</i> | <i>“I would like to hear a reassurance that the odds of it hacked are low...and maybe things they are doing to doesn` t happen.”</i> |
| <i>“Assisted driving could lower the number of</i> | <i>“If I concentrate on my driving all the time, I am the time. If I surrender control of my car to a chip, responsible for the person my lane deviation kills or</i> |

A Matter of Trust – Media



Google



*“...many consumers are more likely to **trust** tech companies—rather than traditional automakers—to develop safe and reliable autonomous vehicle technology.”*

– JD Power

*“...fewer than half of US consumers surveyed say they **trust** traditional OEMs to bring fully autonomous vehicles to market, opening the door for new entrants to gain a critical foothold...”*

– Deloitte



WAYMO

“...persuading people to actually get in one of these vehicles with no human fallback will take some effort... it may be necessary for the car to tell passengers what it's doing (slowing down, say) and explaining why (because a dog ran into the street).”

– Auto

News



*“In the near future, cybersecurity literally will be a life-and-death matter...It is critical for the simple fact that it pertains to consumer **trust** in a brand and confidence in autonomous vehicles.”*

– NADA



*“The challenge for vehicle manufacturers now is two-fold: fix the technology hiccups & get consumers to experience it for themselves. The answer lies in the ability of manufacturers to build the **trust** between human emotion & technological reliability.”*

Power

i can't. We can!



Electric Vehicles: Dollar Rules

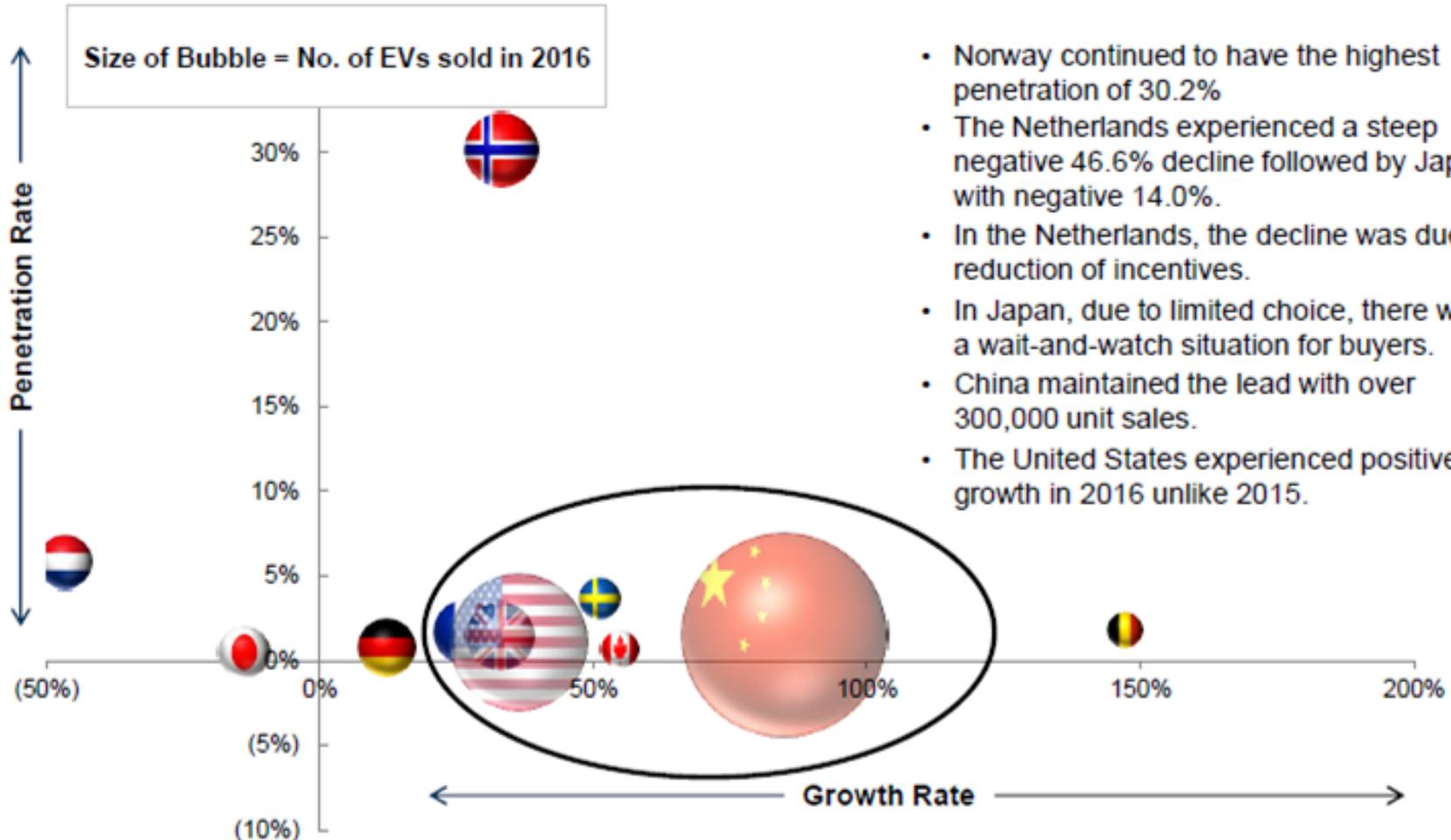




U.S. EV Market: Tempered Growth

- U.S. EV sales increase 35%–40% in 2016, but penetration remains low (2%–3%)

Total EV Market: Growth Analysis for Top Countries, Global, 2016

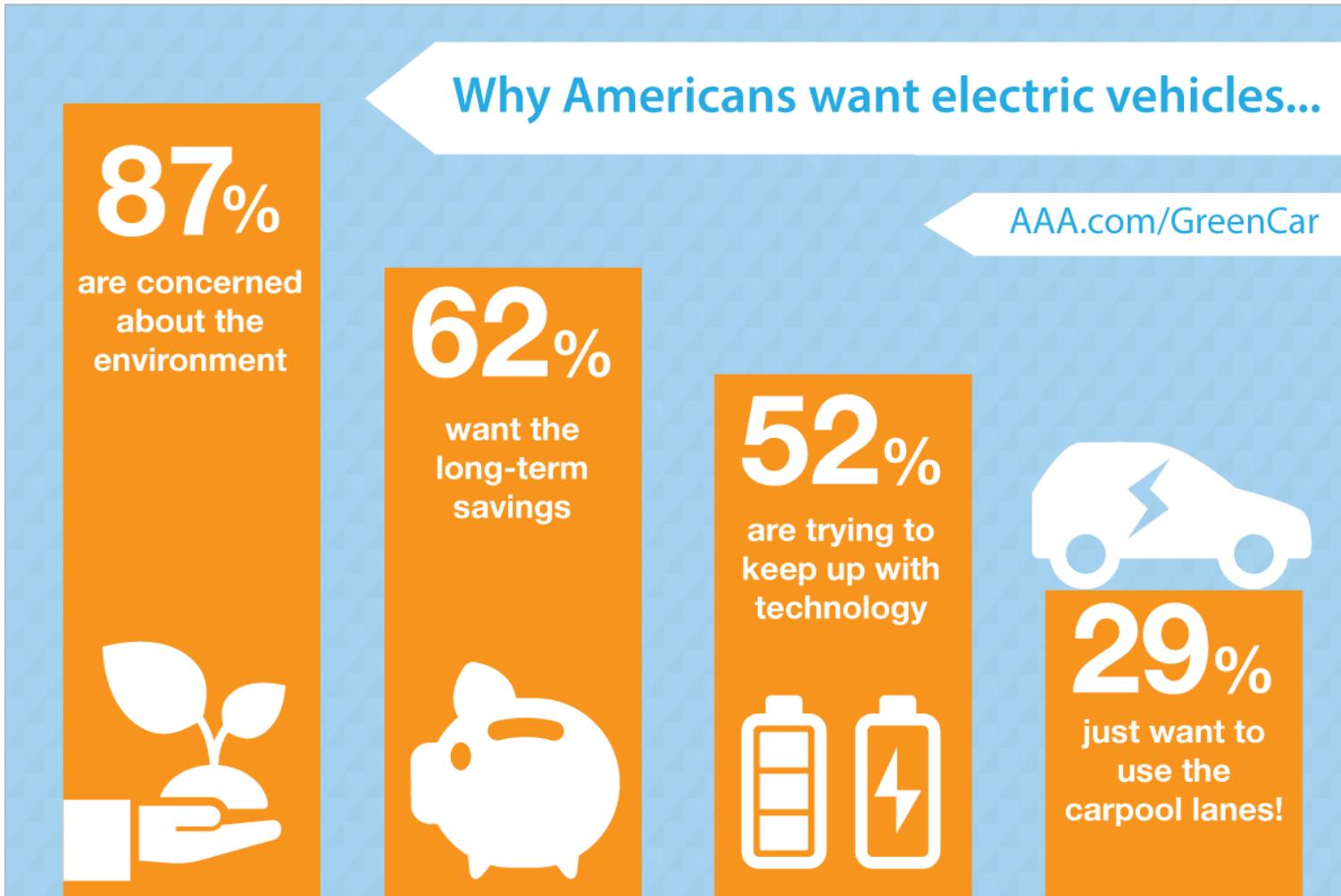


- Norway continued to have the highest penetration of 30.2%
- The Netherlands experienced a steep negative 46.6% decline followed by Japan with negative 14.0%.
- In the Netherlands, the decline was due to reduction of incentives.
- In Japan, due to limited choice, there was a wait-and-watch situation for buyers.
- China maintained the lead with over 300,000 unit sales.
- The United States experienced positive growth in 2016 unlike 2015.

Cognitive Dissonance: Ethics vs. Wallets



- Consideration of EVs mainly centers on the Environment and Financials
- Secondary considerations include Carpool access & keeping up with Technology

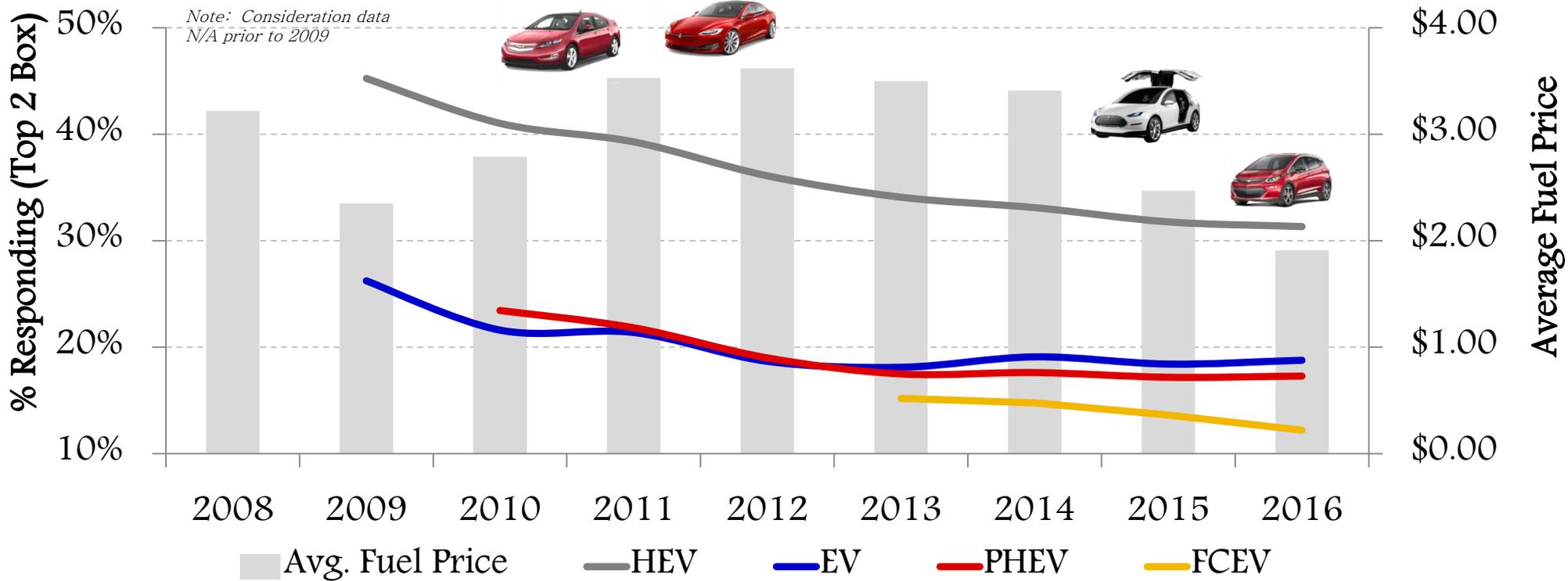




EV interest conflicts with regulation plan

- Consideration of alternative fuel options drops through 2016
- Despite compelling new EVs, low fuel price and positive economy support continued purchase of conventional gas vehicles

Alternative Fuel Consideration

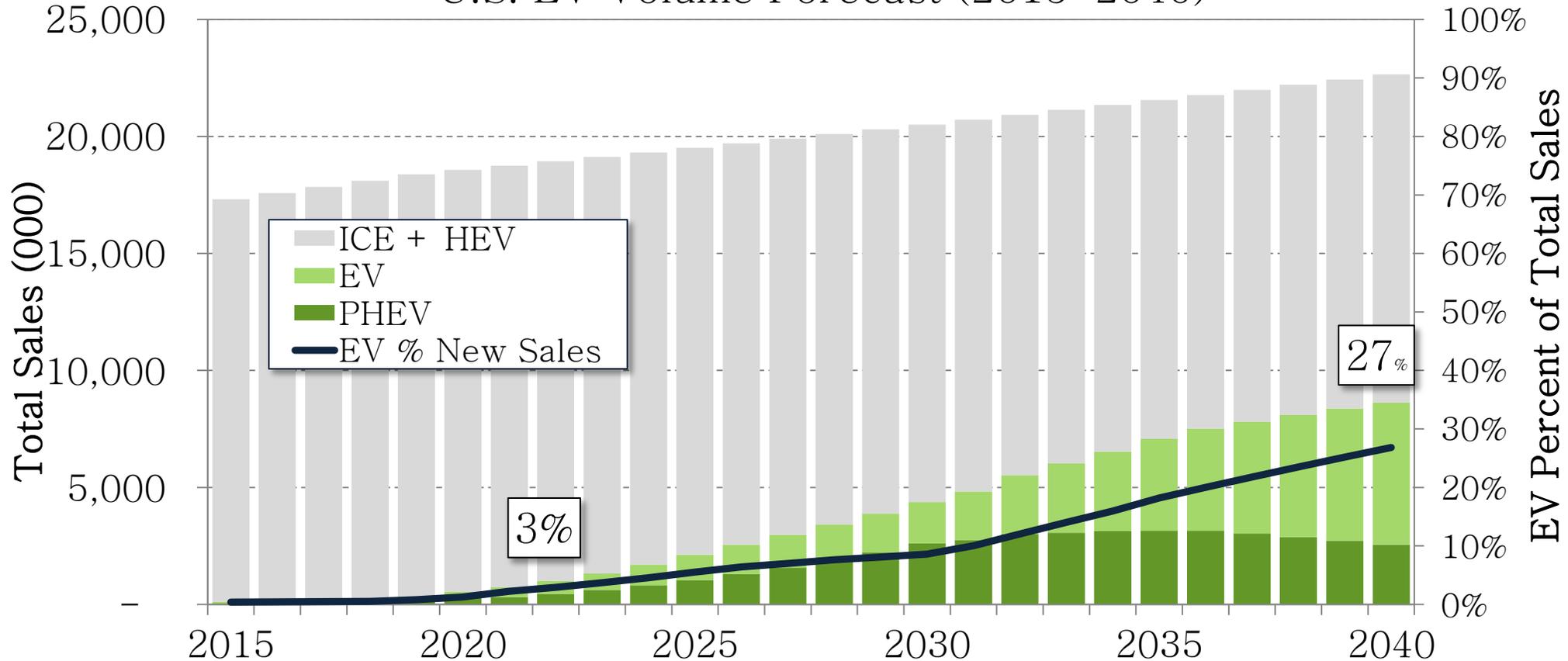




Slow growth through 2040

- U.S. EV forecast is only 3% of the market in 2022, rising to 27% by 2040
- While EVs continue to increase through 2040, PHEV begins to decline after 2035

U.S. EV Volume Forecast (2015-2040)



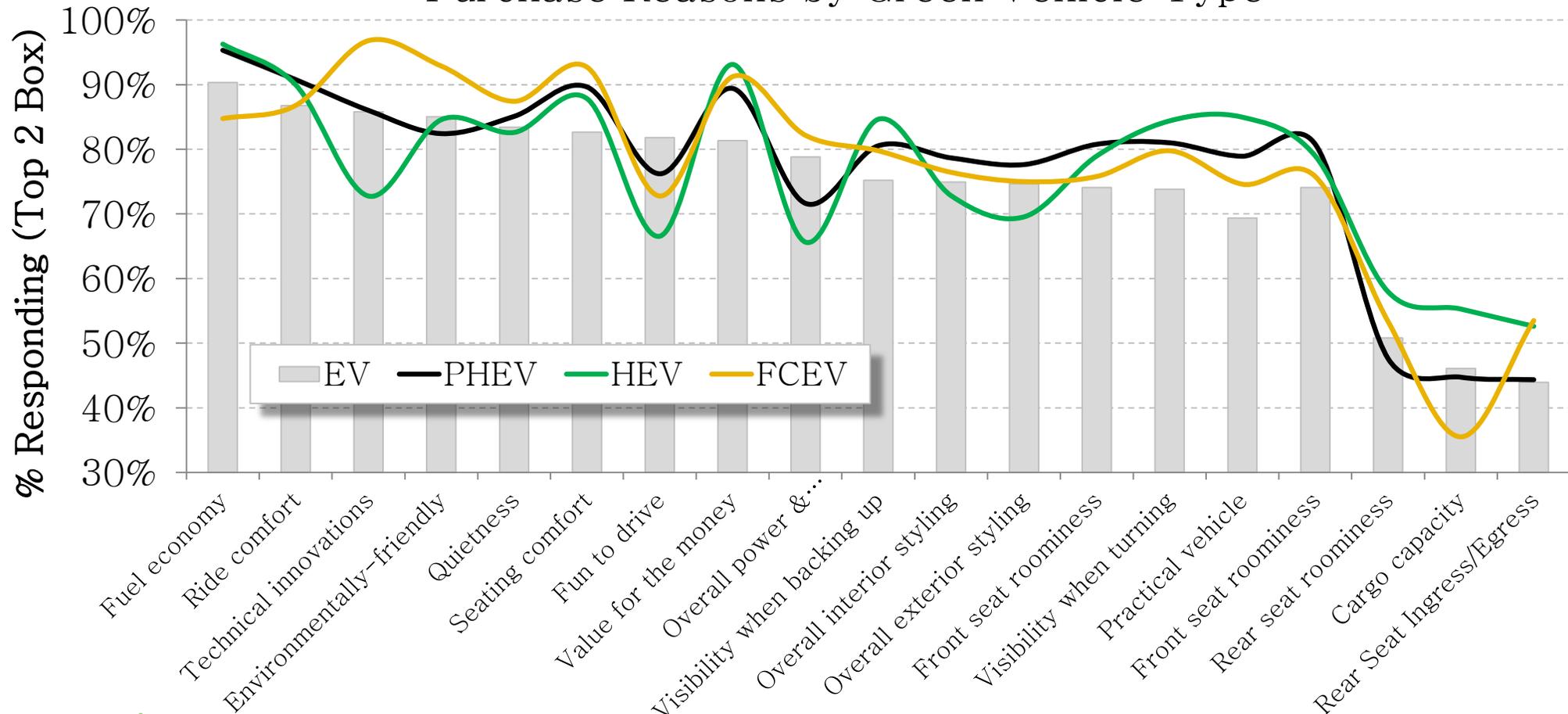
Source: IHS, Bloomberg New Energy Finance



Green Vehicle consumers are largely unique

- EV/PHEV consumers most similar, but PHEV buyers seek to minimize trade-offs
- HEV: Low on Technology, Fun-to-Drive, but prioritize Practicality
- FCEV: High on Technology, Power, Environment, but low on Fuel Economy

Purchase Reasons by Green Vehicle Type

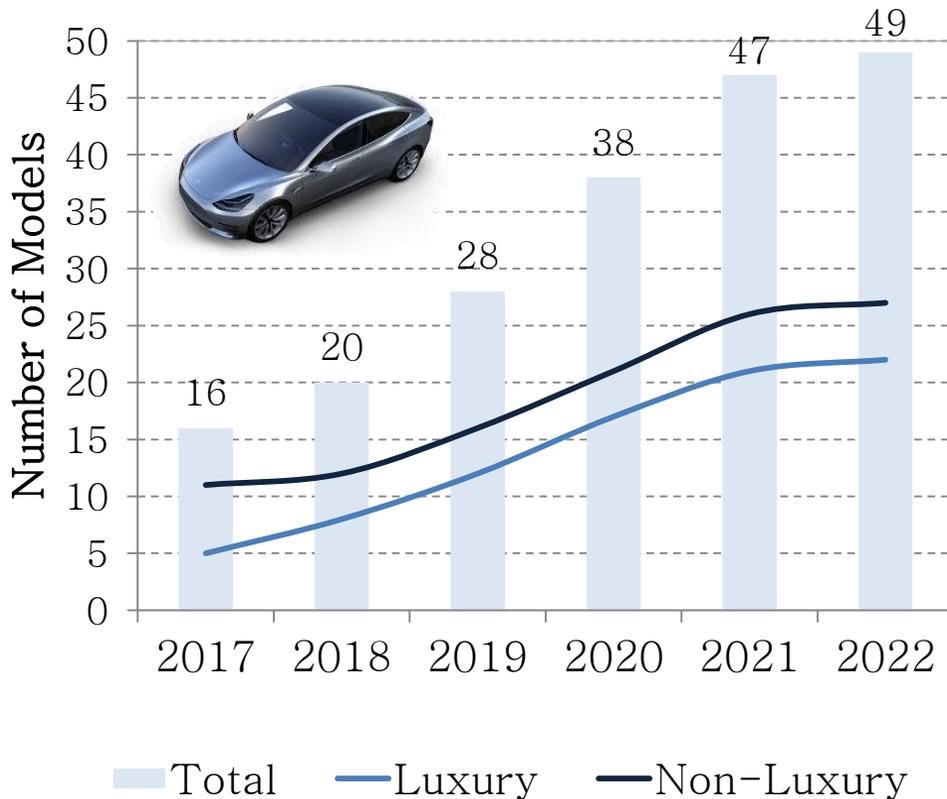




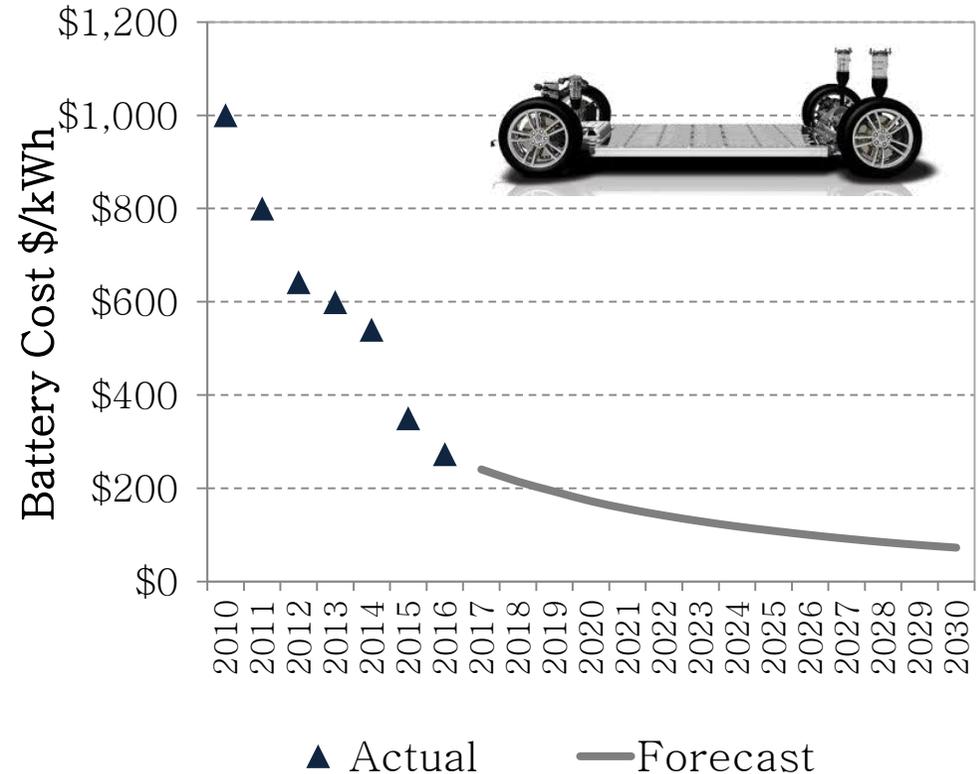
Number of options increase as costs drop

- Number of EVs expected to triple over the next 5 years
- Continued drop in battery prices enables TCO of EVs = ICEs by 2025

of EVs through 2022



Li Ion Battery Costs

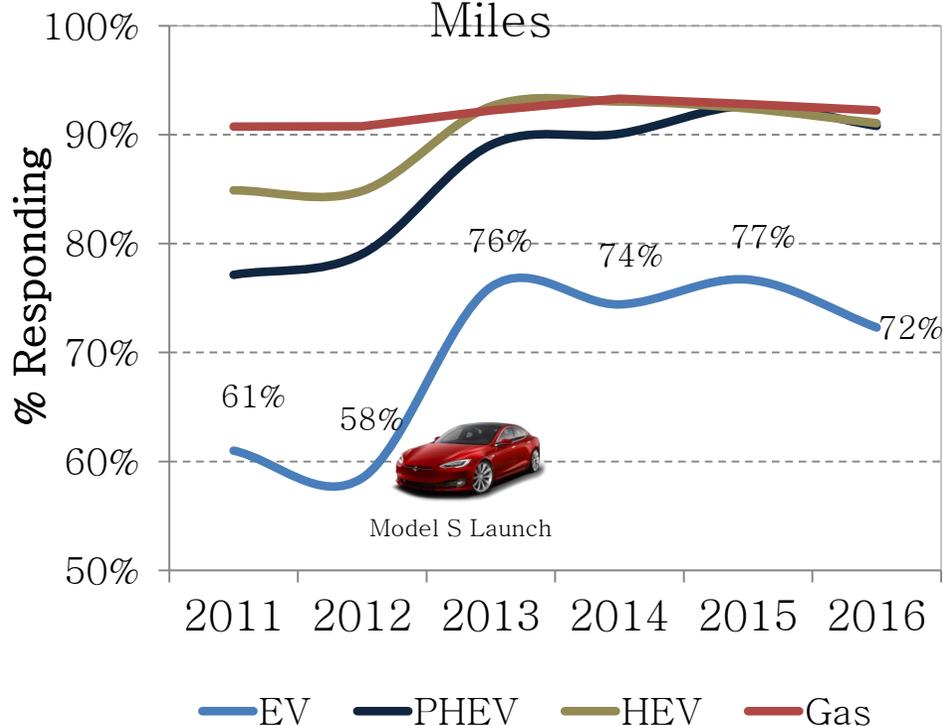


EV range expectation approaches gas vehicles

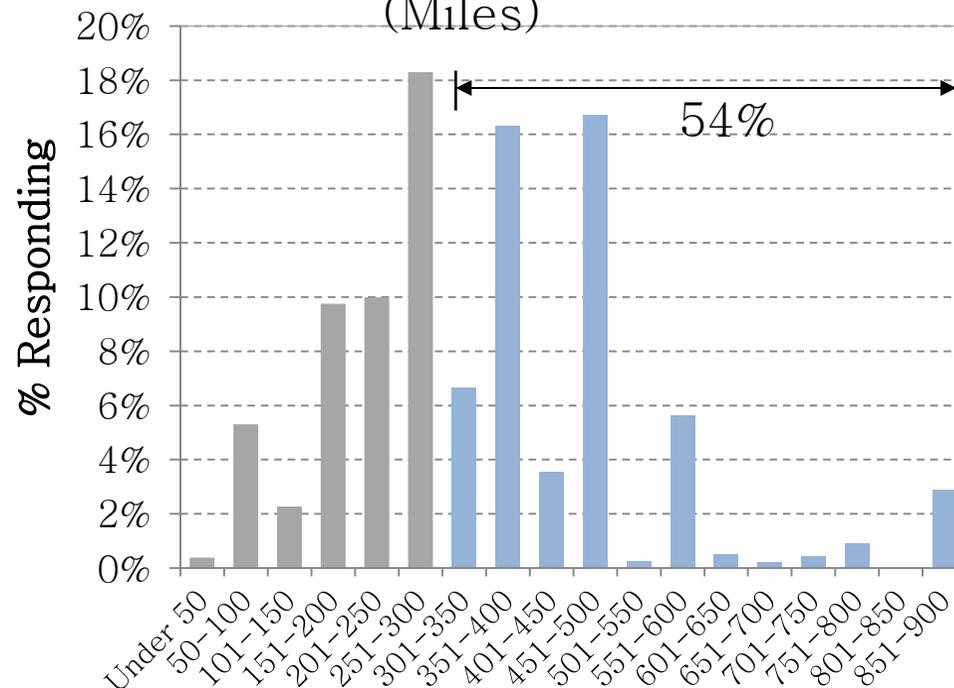


- All electric range (AER) expectations have risen significantly since 2011
- 54% of EV intenders surveyed in 2016 expect 300+ miles AER

Range Expectation – 250+ Miles



2016 EV Range Expectation (Miles)



Source: AutoPacific Competitive Battleground; AutoPacific FADS; AutoSource



Tiering: A relatable EV purchase model

- **AER expectations have risen beyond the minimum for many consumers**
- **Opportunity to implement modular/tiered strategy to meet wider consumer needs**
 - **Tesla has already implemented this strategy, with battery options ranging from 75kWh to 100kWh on Model S and X**

| iPhone Tiered Model | | | | |
|--|-------------------------|-------------|--------------|---------------|
| <u>Model</u> | <u>Screen Size Size</u> | <u>32GB</u> | <u>128GB</u> | <u>256GB</u> |
|  SE | 4" Diagonal | \$399.00 | \$499.00 | Not Available |
|  7s | 4.7" Diagonal | \$649.00 | \$749.00 | \$849.00 |
|  7s Plus | 5.5" Diagonal | \$769.00 | \$869.00 | \$969.00 |

| Other Tiered Products | |
|---|---|
| Communications (Data Usage) | |
|  at&t |  verizon |
|  | |
| Entertainment (Content/Speed) | |
|  U-verse |  |
|  |  |
| Computer (Processor/Memory) | |
|  |  |
|  |  |

Gratuitous Plug...with a relevant message



26



- 1st Green Vehicle with 3 P/T types: EV, HEV, PHEV
- Addresses consumer demand for efficiency plus practicality and styling
- Innovative EV leasing plan:
 - 36-month lease ranging from \$275-\$365 + tax
 - \$2,500 down payment covered by CA \$2,500 incentive
 - Unlimited miles
 - Charging reimbursement
 - Scheduled maintenance for 50K miles



The Power to Surprise

NIRO



- 1st non-luxury dedicated SUV Green Vehicle
- 2nd best-selling Dedicated Green Vehicle for 2017
- 4th best-selling Green Vehicle overall for 2017
- HEV & PHEV versions (PHEV available 2nd half 2017)
- SUV style & image with Green Vehicle efficiency

- *OEMs require innovative marketing to offset Green Vehicle affordability*
- *Consumers now demand Green Vehicle efficiency with conventional vehicle style & practicality*

i can't. We can!

Autonomous Vehicles

- ADAS enables transition to full autonomy
- Implementation, customization and ease of use build trust
- Trust (in accuracy, performance, safety) is the key to mass adoption
- Skepticism grows, with Gen Z preliminarily more pragmatic than Millennials



Electric Vehicles

- Consumer interest grows, but financials & AER still hinder adoption
- OEMs adopt innovative marketing to encourage sales
- Battery tiering and Tech company partnerships are powerful enablers
- New models minimize sacrifices for efficiency
- EV/Gas “singularity” projected at 2025



Questions?

