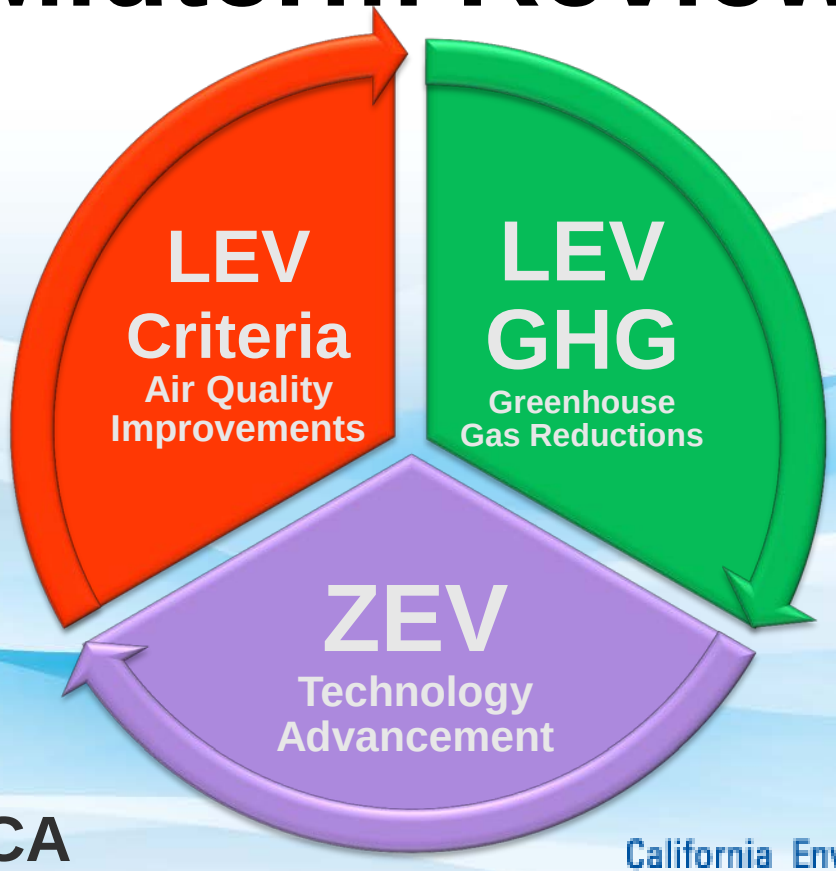
2015 Update to the Board: Advanced Clean Cars Program Midterm Review

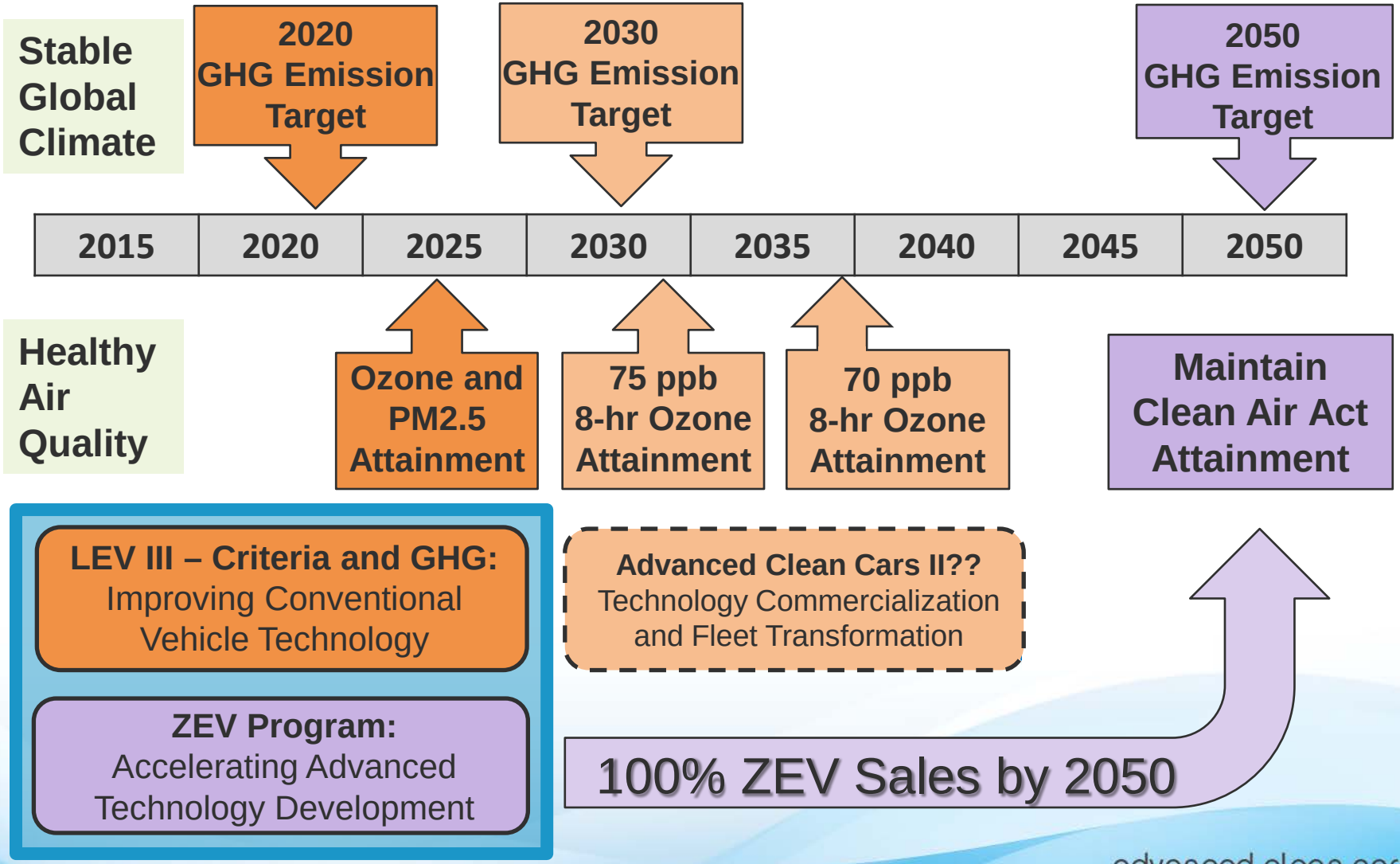


Diamond Bar, CA

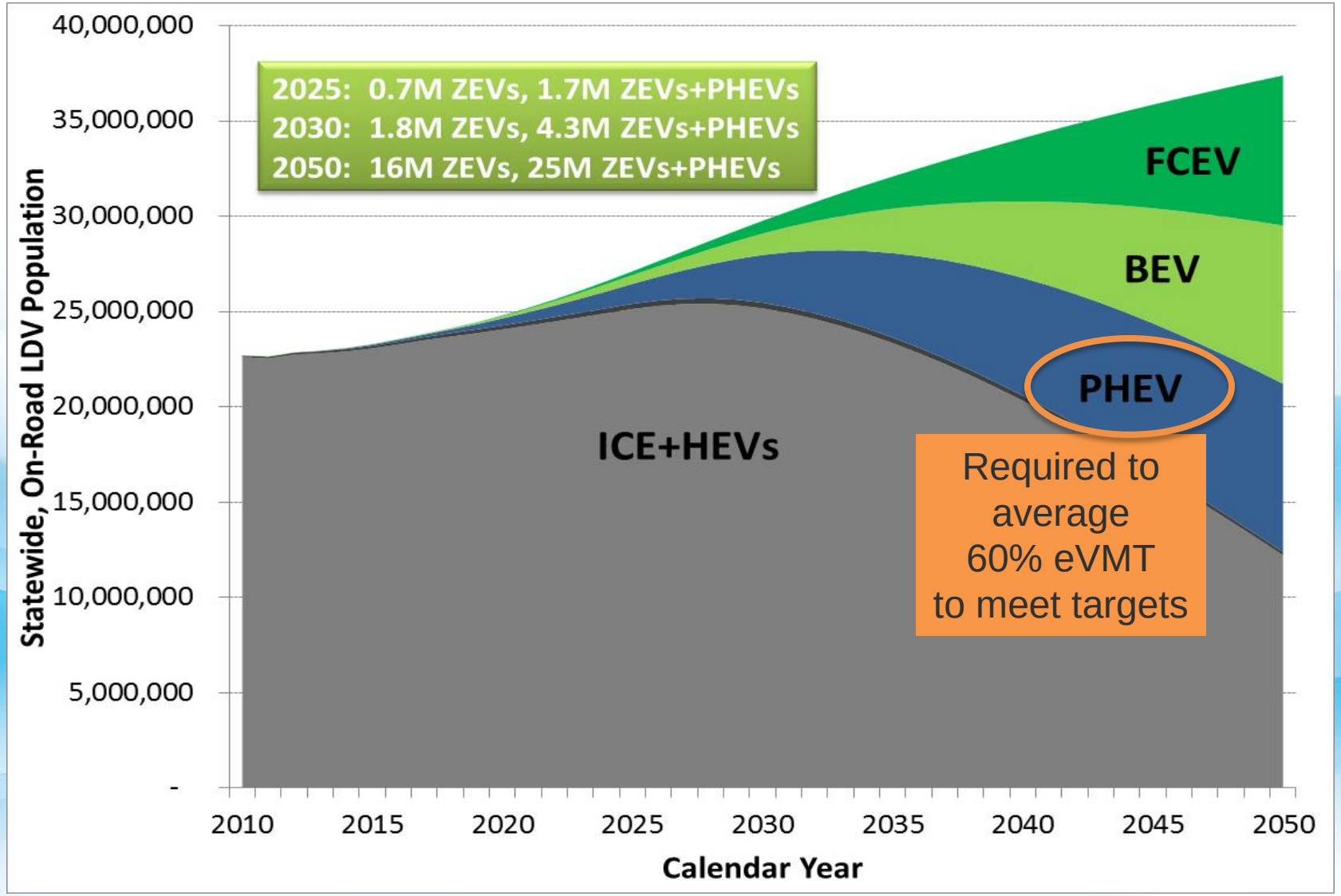
October 22, 2015

California Environmental Protection Agency
Air Resources Board

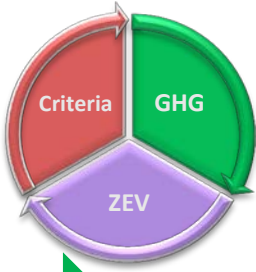
Role of Advanced Clean Cars



Mobile Source Modeling Re-affirms Need for ZEVs



ARB's Midterm Review



GHG (with Federal Partners)

Load and mass reduction studies

Testing and benchmarking of advanced engines and drivetrains

Review of market acceptance of emerging GHG technologies

Teardowns of new vehicle technologies

ZEV Review

ZEV credit analysis

Technology assessment

Role of PHEVs/OEM Data Analysis

Consumer awareness and attitudes

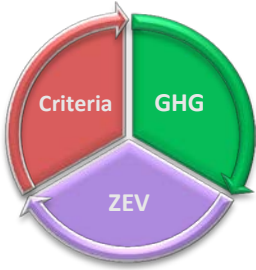
Infrastructure Assessment

1 mg/mi PM Standard

Measurement feasibility

Vehicle feasibility and testing

Midterm Review Timeline



ARB

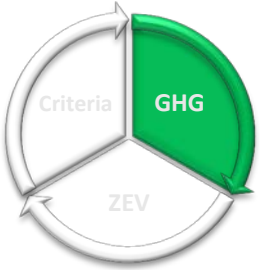
- ZEV Infrastructure Update
- PM Measurement Capability Update
- Full CA Midterm Review Presented

2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020

EPA/ NHTSA /ARB

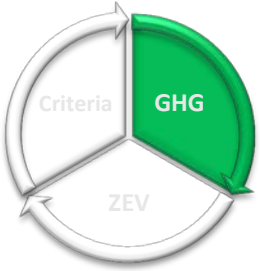
- National GHG Joint Technical Report
- Joint Decision on appropriateness of National standards [*Due <u>No Later than</u> April 1*]

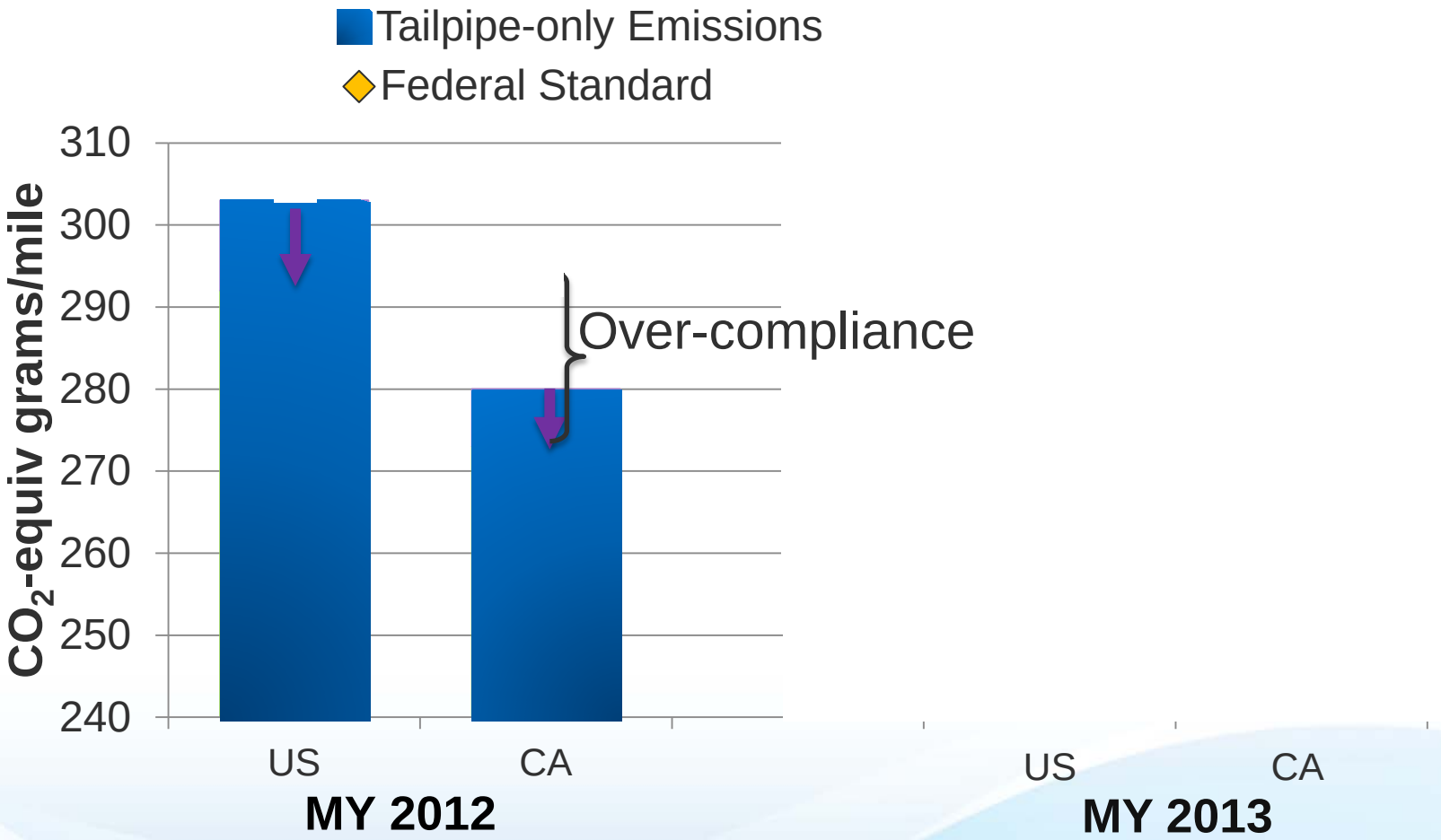
LEV-GHG Review Status



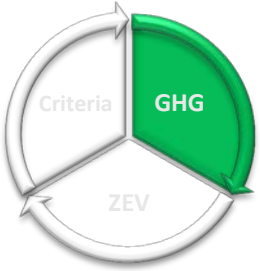
- Manufacturers are over-complying with current GHG standards
- Initial findings show manufacturers on track to comply with future standards
  - NAS Committee Report concluded compliance with future standards is feasible
  - ARB research shows road load reduction can contribute substantially (powertrain/engine improvements contribute remainder)

CA vs. US Compliance with One National Program for GHG



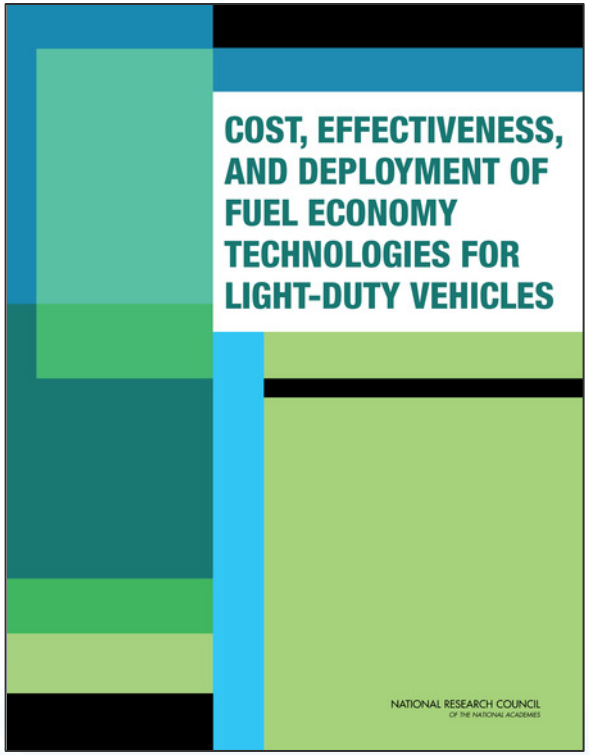


Standards calculated based on sales from the six large volume manufacturers subject to CA GHG regulations for MY 2012-2013 including credits.



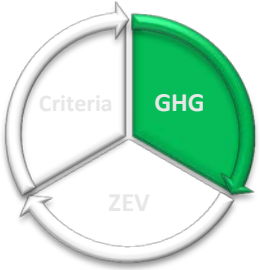
2015 NAS CAFE Study

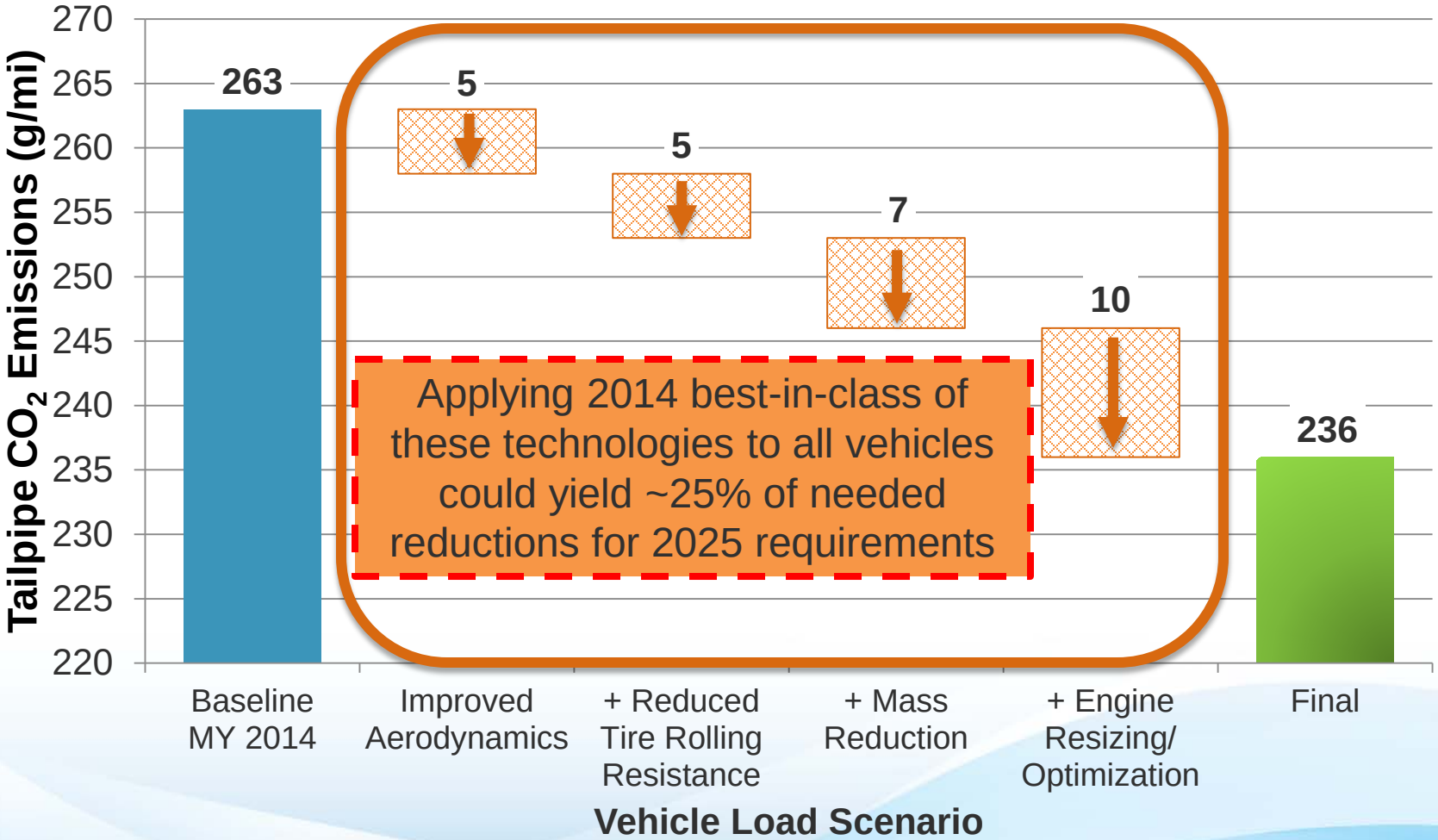
Conclusions



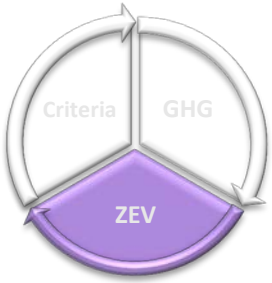
- "The committee found **the analysis conducted** by NHTSA and EPA in their development of the 2017-2025 standards to be **thorough and of high caliber on the whole**."
- "Most of the vehicles use spark-ignition gasoline engines and demonstrate the potential for **conventional technologies to meet these standards**."
- Acknowledged the California ZEV regulation in driving higher ZEV volumes than would be likely required through the GHG tailpipe and fuel economy standards alone.

ARB Research Contract on Road Load Reduction Potential



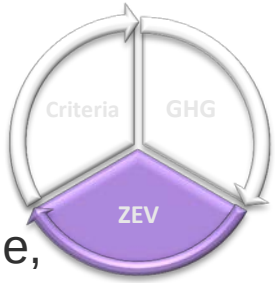


ZEV Review Status

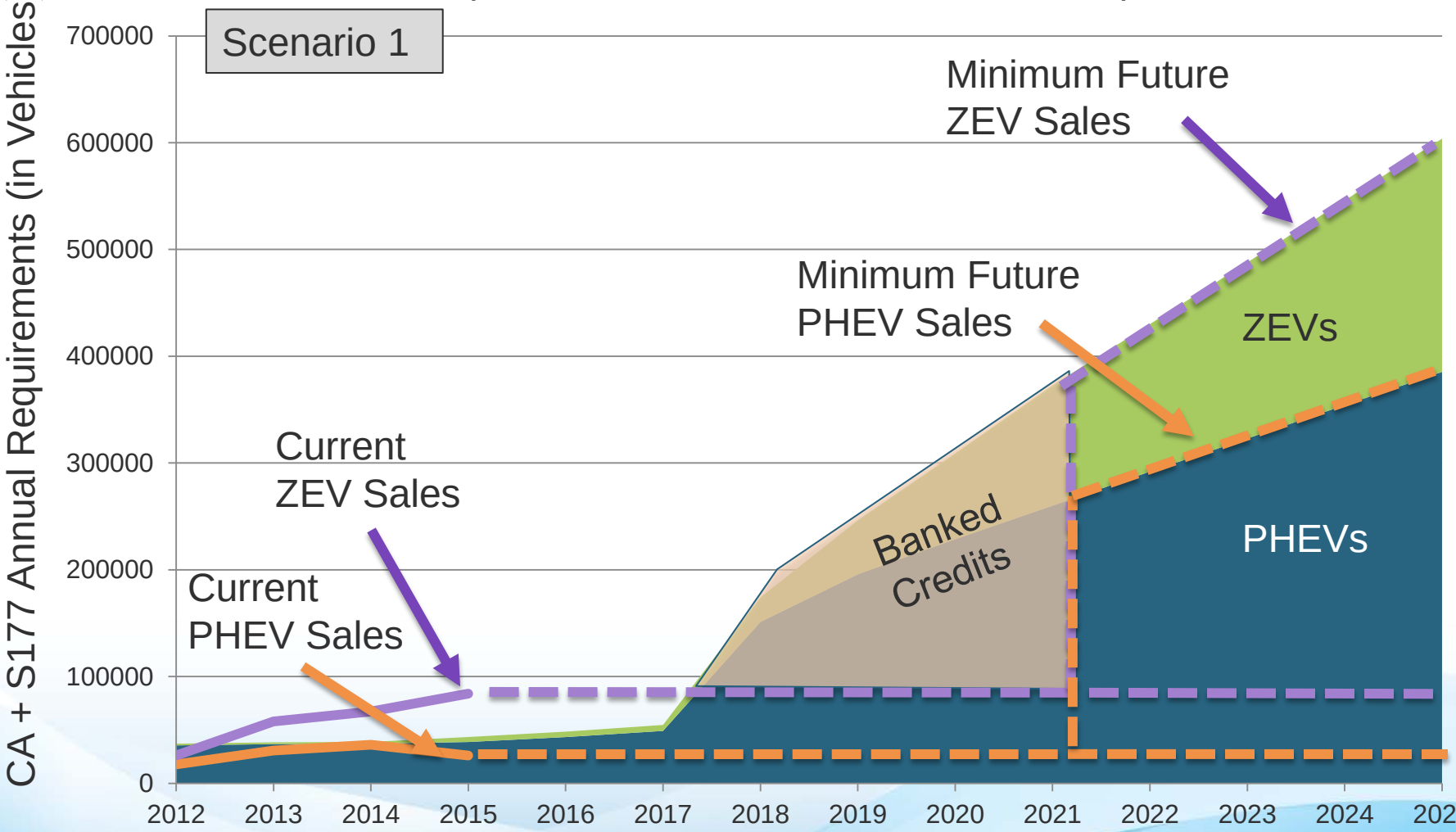


- Credits will continue to provide flexibility for manufacturers' compliance, but requirements continue to push ZEV commercialization
- Pure ZEV sales are increasing
- Consumers pleased with PEV decision but many willing to pay for more electric range
- Vehicle usage data show eVMT to be highly variable, even for same vehicle type

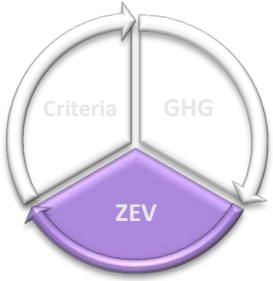
What is the status of ZEV Credits?



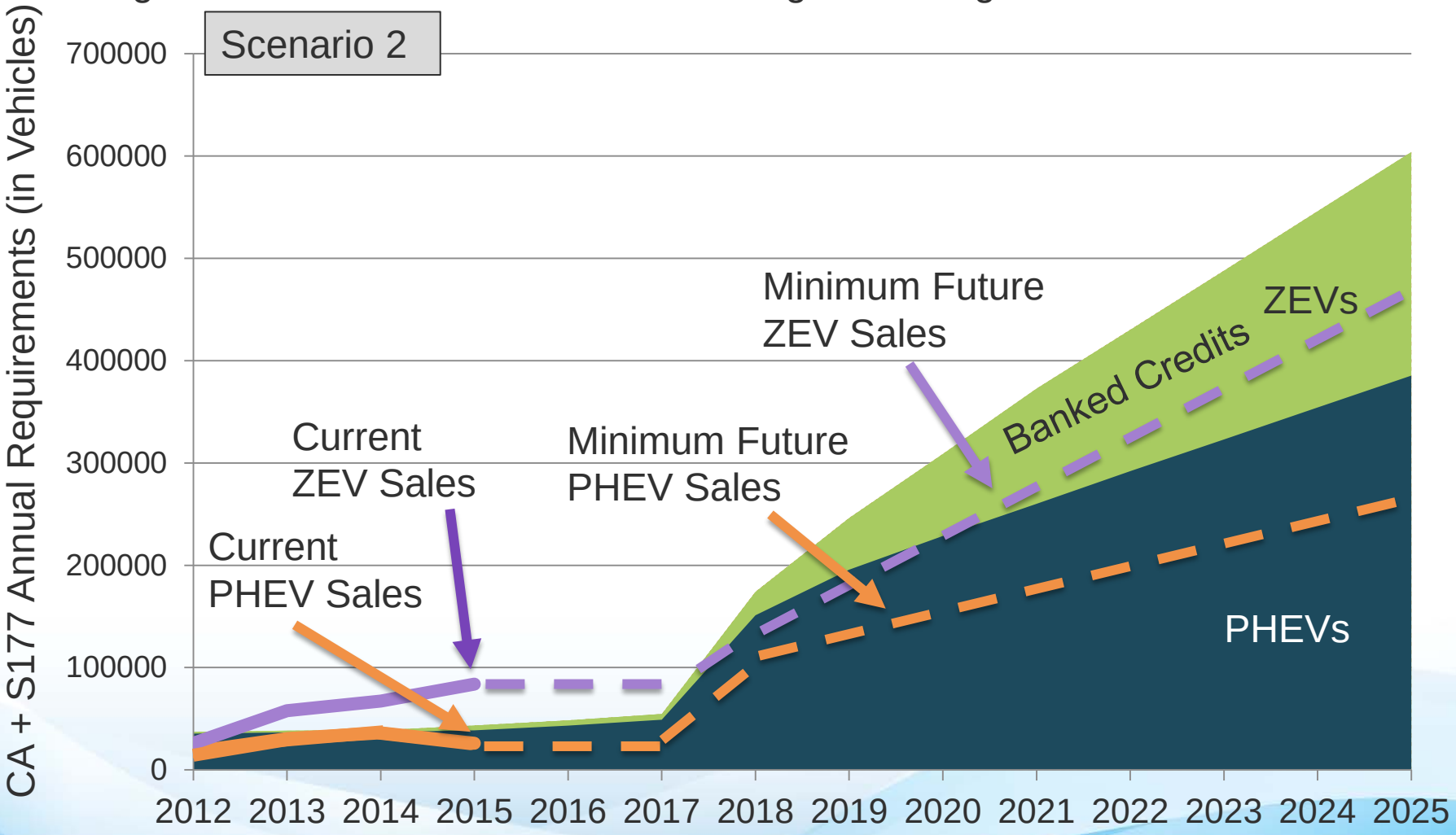
Assuming current sales levels, and using all credits as quickly as possible, manufacturers would deplete credit banks after 2021 MY compliance



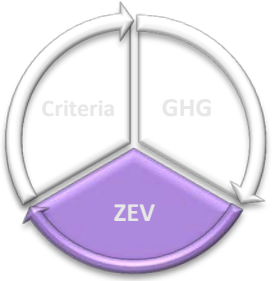
What is the status of ZEV Credits?

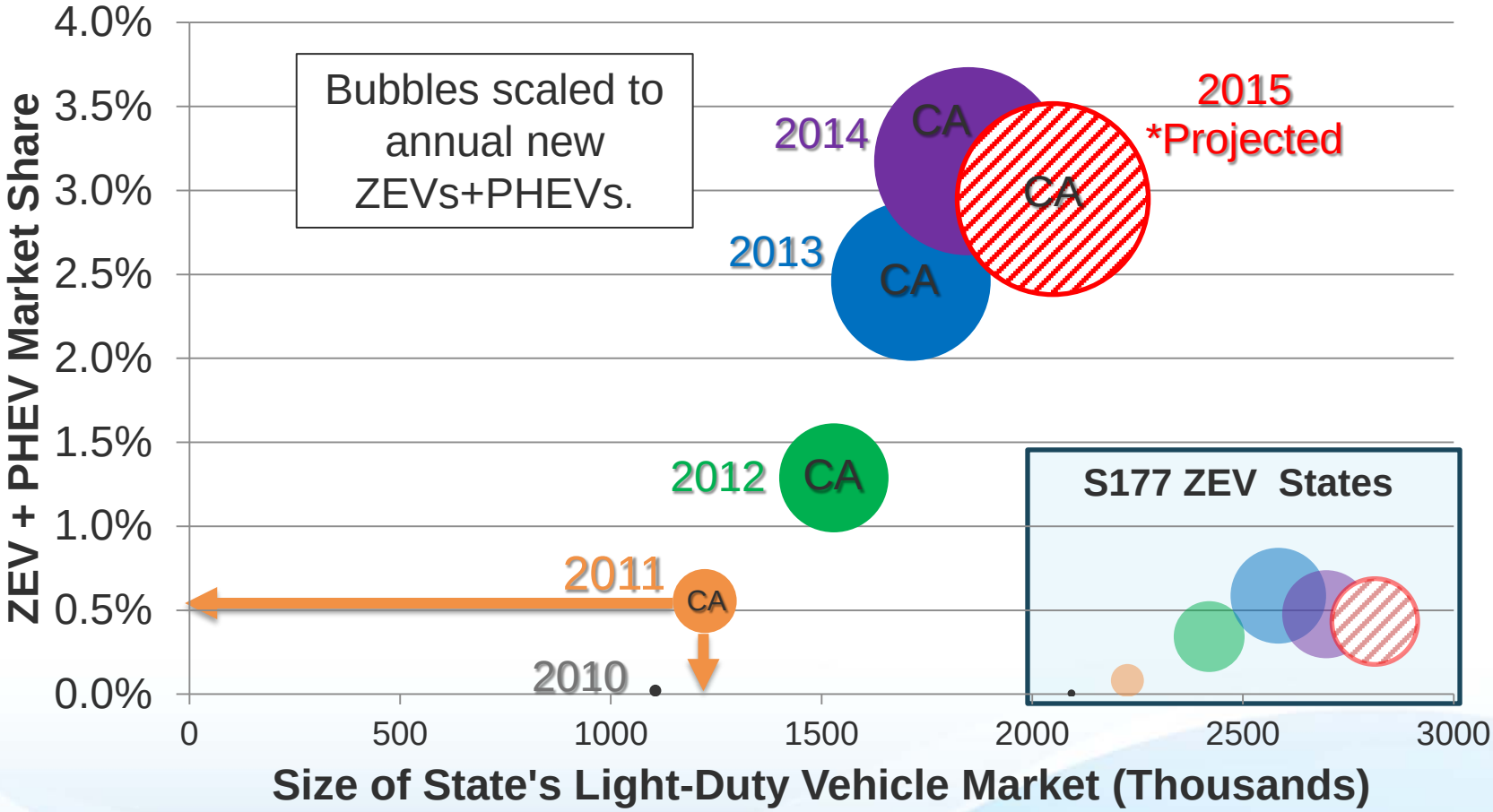


Manufacturers could supplement compliance with the ZEV requirement through 2025 with banked credits, assuming increasing sales



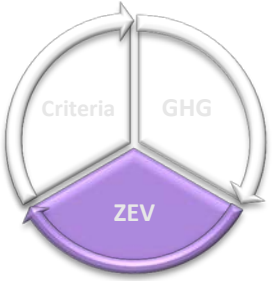
Trends in California and S177 ZEV States

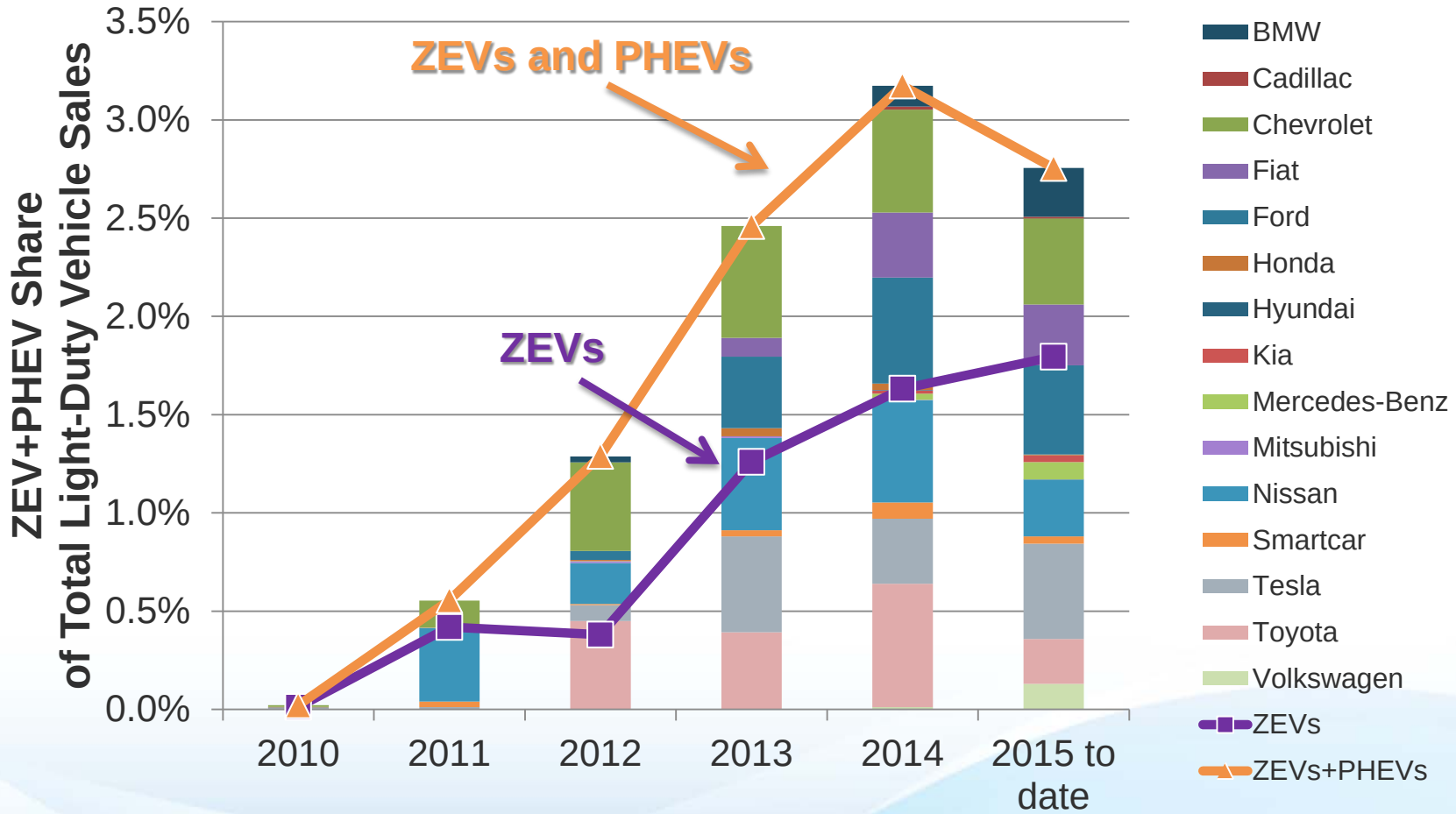




Source: IHS Automotive, Polk new vehicle registrations for CYE2010-14. *2015 projections based on ARB calculations, using IHS Automotive, Polk new vehicle registrations for January 2015 through August 2015.

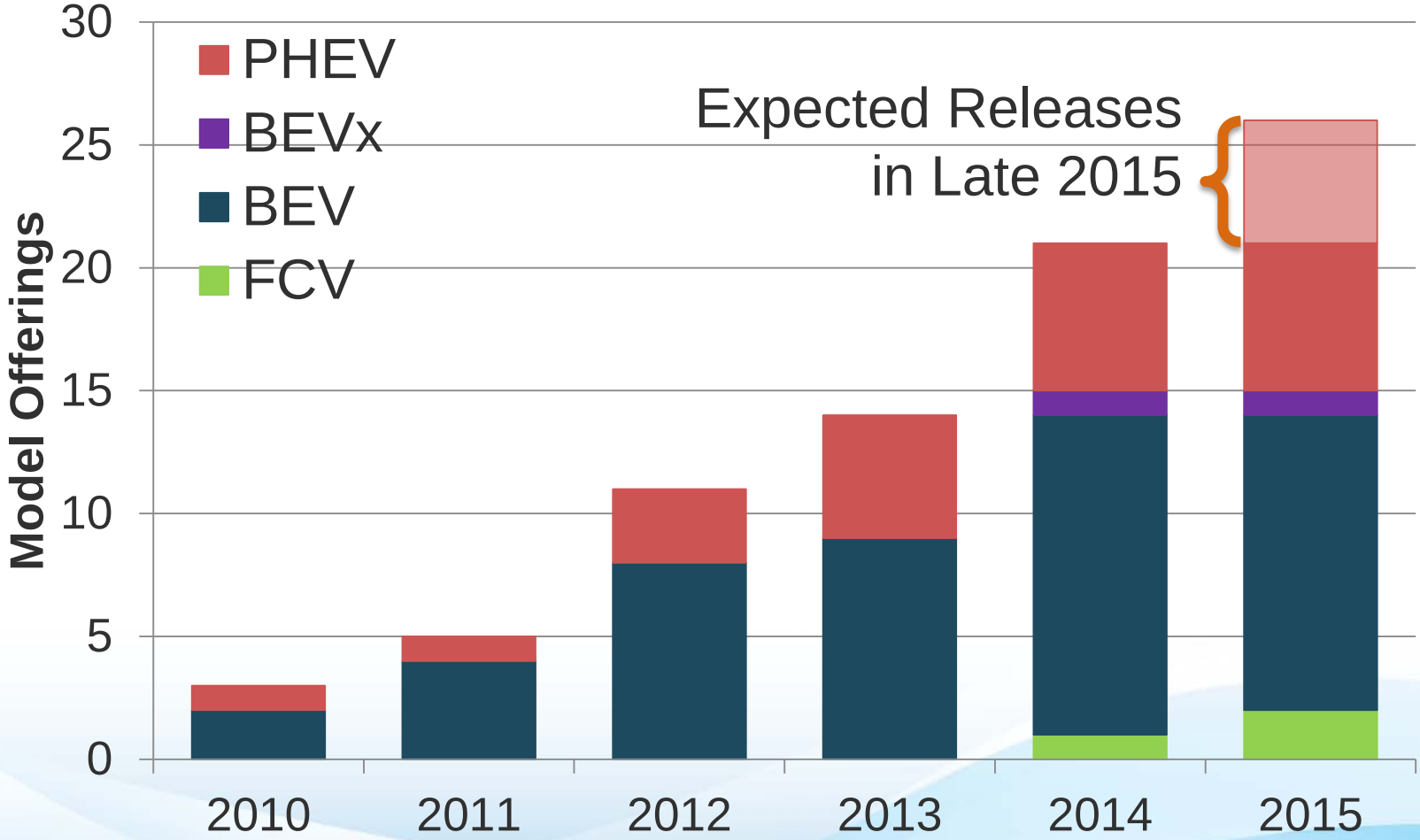
CA 2015 ZEV Market Growth Outpacing PHEVs



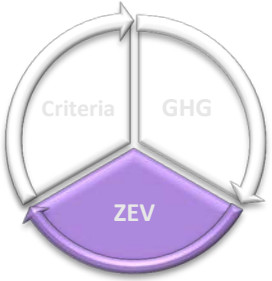


Source: IHS Automotive, Polk new vehicle registrations for CY2010-2015 as of August 2015.

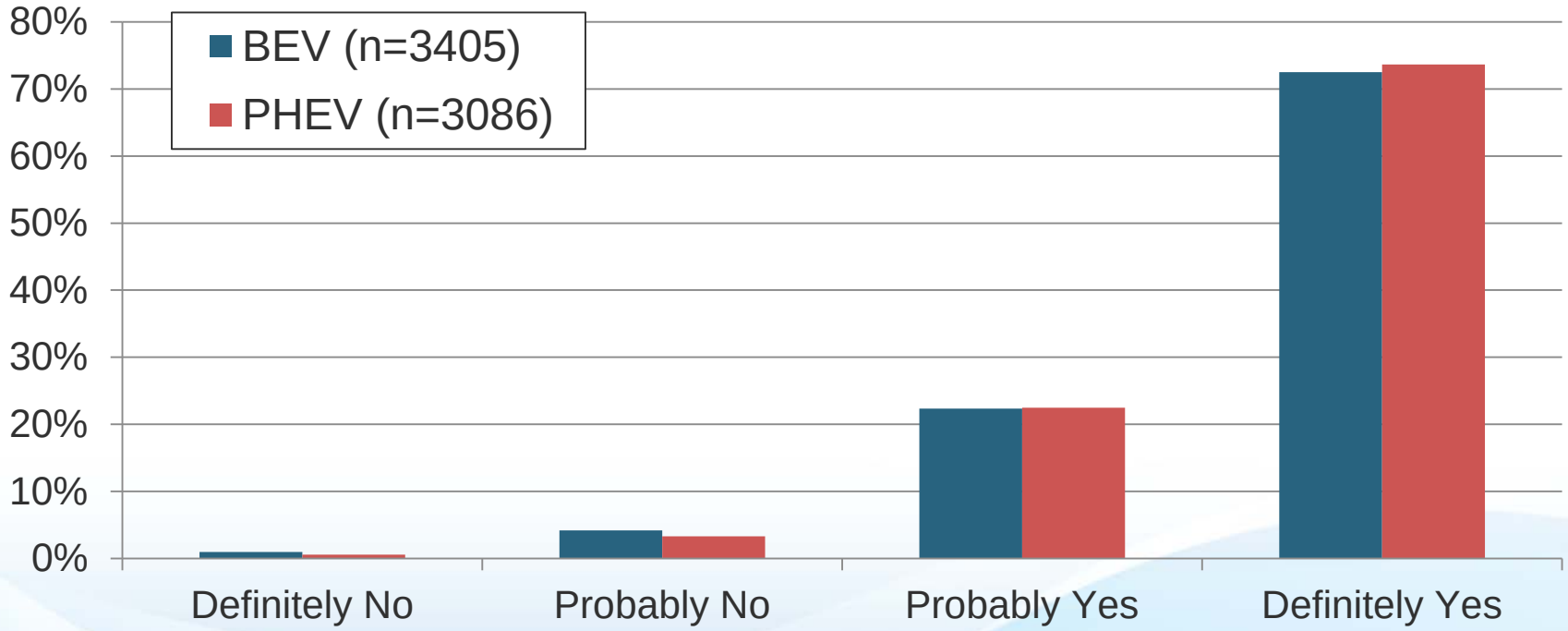
Consumer ZEV Choices Continue to Expand



Driver Satisfaction High for Both BEV and PHEVs

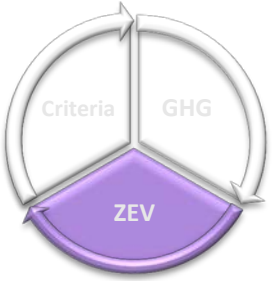


"Would you recommend your PEV to someone you know looking for a new car?"

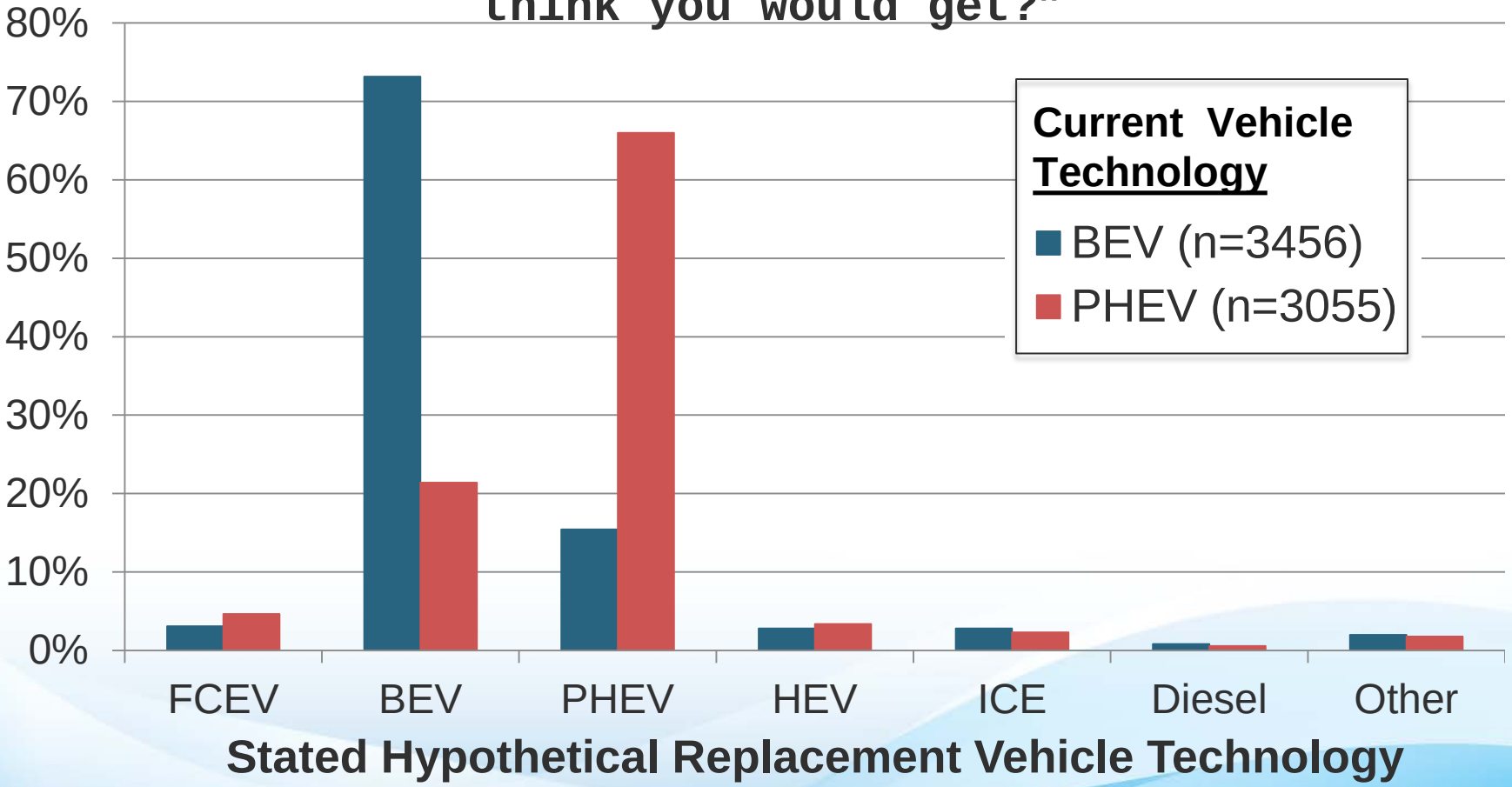


Source: Ownership Experience Survey of CVRP Recipients, April-May 2015.

PEV Drivers Likely to Buy Again

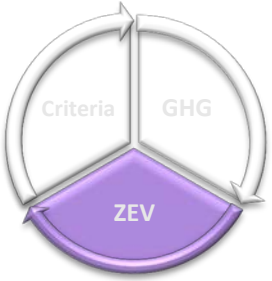


"If you suddenly needed to replace your PEV tomorrow, what kind of vehicle do you think you would get?"

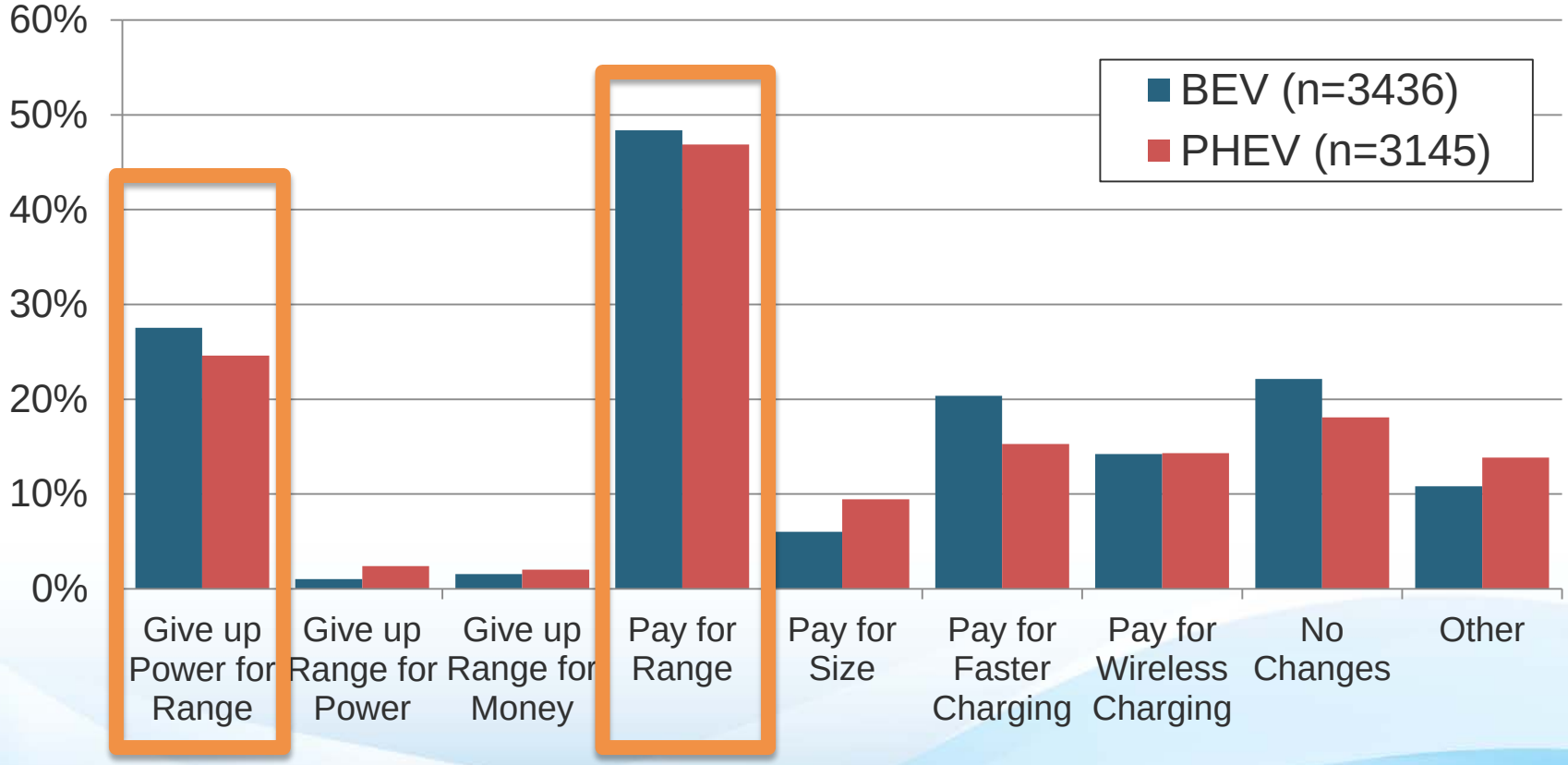


Source: Ownership Experience Survey of CVRP Recipients, April-May 2015.

Both BEV and PHEV Drivers Want More e-Range

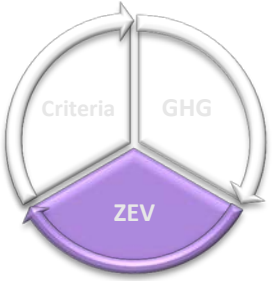


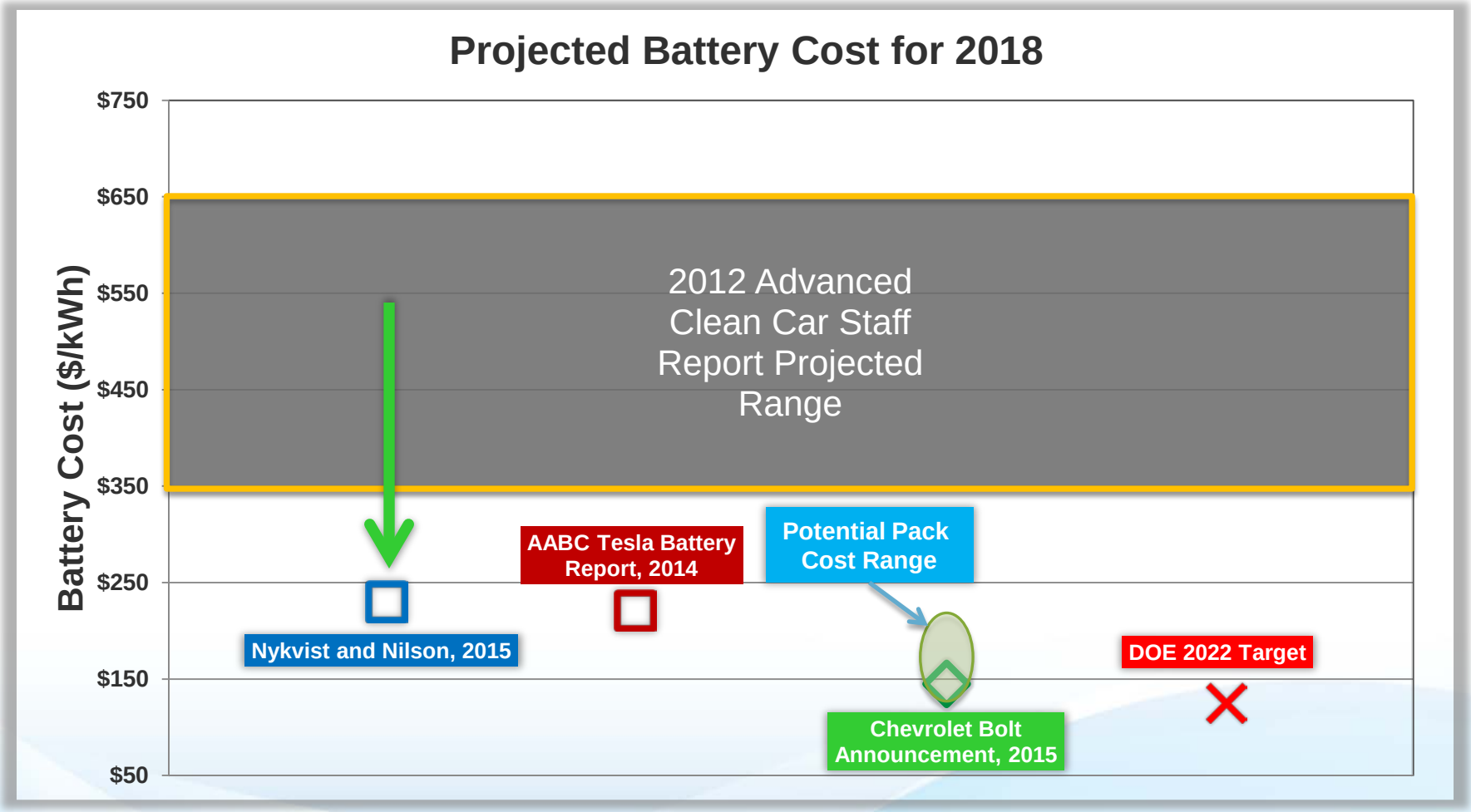
"If you could, how would you change your PEV?"



Source: Ownership Experience Survey of CVRP Recipients, April-May 2015.
Respondents able to choose more than one. Totals will sum to more than 100%.

Battery Costs Falling Faster Than Expected

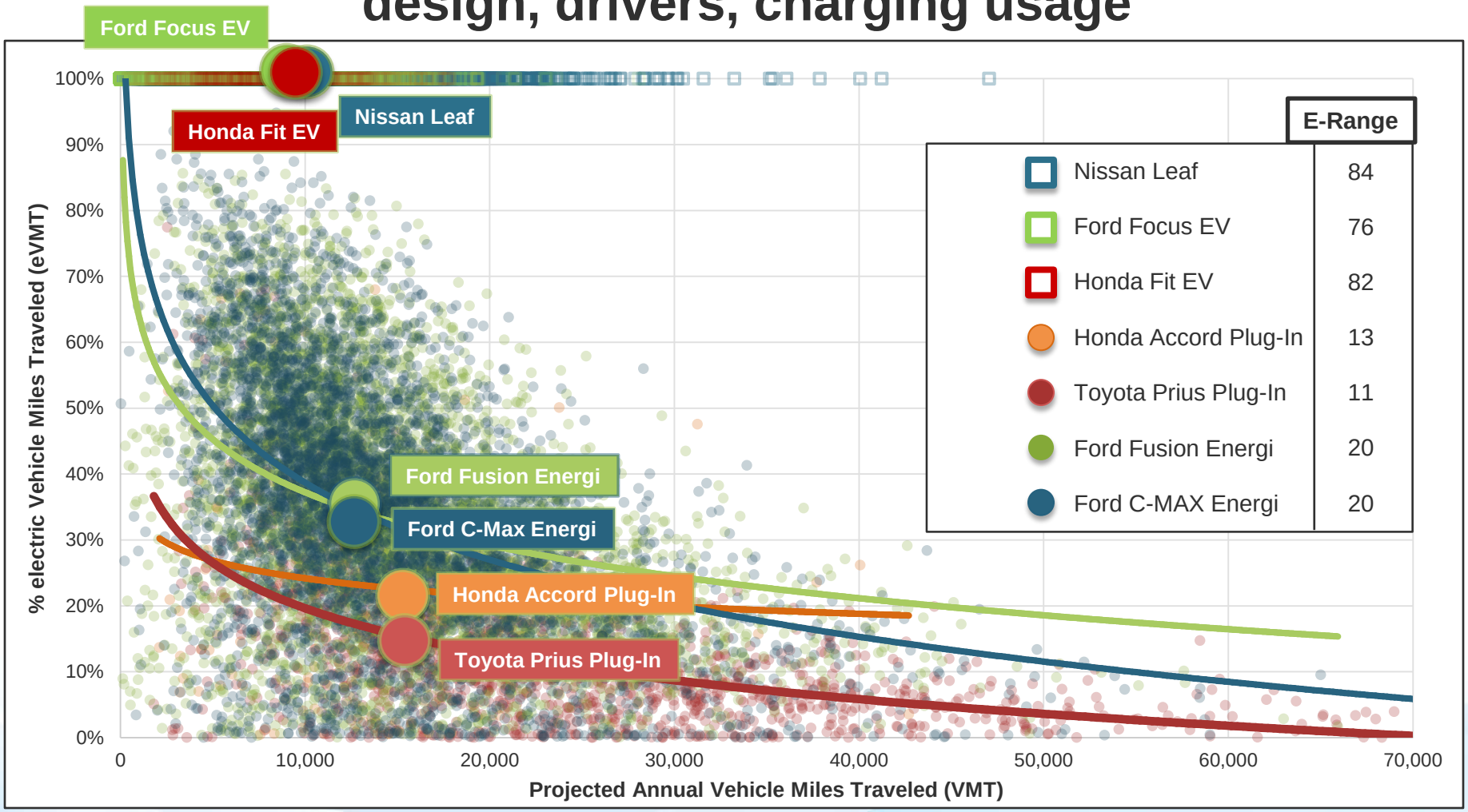




Nykvist and Nilson, Rapidly falling costs of battery packs for electric vehicles, March 23, 2015, http://www.nature.com/nclimate/journal/v5/n4/full/nclimate2564.html
Anderman, The Tesla Battery Report, November 12, 2014, https://www.advancedautobat.com/industry-reports/2014-Tesla-report/Extract-from-the-Tesla-battery-report.pdf
Chevrolet Bolt Announcement, October 2, 2015, http://www.hybridcars.com/gm-ev-battery-cells-down-to-145kwh-and-still-falling/
DOE 2022 Target, January 31, 2013, http://energy.gov/sites/prod/files/2014/02/f8/eveverywhere_blueprint.pdf

PEV eVMT Distribution

Wide eVMT variability across PEV platforms, design, drivers, charging usage



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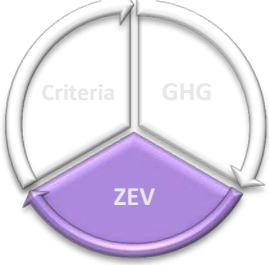
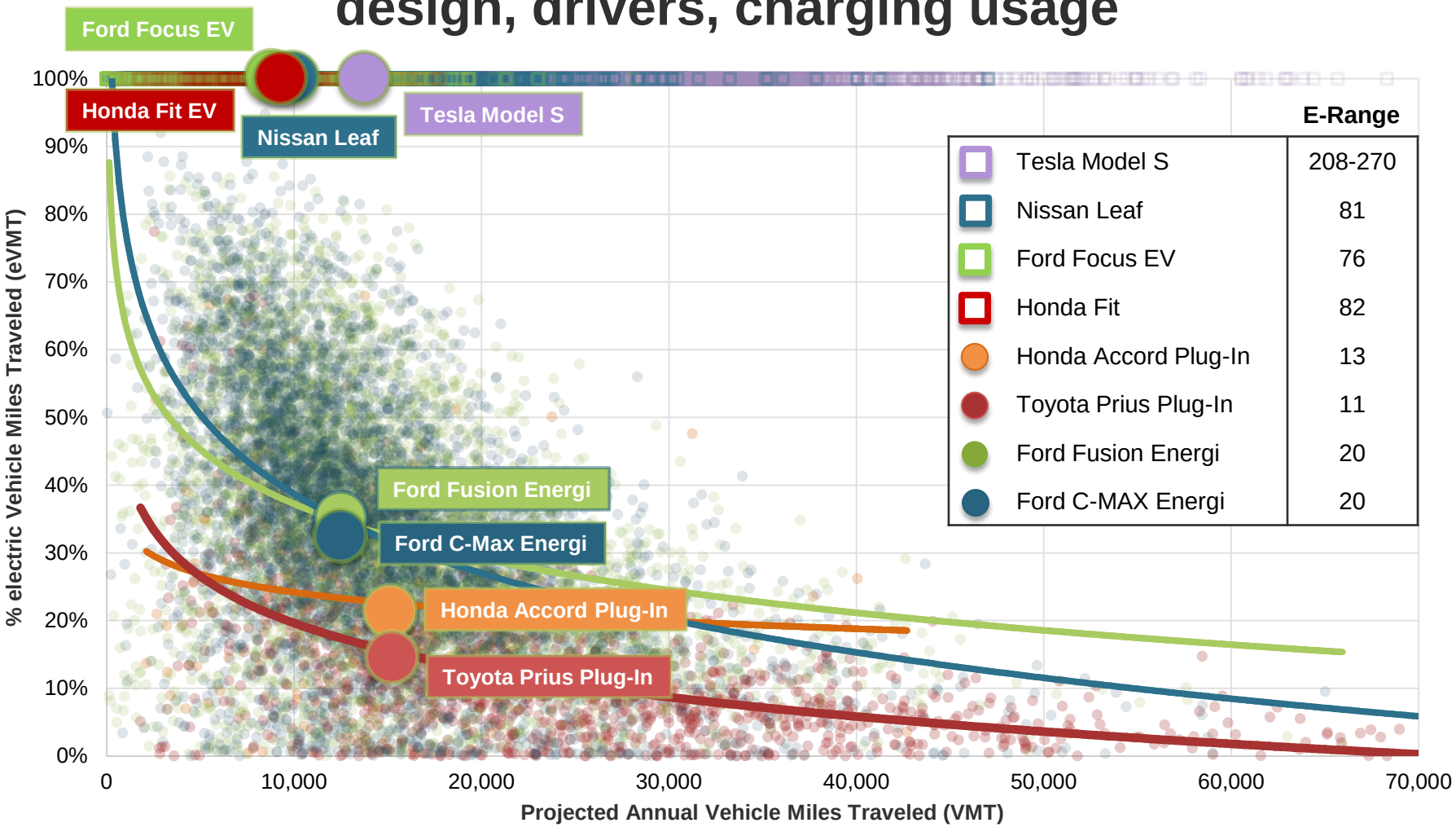
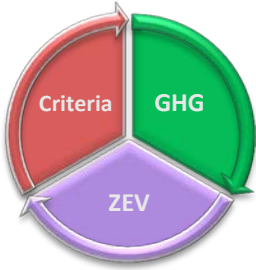
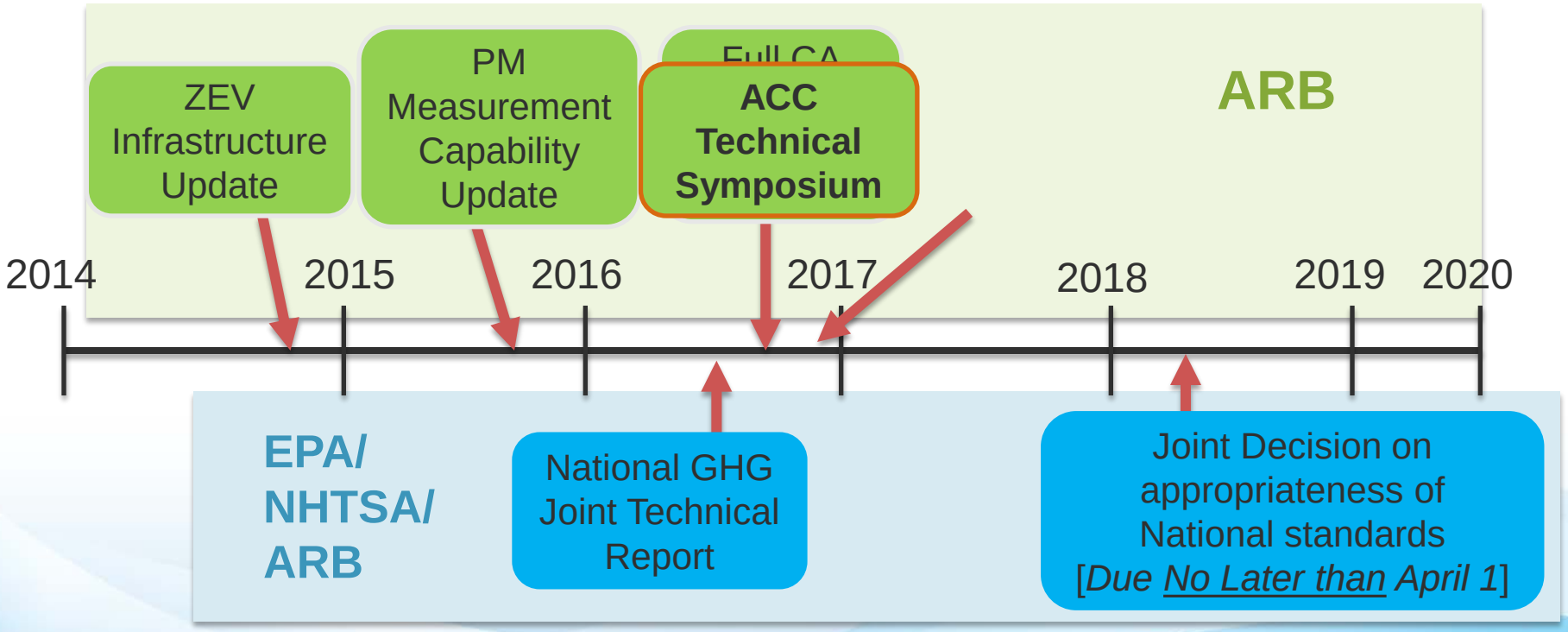




	E-Range
Tesla Model S	208-270
Nissan Leaf	81
Ford Focus EV	76
Honda Fit	82
Honda Accord Plug-In	13
Toyota Prius Plug-In	11
Ford Fusion Energi	20
Ford C-MAX Energi	20

Summary and Next Steps



- On track to come back to the Board by the end of 2016 with California's full midterm review
- 2016 ACC Technical Symposium (September)