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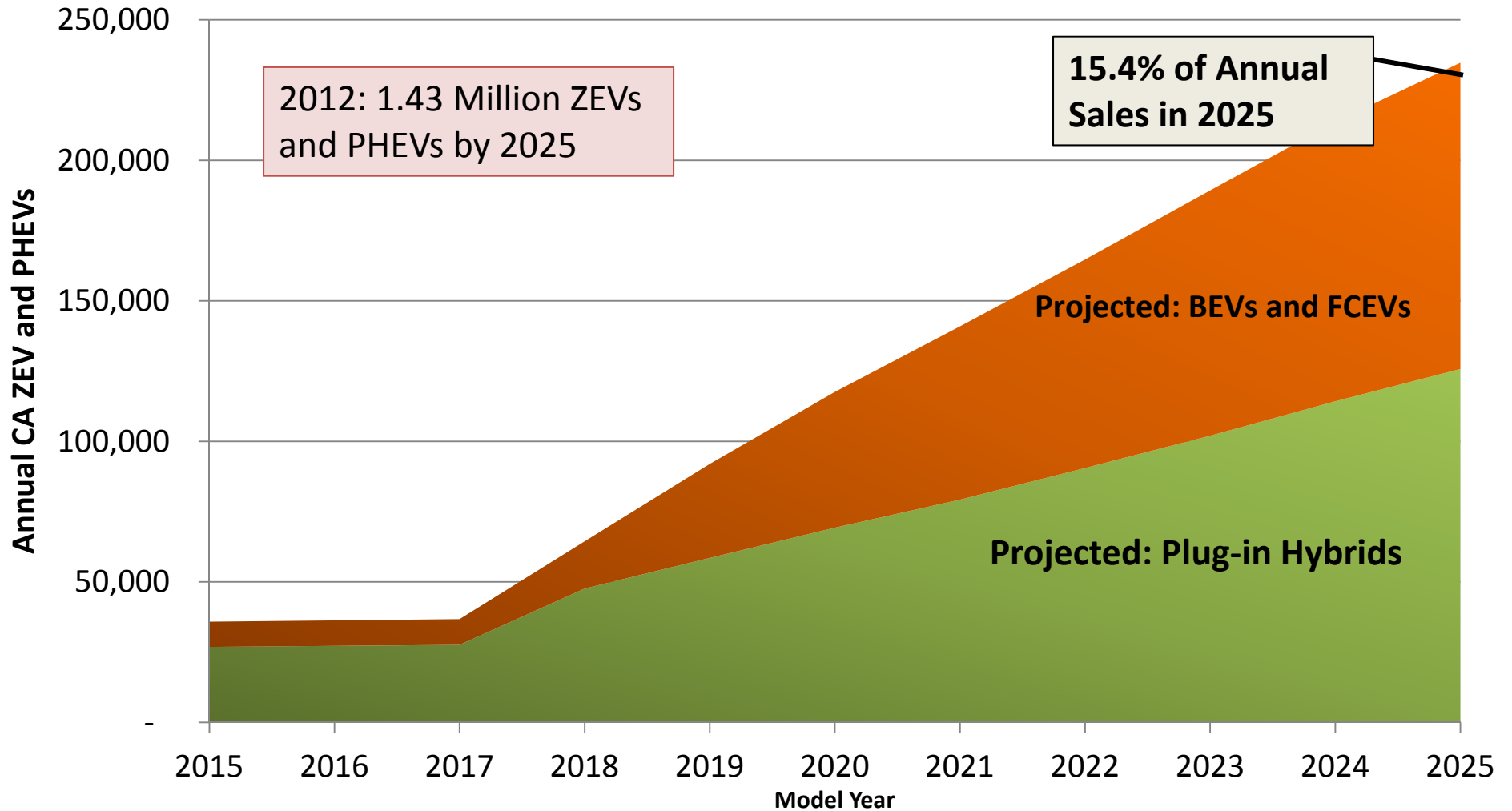
ARB Midterm Review ZEV Regulation Compliance Scenarios

June 2017

Anna Wong

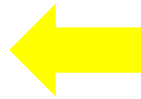
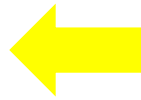
Staff Air Pollution Specialist

2012 ZEV Compliance Scenario



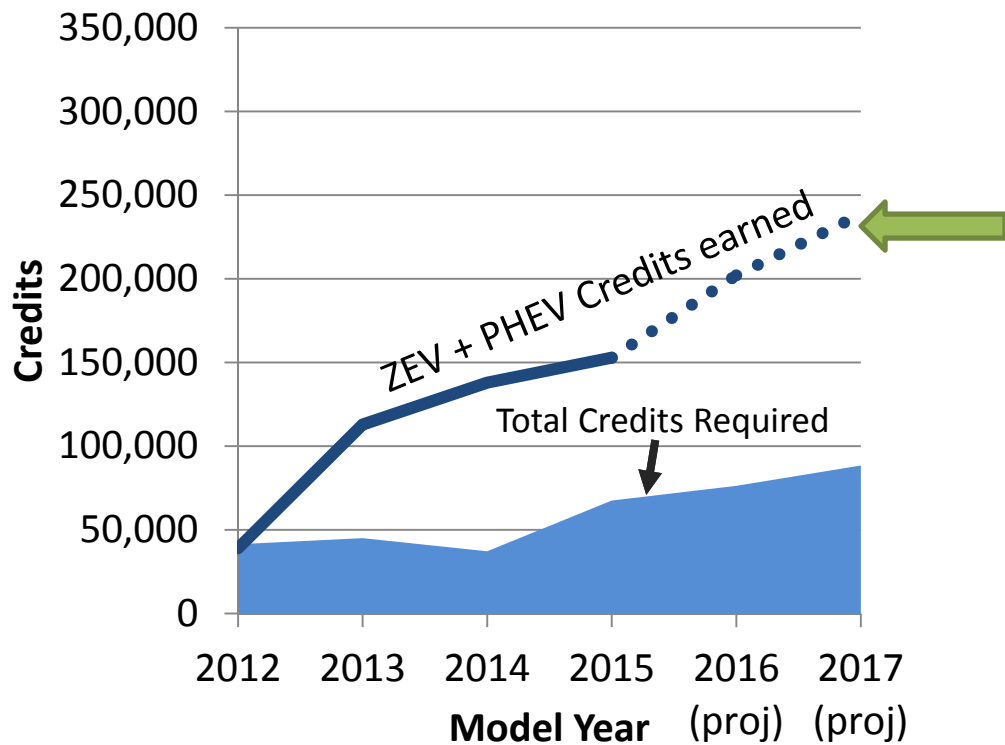
Scenario Inputs

Inputs	2012 ACC Rulemaking
Annual growth in electric range	0%
'18-'25 model year BEV label range (mi)	70
'18-'25 model year non-US06 PHEV label range (mi)	15 mile US06 or 28 mile non-US06
'18-'25 model year US06 PHEV label range (mi)	
GHG over-compliance	n/a
Credit Reserve (in '26 model year)	n/a
BEV only LVMs	n/a
FCEV LVMs	17→40%
US06 PHEV OEMs	n/a



Reality hits...

California



- Higher actual volumes than required
- Vehicles produced and announced with (much) greater range
- Widespread support for electrification

Developing New Scenarios

- Scenarios modeled
 - Up to 2017 actual compliance + CVRP projections
 - 2018-2025 **exact** compliance with ZEV regulation (for California and Section 177 ZEV States)
- Based on information gathered during midterm review
- No OEM-specific assumptions identifiable in scenarios
- Adjustable growth rate used to represent annual increases in PEV electric range
- FCEV volumes coordinated with AB 8 surveys

New ZEV Calculator

- Updated calculator released along with MTR Final Report, in conjunction with Appendix A

- Available:

<https://www.arb.ca.gov/msprog/zevprog/zevcalculator/zevcalculator.htm>

**California's
Advanced Clean Cars
Midterm Review**

**Appendix A:
Analysis of Zero Emission Vehicle
Regulation Compliance Scenarios:**

Estimated minimum 1.2 million ZEVs and
PHEVs by 2025

January 18, 2017

[California Environmental Protection Agency](#)
Air Resources Board

ZEV Compliance Calculator

Yellow Highlighted Cells throughout this workbook are input cells, and are intended for the user to modify as desired.

INPUTS SCENARIO 1

Technology Mix/Vehicle Numbers	AER Growth Rate	2018	2019	2020	2021	2022	2023	2024	2025
% of ZEV/PHEV LVMs making FCEVs (1=100%)	n/a	35%	35%	35%	35%	45%	45%	45%	45%
Label Range BEV (miles)	5.0%	150	158	165	174	182	191	201	211
% of LVMs making PHEV A (1=100%)	n/a	65%	65%	65%	65%	50%	50%	50%	50%
Label Range PHEV A (miles)	5.0%	20	21	22	23	24	26	27	28
Label Range PHEV B (miles)	5.0%	40	42	44	46	49	51	54	56

INPUTS SCENARIO 2

Technology Mix/Vehicle Numbers	AER Growth Rate	2018	2019	2020	2021	2022	2023	2024	2025
% of ZEV/PHEV LVMs making FCEVs (1=100%)	n/a	5%	5%	5%	5%	5%	5%	5%	5%
Label Range BEV (miles)	2.5%	150	154	158	162	166	170	174	178
% of LVMs making PHEV A (1 = 100%)	n/a	65%	65%	65%	65%	65%	65%	65%	65%
Label Range PHEV A (miles)	2.5%	20	21	21	22	22	23	23	24
Label Range PHEV B (miles)	2.5%	40	41	42	43	44	45	46	48

INPUTS SCENARIO 3

Technology Mix/Vehicle Numbers	AER Growth Rate	2018	2019	2020	2021	2022	2023	2024	2025
% of ZEV/PHEV LVMs making FCEVs (1=100%)	n/a	40%	40%	40%	40%	50%	50%	50%	50%
Label Range BEV (miles)	7.5%	180	194	208	224	240	258	278	299
% of LVMs making PHEV A (1 = 100%)	n/a	50%	50%	50%	50%	50%	50%	50%	50%
Label Range PHEV A (miles)	7.5%	25	27	29	31	33	36	39	41
Label Range PHEV B (miles)	7.5%	45	48	52	56	60	65	69	75

Cumulative CA Vehicle Number

CA Bank Vets

Number of Vehicles

Mid-Range Case
Slow Technology Case
High Technology Case

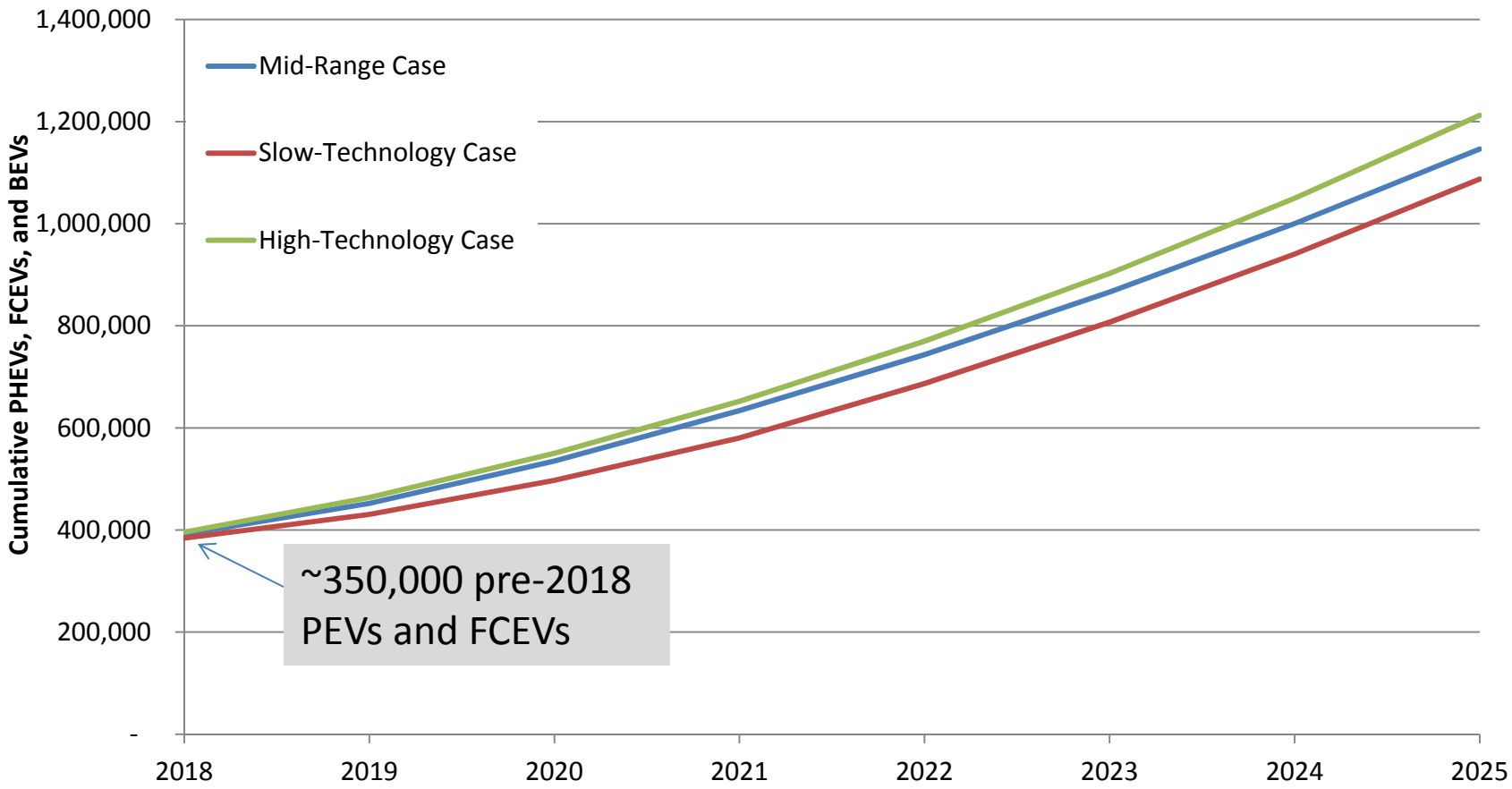
LVM Market Share		
	CA Market Share	S177 (Average) Market Share
BMW	5%	5%
FCA	9%	14%
Ford	12%	13%
General Motor	12%	15%
Honda	13%	14%
Hyundai	8%	8%

3 Technology Themes

Scenario	Theme
Mid-Range ZEV Technology Advancement Case	Continued advancement in ZEV technology leads to balance of new sales of improved capability ZEVs and moderate use of banked ZEV and GHG credits
Slow ZEV Technology Advancement Case	Delayed advancement in ZEV technology leads to higher dependence on banked ZEV and GHG credits to support sales of only slightly improved ZEVs
High ZEV Technology Advancement Case	Aggressive advancement in ZEV technology leads to larger increase in new sales of highly capable ZEVs as dominant mechanism for compliance

Cumulative Results

California



~350,000 pre-2018
PEVs and FCEVs

Mid-Range Case Assumptions

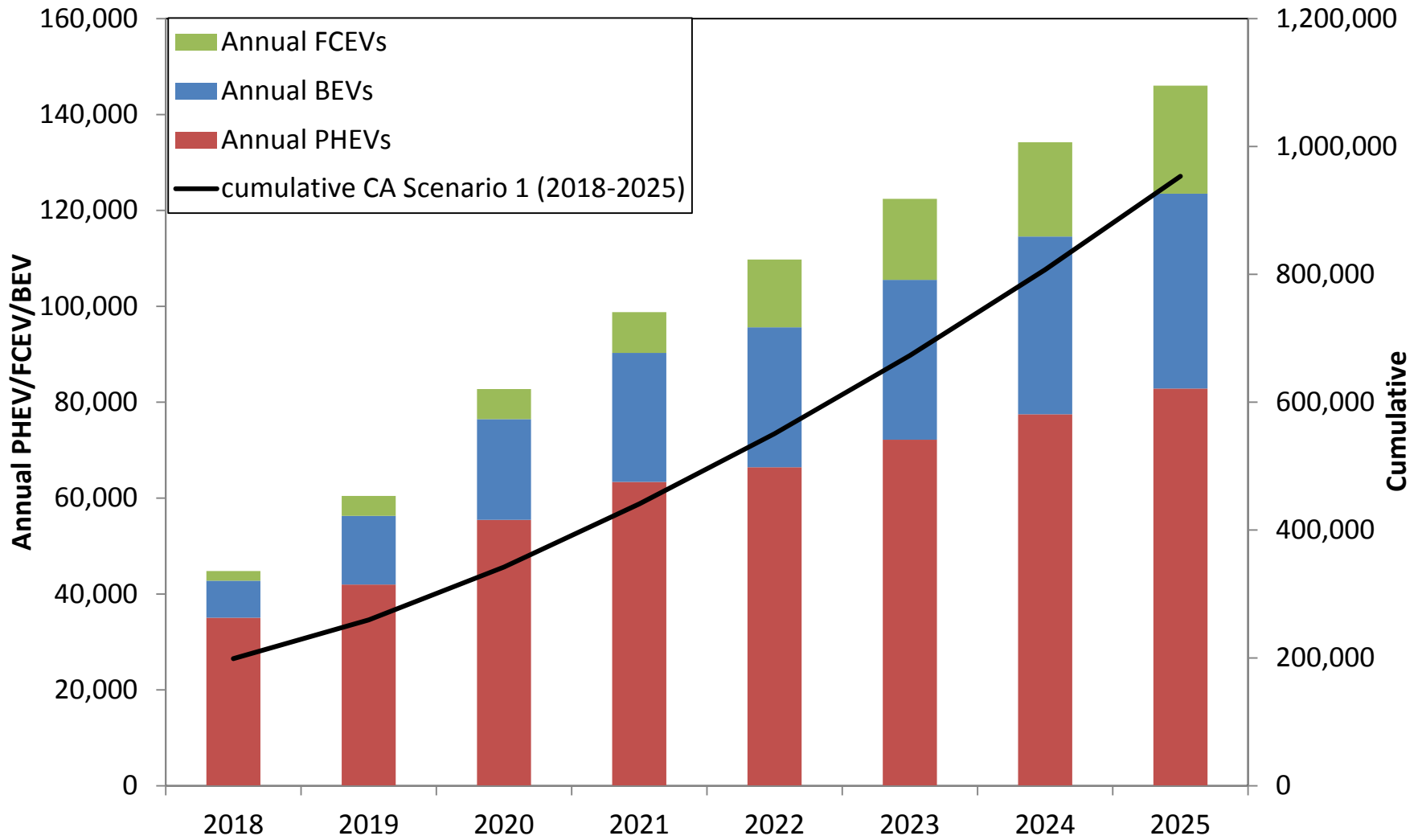
- Theme: Continued advancement in ZEV technology, balance of new sales of improved capability ZEVs and moderate use of regulatory flexibilities

Range Assumptions

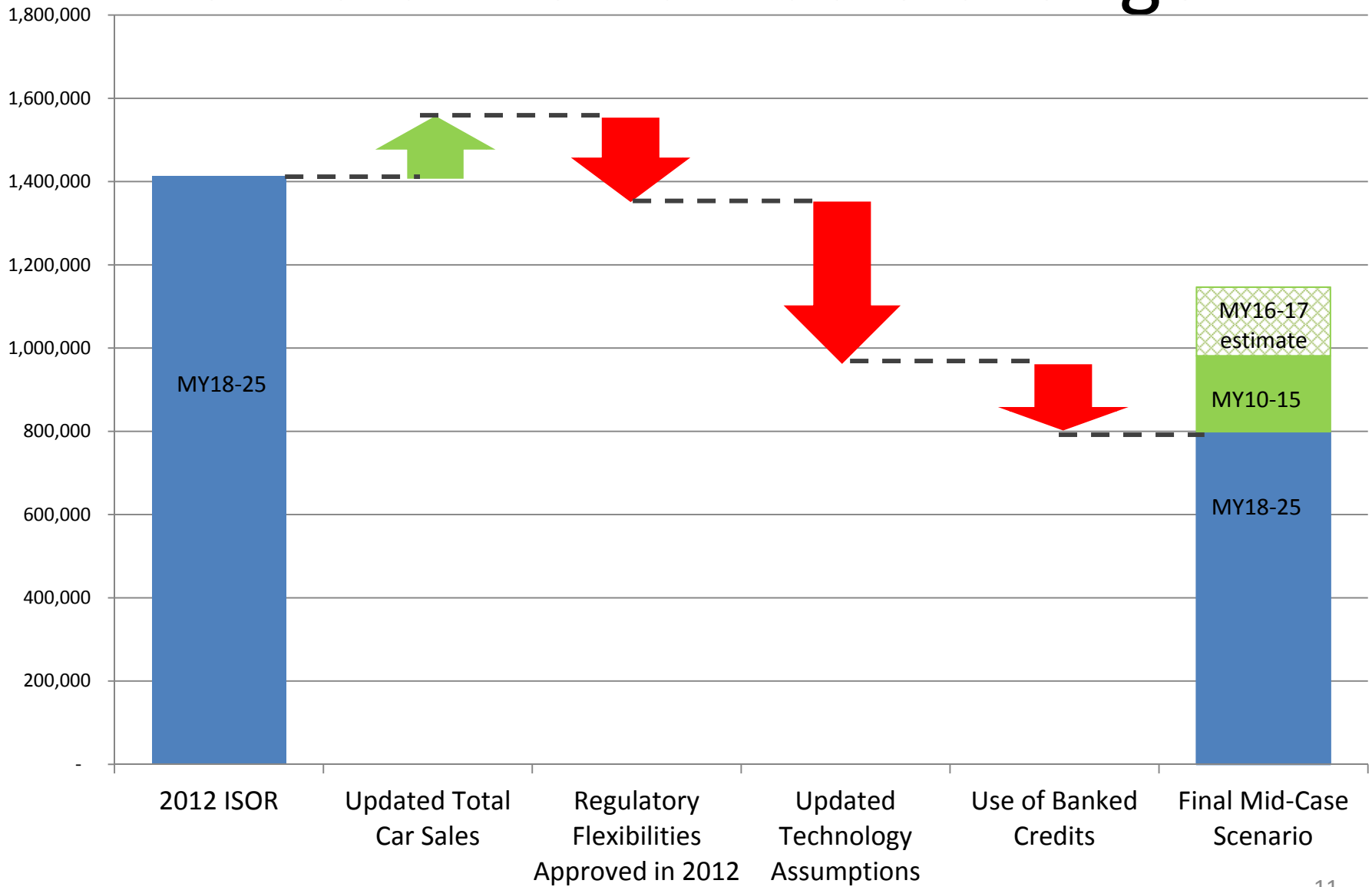
PEV type	MY 2018 →	MY 2025
BEV	150 miles	210 miles
Non-US06 PHEV	20 miles	30 miles
US06 PHEV	40 miles	55 miles

Mid-Range Case

California Results



How did the numbers change?



Scenario Inputs

Inputs	2012 ACC Rulemaking	Slower ZEV Tech	Mid-range	High ZEV Tech
Annual growth in electric range	0%	2.5%	5.0%	7.5%
'18-'25 model year BEV label range (mi)	70	150→180	150→210	200→300
'18-'25 model year non-US06 PHEV label range (mi)	15 mile US06 or 28 mile non-US06	20→25	20→30	25→40
'18-'25 model year US06 PHEV label range (mi)		40→50	40→55	45→75
GHG over-compliance	n/a	20% of LVMs	10% of LVMs	10% of LVMs
Credit Reserve (in '26 model year)	n/a	25%	100%	200%
BEV only LVMs	n/a	0%	10%	10%
FCEV LVMs	17→40%	5%	35→45%	40→50%
US06 PHEV OEMs	n/a	35%	35→50%	50%