Developing a Methodology to Allocate AB 118 Program Funds for LDVs

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Fuels and Transportation Division

Staff Workshop
California Energy Commission Headquarters
Sacramento, CA
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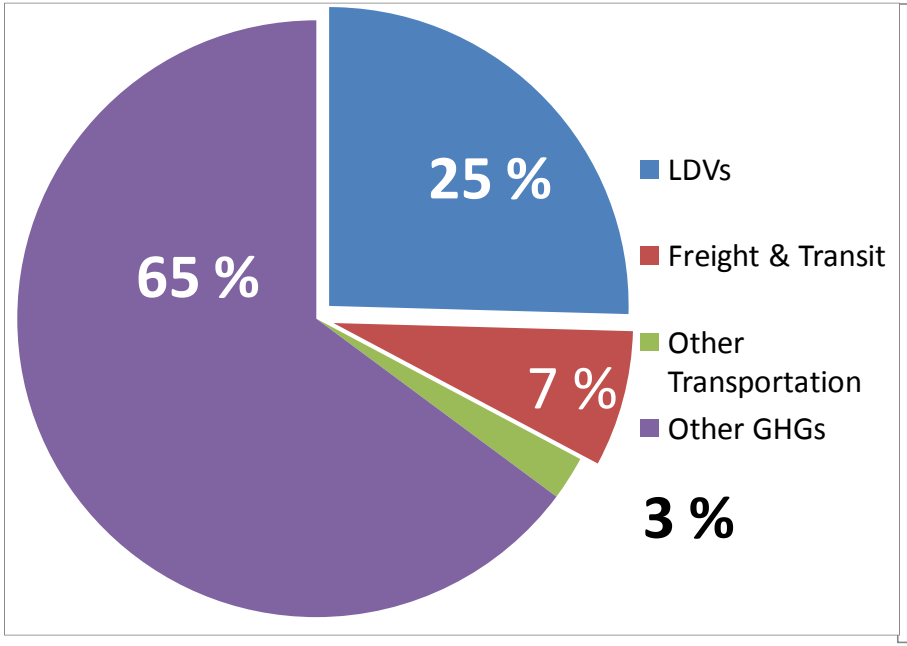
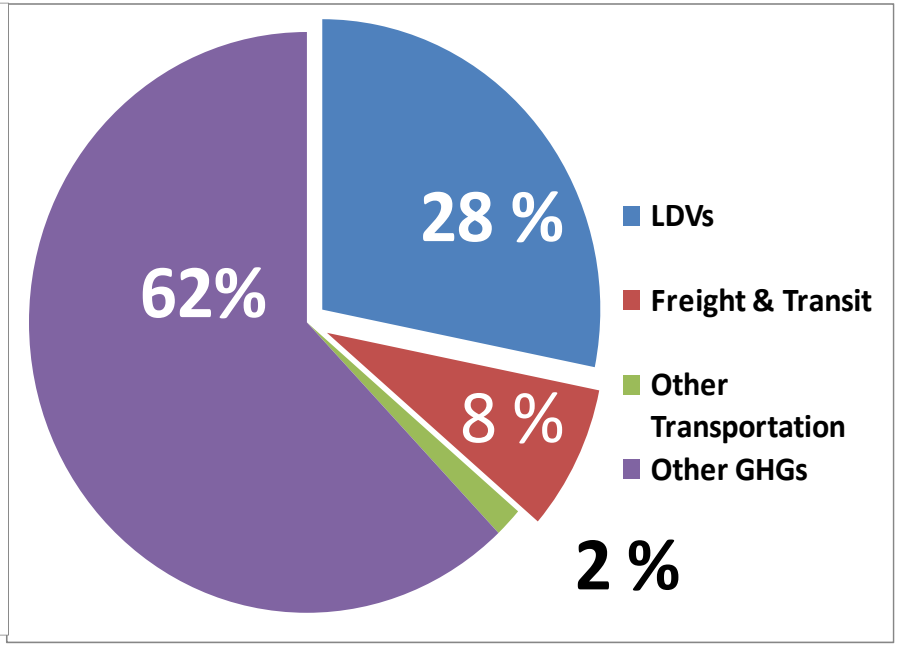
California's GHG Emissions

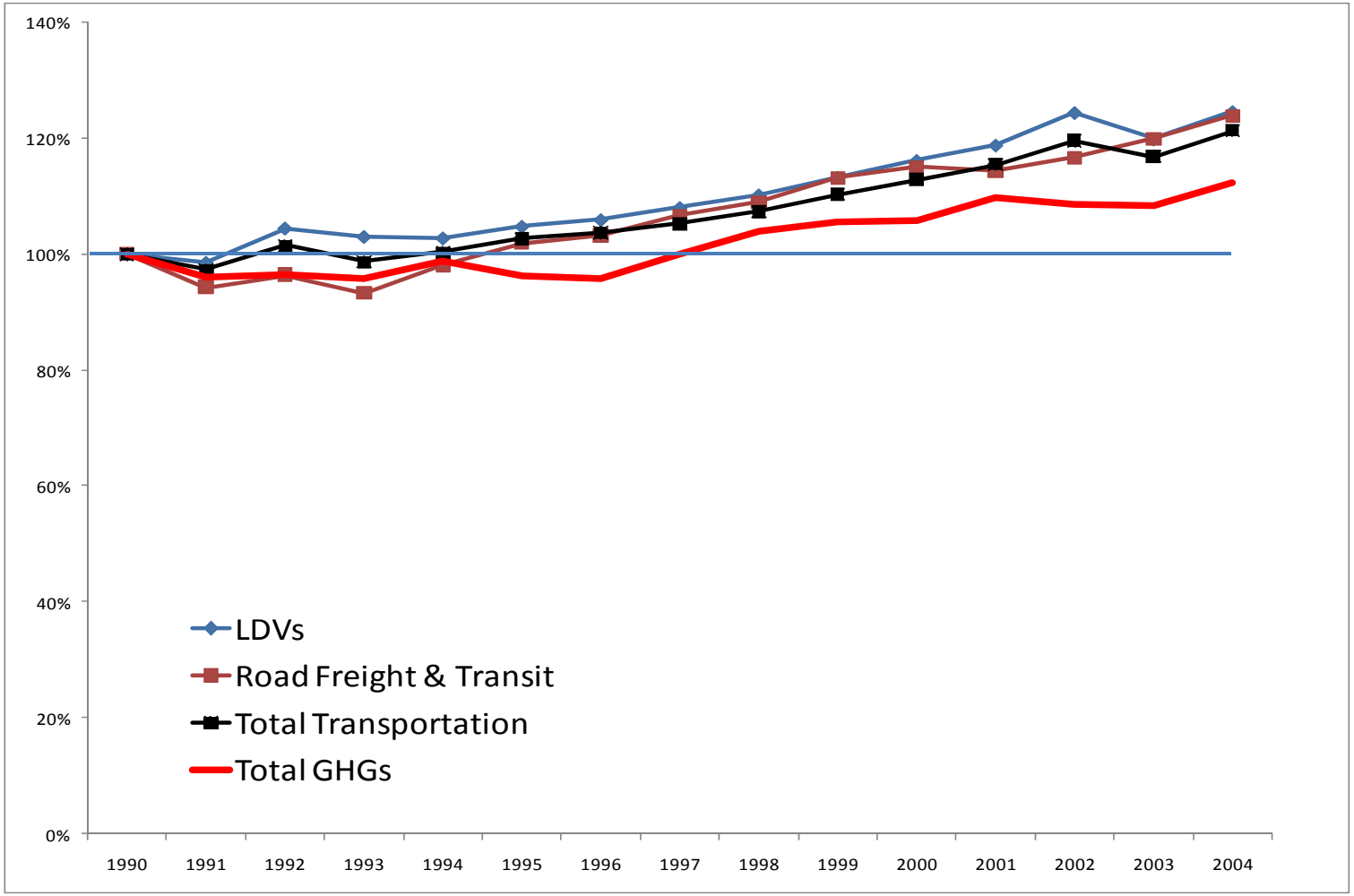
1990



2004



California's GHG Emissions Trends



2050 Vision Analysis

- Can AB 118 funding be focused to put California's light-duty vehicle fleet on a path towards accomplishing an 80% reduction in greenhouse gas emissions?
- Challenge: Work backwards from the "2050 Vision" in the State Alternative Fuels Plan to find a starting point that would lead to the outcome expressed in the "2050 Vision"

2050 Vision Analysis

- Begin with vehicle attributes from 2050 Vision:
  - Most vehicles get 60 mpg; electric get 80 mpg
  - Super-Ultra-Low-Carbon Vehicles are 40% of fuel mix; ULCs are 30% and other fuels are 30%
  - Per-person VMT reduced from 10,300 under Business-As-Usual to 8,200 under 2050 Vision (5% reduction from today; 20% reduction from Business-as-usual).

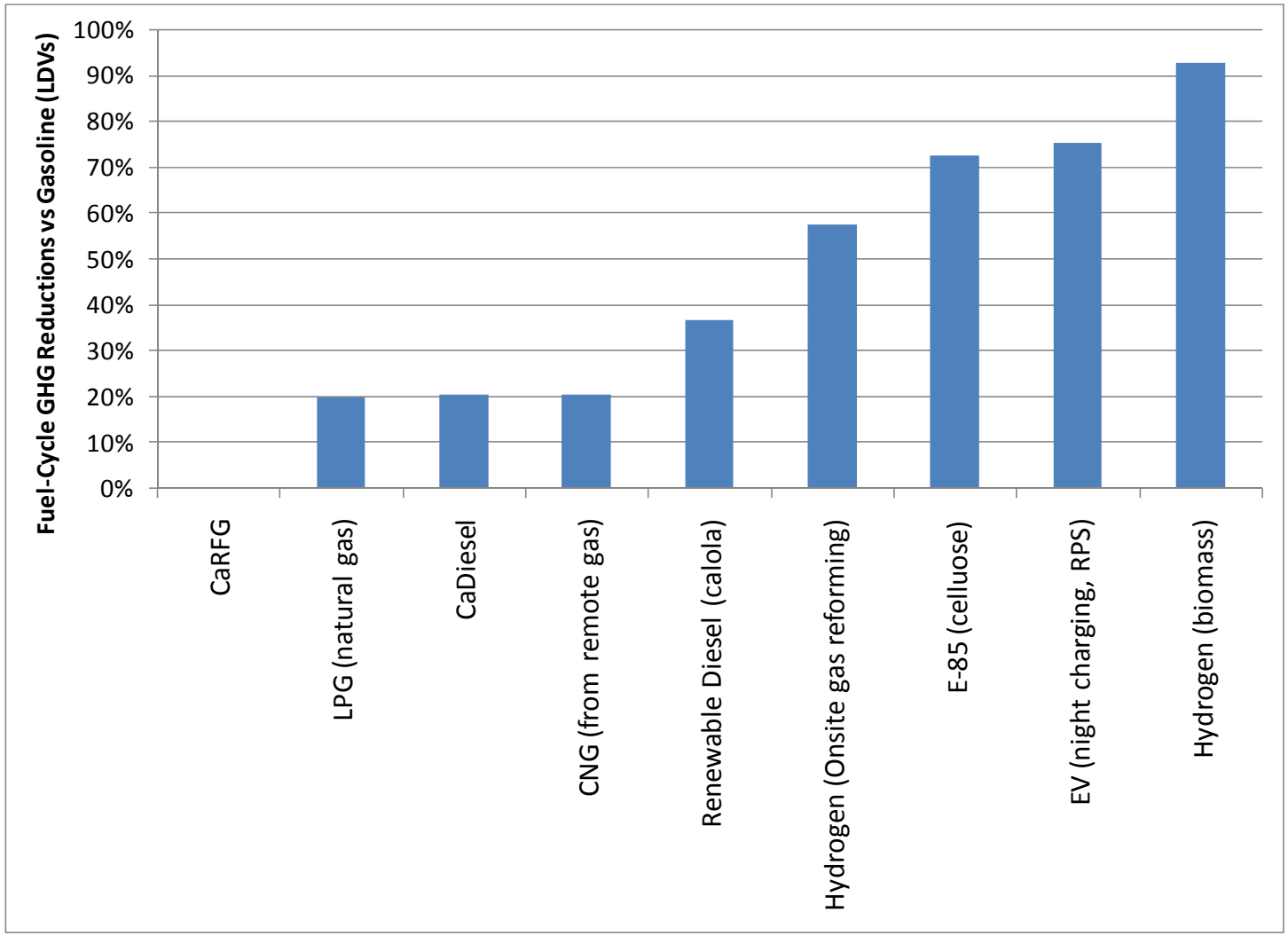
2050 Vision Analysis Under Business-as-usual (BAU)

- Extend CEC-adopted forecast to 2050
  - Population data from DOF
  - Hold miles/gallon fuel economy at 2030 levels from forecast out to 2050 for BAU
  - Extend per-person VMT from forecast period to 2050 value of 10,300 from BAU under 2050 Vision
  - Likewise, extend new vehicle purchases

2050 Vision Analysis

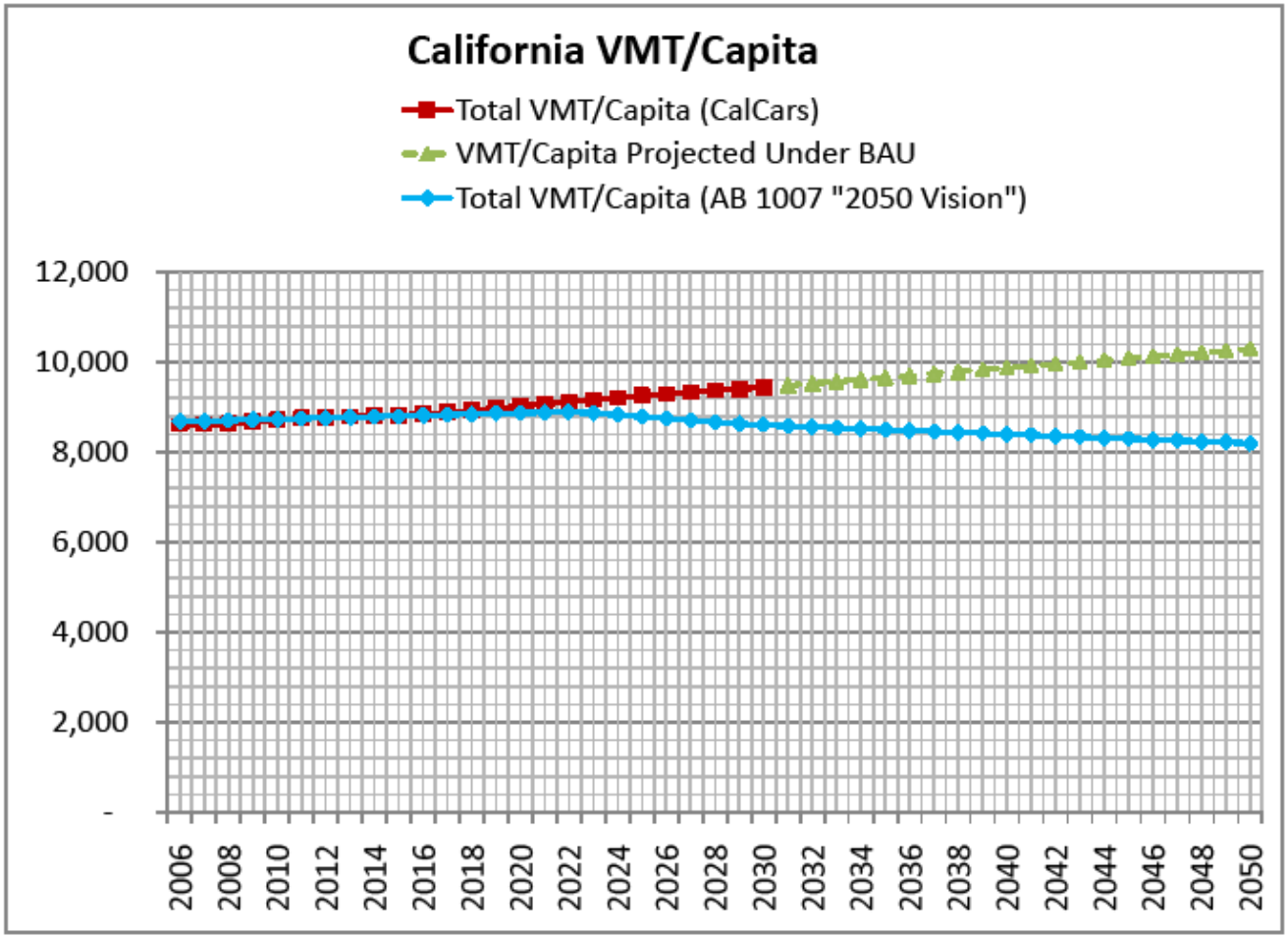
- Break new vehicles into 3 groups:
  - Low Carbon (LC) vehicles at 60 mpg and 10% carbon reduction
  - Ultra-Low Carbon (ULC) vehicles at 60 mpg and 80% carbon reduction
  - Super-Ultra-Low Carbon (SULC) vehicles at 80 mpg and 90% carbon reduction—Break into 3 subcategories for more refined calculations

Fuel Cycle GHGs for LDVs



2050 Vision Analysis

- Add Alternative Fuel Vehicles to the mix using "Story Lines" from State Alternative Fuels Plan, updated by staff.
- Non-petroleum alternative fuels restricted to replacing gasoline and diesel in LC vehicles
- Biofuels used for portion of LD Diesels, ULCs and fuel portion of SULC Plug-In vehicle trips.
- SULCs also include battery electrics and fuel cell vehicles


California VMT/Capita
Total VMT/Capita (CalCars)
VMT/Capita Projected Under BAU
Total VMT/Capita (AB 1007 "2050 Vision")
12,000
10,000
8,000
6,000
4,000
2,000
-
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
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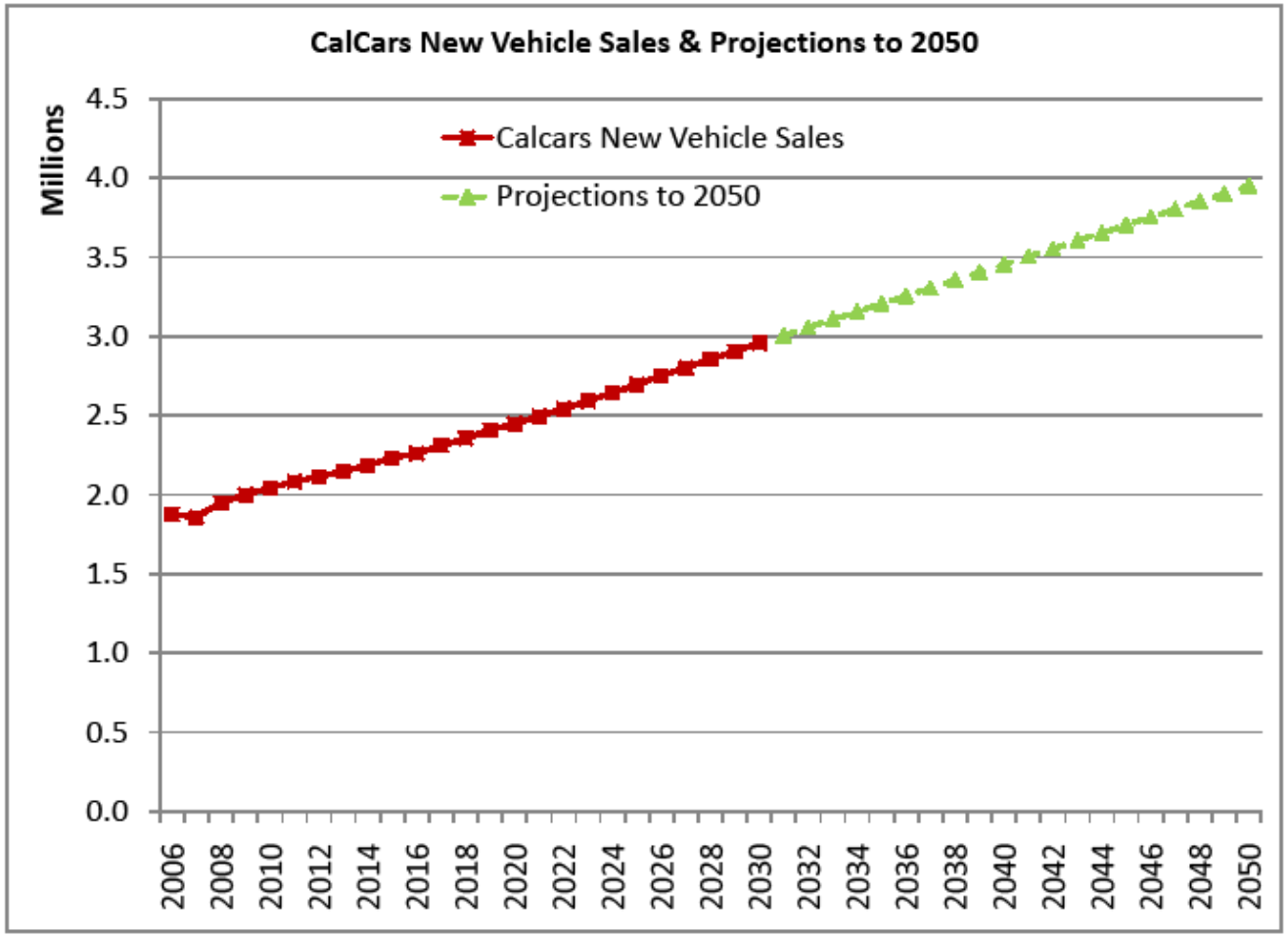
2048
2050


CalCars New Vehicle Sales & Projections to 2050
Millions
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Calcars New Vehicle Sales
Projections to 2050
2006
2008
2010
2012
2014
2016
2018
2020
2022
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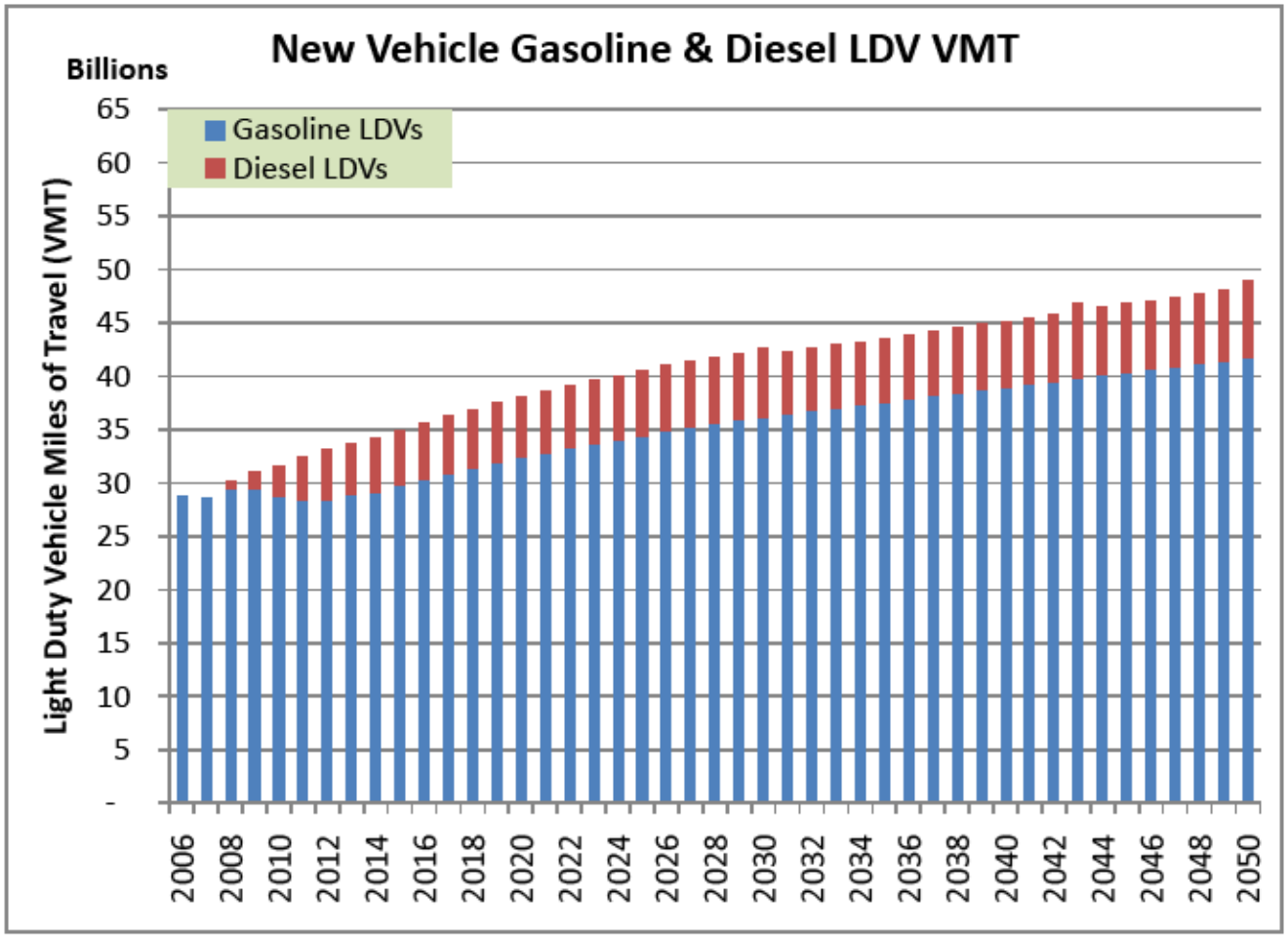
New Vehicle Gasoline & Diesel LDV VMT
Billions
Light Duty Vehicle Miles of Travel (VMT)
Gasoline LDVs
Diesel LDVs
65
60
55
50
45
40
35
30
25
20
15
10
5
-
2006
2008
2010
2012
2014
2016
2018
2020
2022
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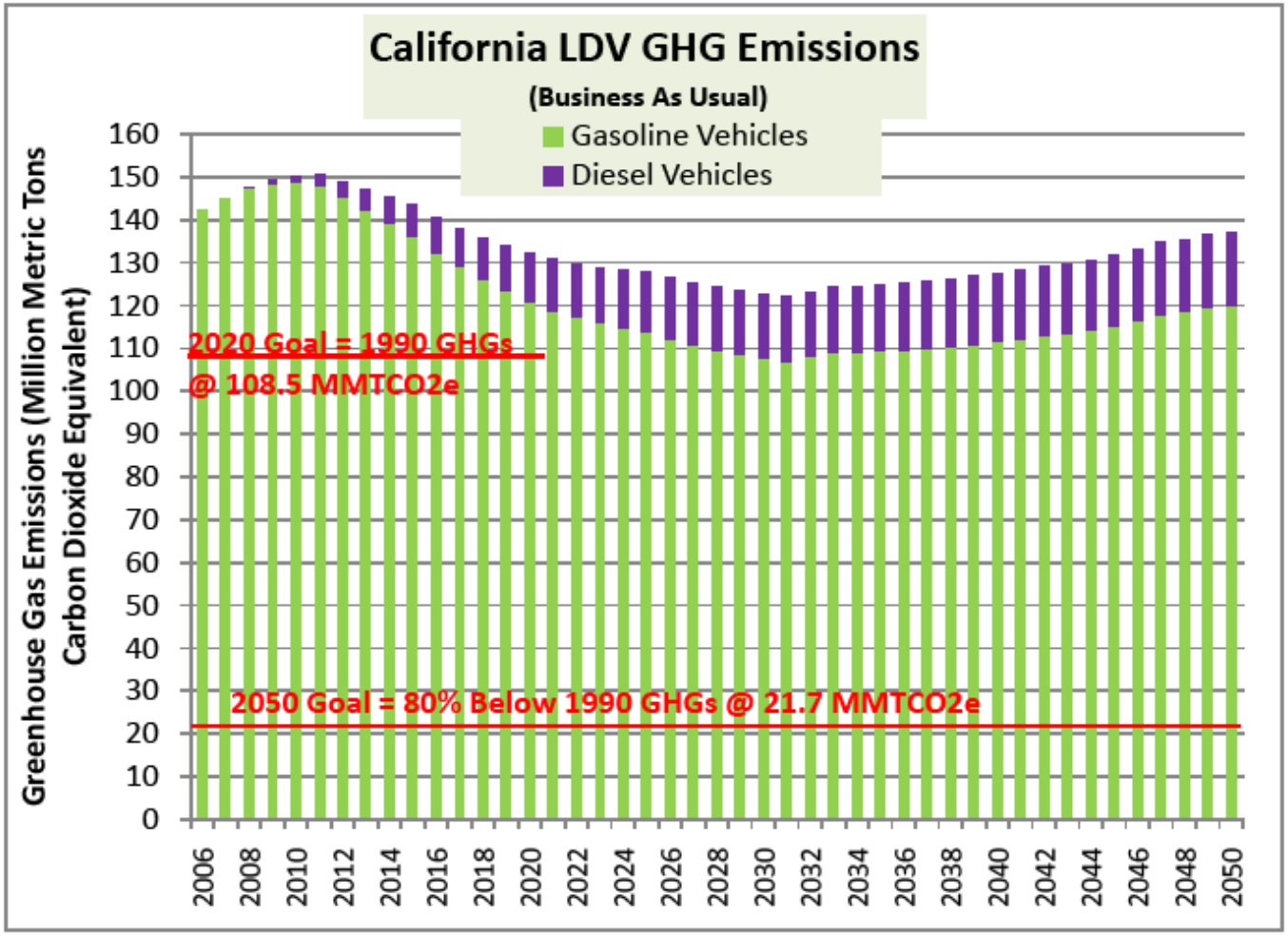
California LDV GHG Emissions
(Business As Usual)
Gasoline Vehicles
Diesel Vehicles
Greenhouse Gas Emissions (Million Metric Tons Carbon Dioxide Equivalent)
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
2020 Goal = 1990 GHGs
@ 108.5 MMTCO2e
2050 Goal = 80% Below 1990 GHGs @ 21.7 MMTCO2e
2006
2008
2010
2012
2014
2016
2018
2020
2022
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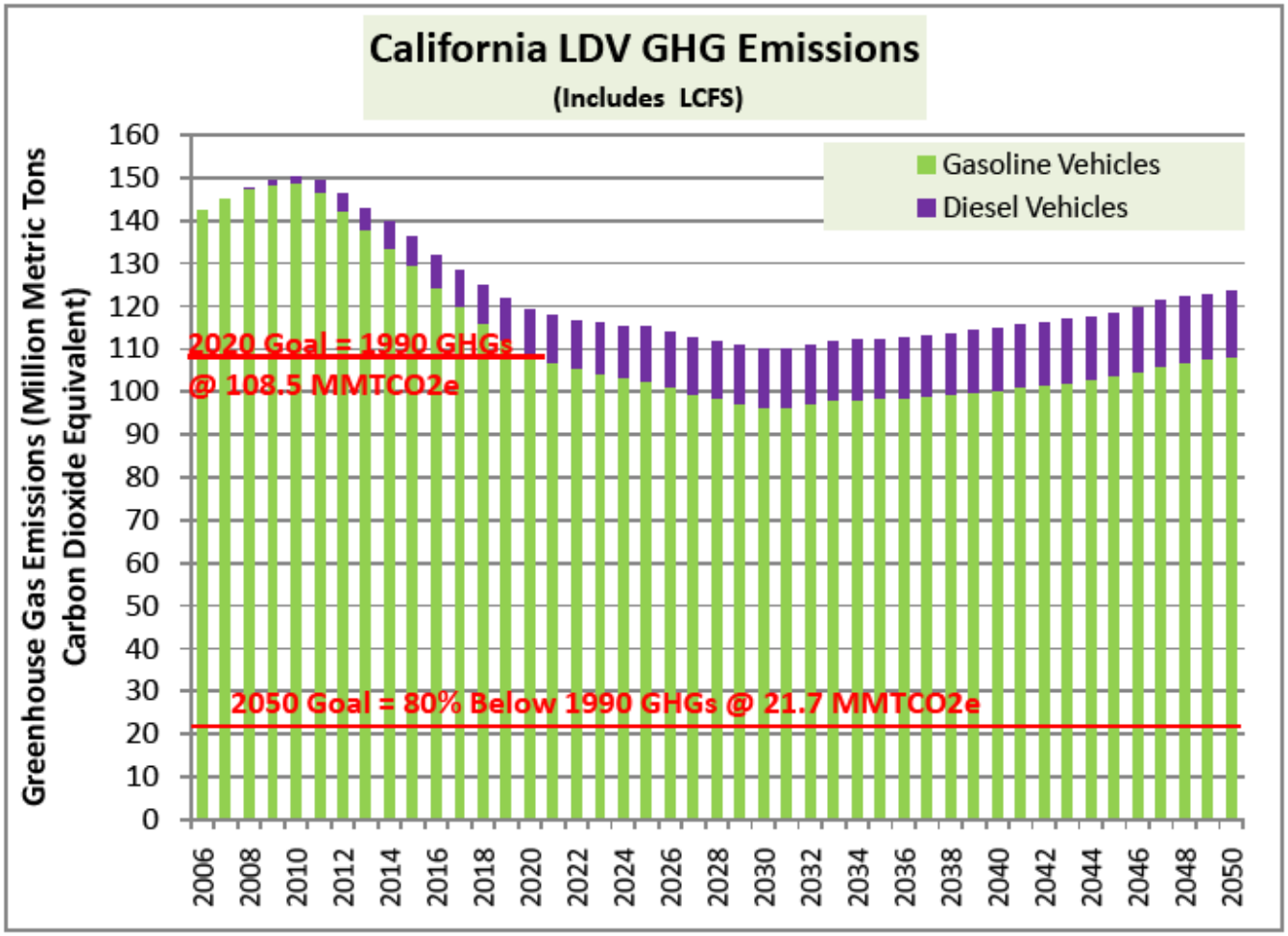
California LDV GHG Emissions
(Includes LCFS)
Greenhouse Gas Emissions (Million Metric Tons Carbon Dioxide Equivalent)
Gasoline Vehicles
Diesel Vehicles
2020 Goal = 1990 GHGs @ 108.5 MMTCO2e
2050 Goal = 80% Below 1990 GHGs @ 21.7 MMTCO2e
0
10
20
30
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60
70
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100
110
120
130
140
150
160
2006
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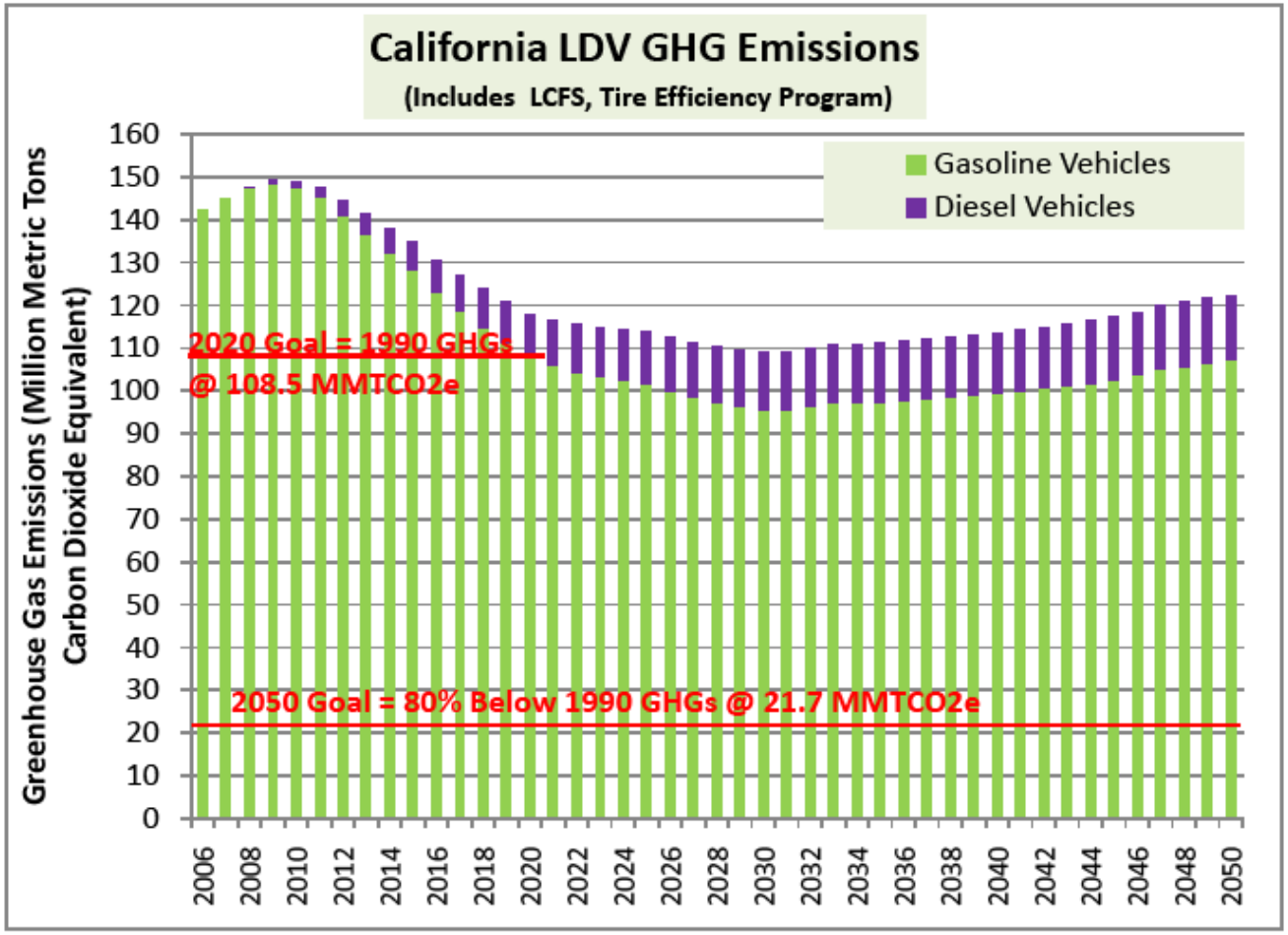
California LDV GHG Emissions
(Includes LCFS, Tire Efficiency Program)
Greenhouse Gas Emissions (Million Metric Tons Carbon Dioxide Equivalent)
Gasoline Vehicles
Diesel Vehicles
2020 Goal = 1990 GHGs @ 108.5 MMTCO2e
2050 Goal = 80% Below 1990 GHGs @ 21.7 MMTCO2e
0
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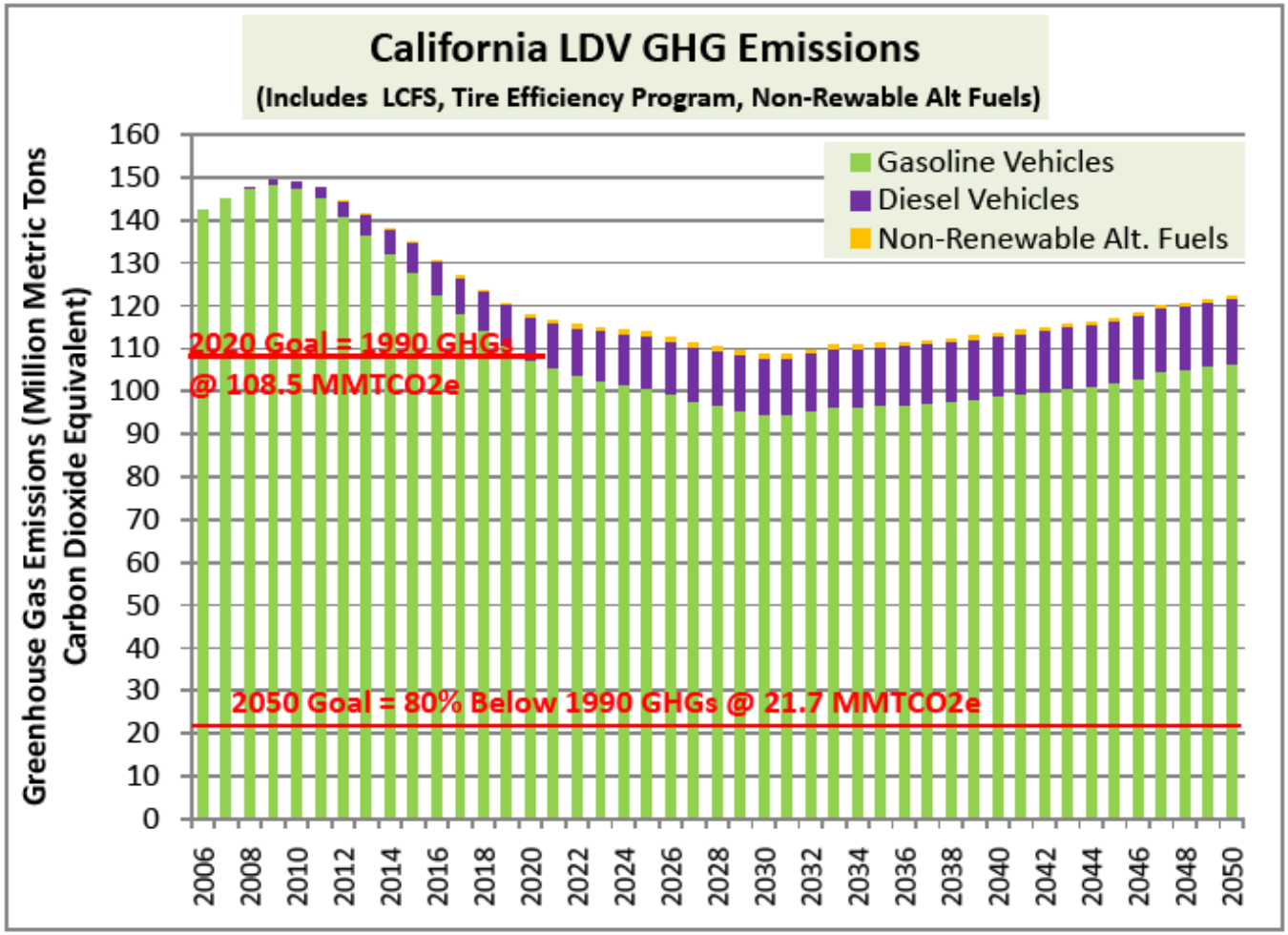
California LDV GHG Emissions
(Includes LCFS, Tire Efficiency Program, Non-Rewable Alt Fuels)
Greenhouse Gas Emissions (Million Metric Tons Carbon Dioxide Equivalent)
Gasoline Vehicles
Diesel Vehicles
Non-Renewable Alt. Fuels
2020 Goal = 1990 GHGs @ 108.5 MMTCO2e
2050 Goal = 80% Below 1990 GHGs @ 21.7 MMTCO2e
0
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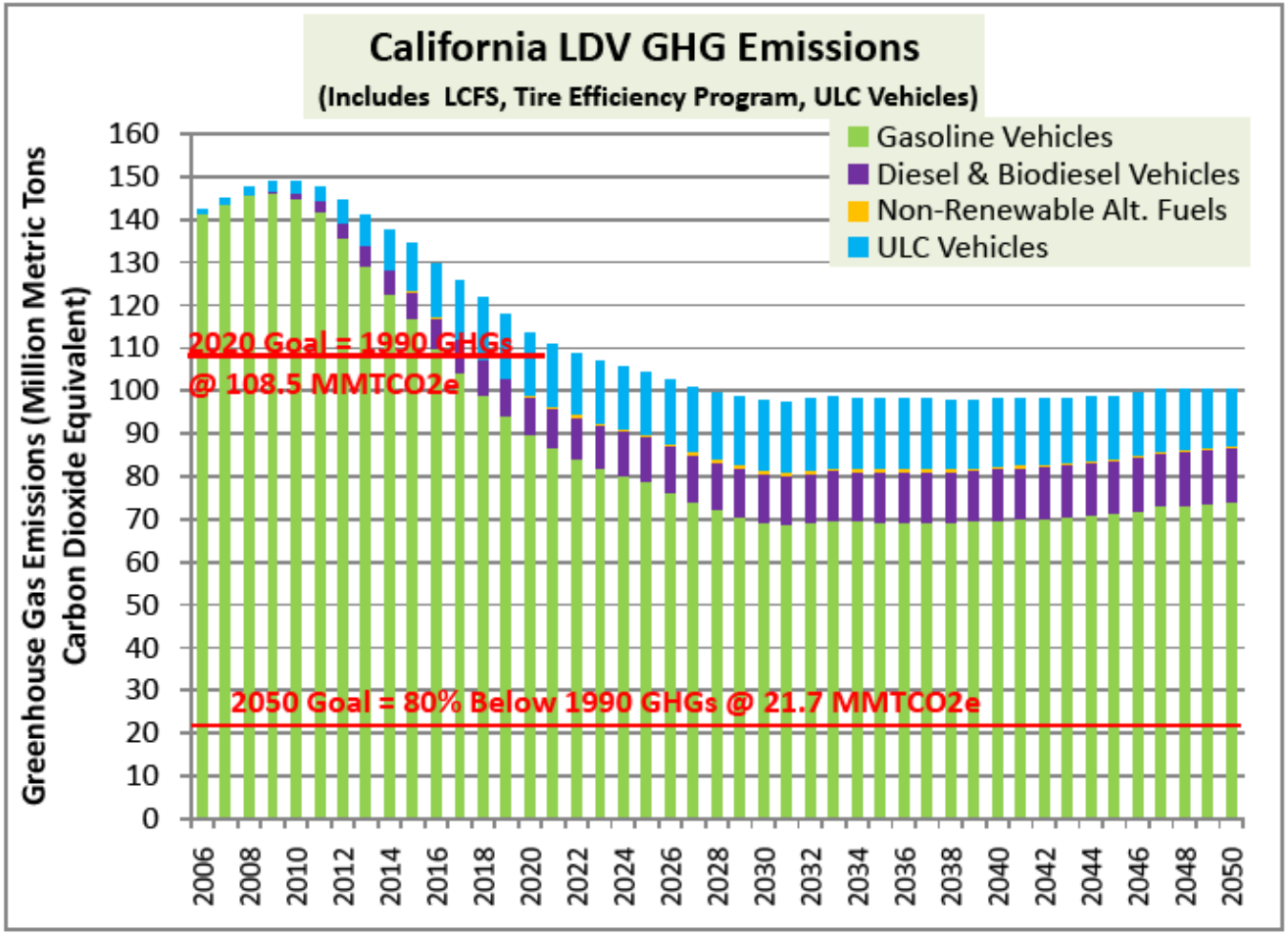
California LDV GHG Emissions
(Includes LCFS, Tire Efficiency Program, ULC Vehicles)
Greenhouse Gas Emissions (Million Metric Tons Carbon Dioxide Equivalent)
Gasoline Vehicles
Diesel & Biodiesel Vehicles
Non-Renewable Alt. Fuels
ULC Vehicles
2020 Goal = 1990 GHGs @ 108.5 MMTCO2e
2050 Goal = 80% Below 1990 GHGs @ 21.7 MMTCO2e
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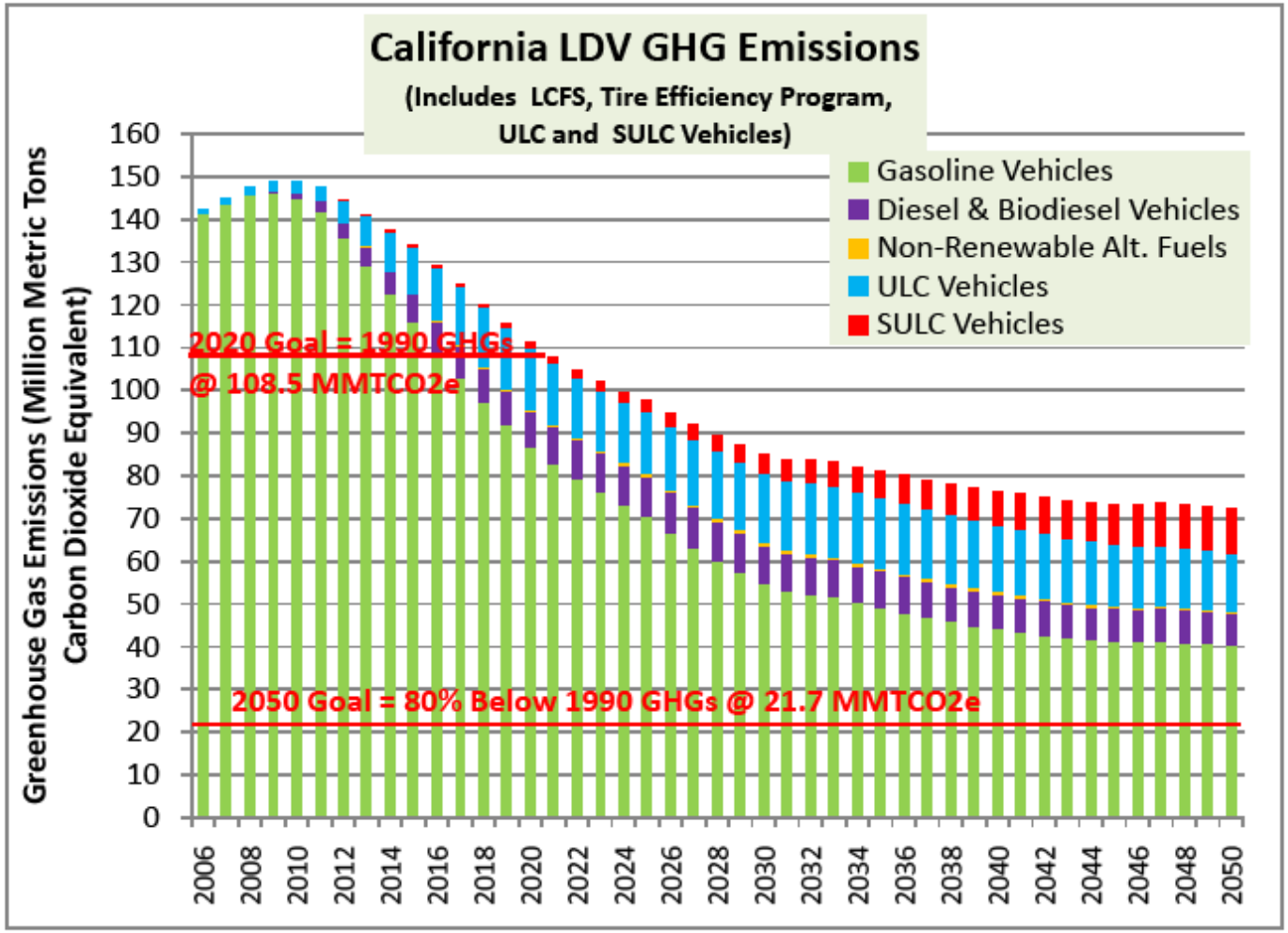
California LDV GHG Emissions
(Includes LCFS, Tire Efficiency Program, ULC and SULC Vehicles)
Greenhouse Gas Emissions (Million Metric Tons Carbon Dioxide Equivalent)
Gasoline Vehicles
Diesel & Biodiesel Vehicles
Non-Renewable Alt. Fuels
ULC Vehicles
SULC Vehicles
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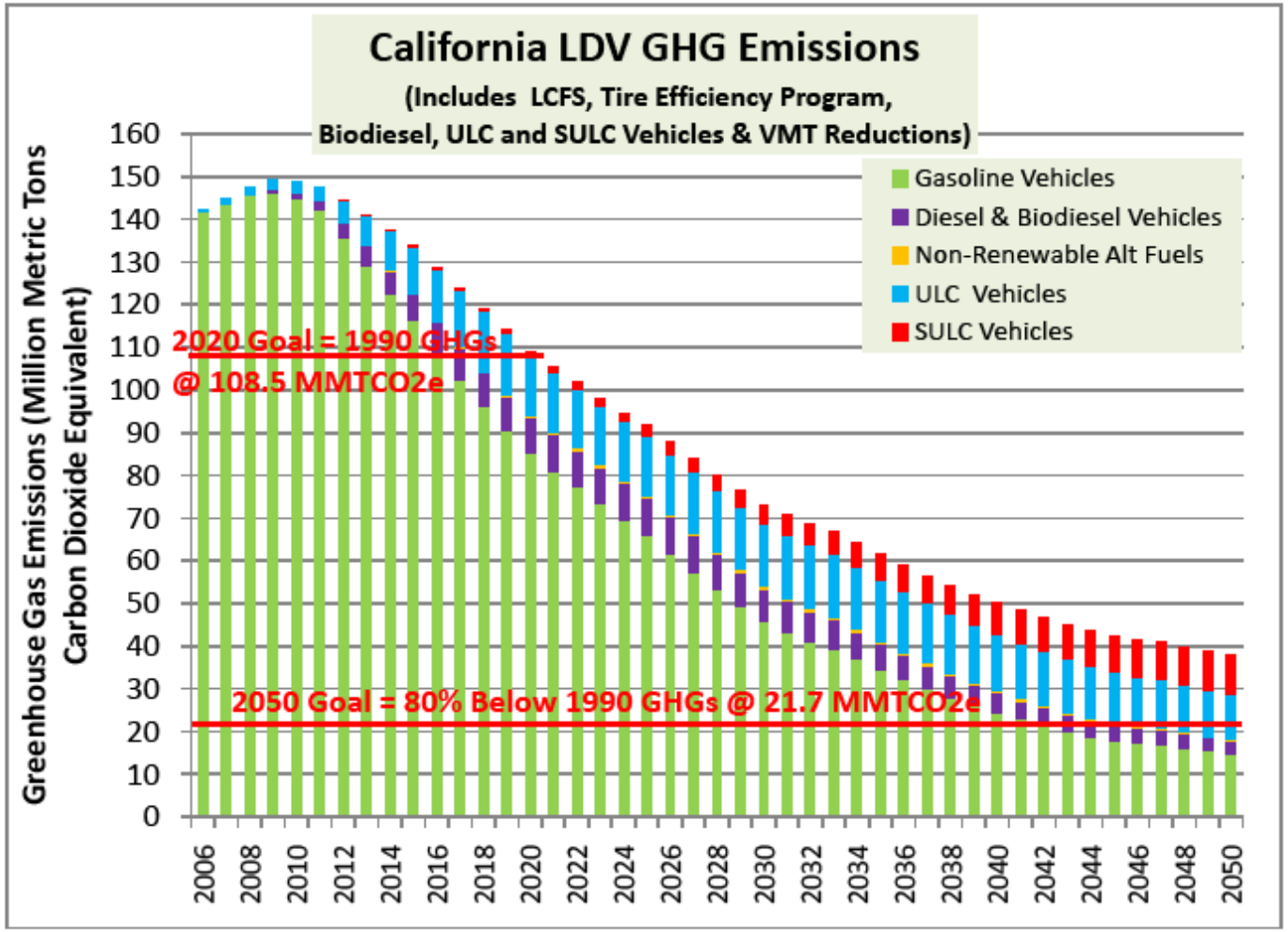
California LDV GHG Emissions
(Includes LCFS, Tire Efficiency Program, Biodiesel, ULC and SULC Vehicles & VMT Reductions)
Greenhouse Gas Emissions (Million Metric Tons Carbon Dioxide Equivalent)
Gasoline Vehicles
Diesel & Biodiesel Vehicles
Non-Renewable Alt Fuels
ULC Vehicles
SULC Vehicles
2020 Goal = 1990 GHGs @ 108.5 MMTCO2e
2050 Goal = 80% Below 1990 GHGs @ 21.7 MMTCO2e
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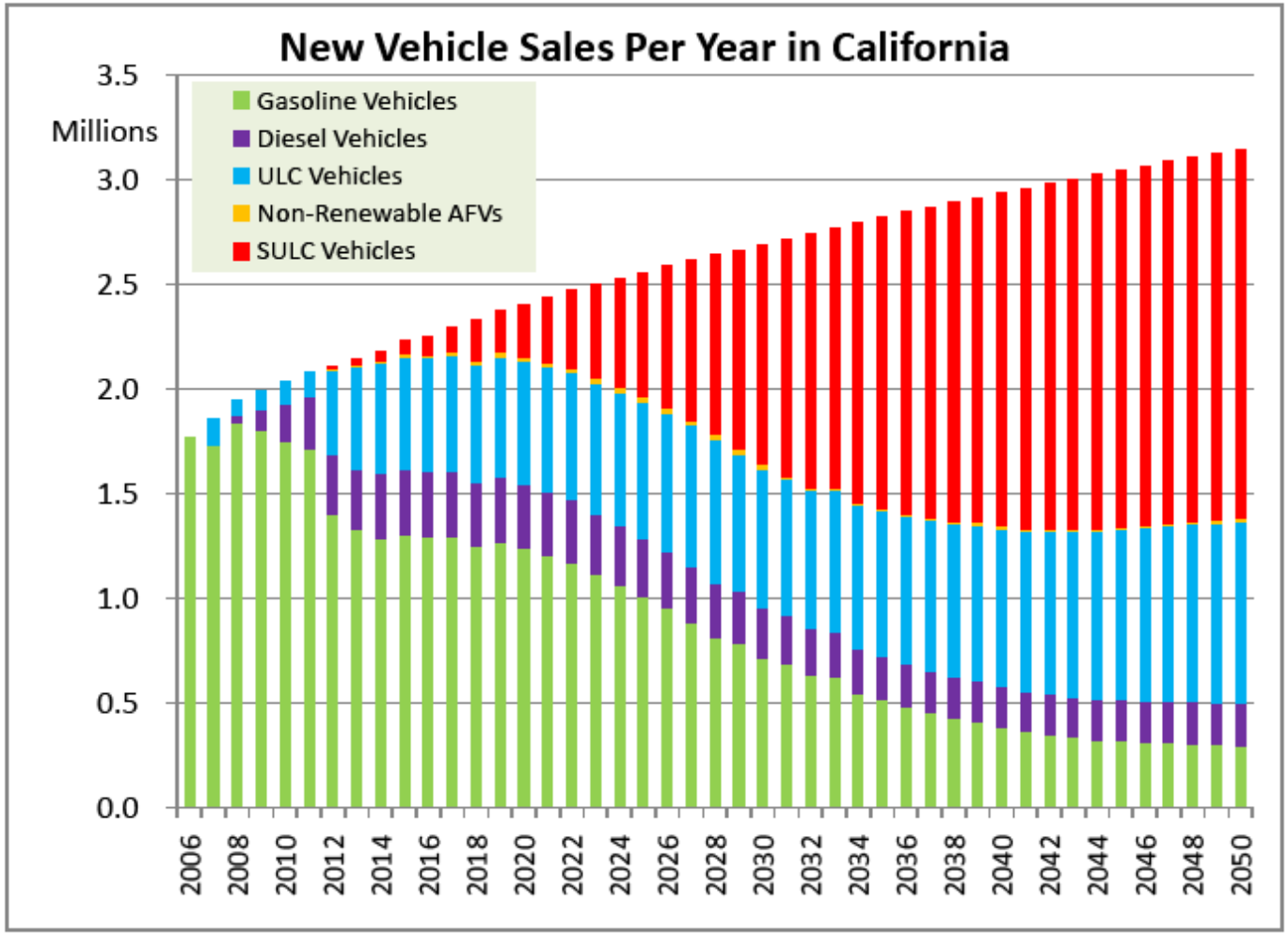
New Vehicle Sales Per Year in California
Millions
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Gasoline Vehicles
Diesel Vehicles
ULC Vehicles
Non-Renewable AFVs
SULC Vehicles
2006
2008
2010
2012
2014
2016
2018
2020
2022
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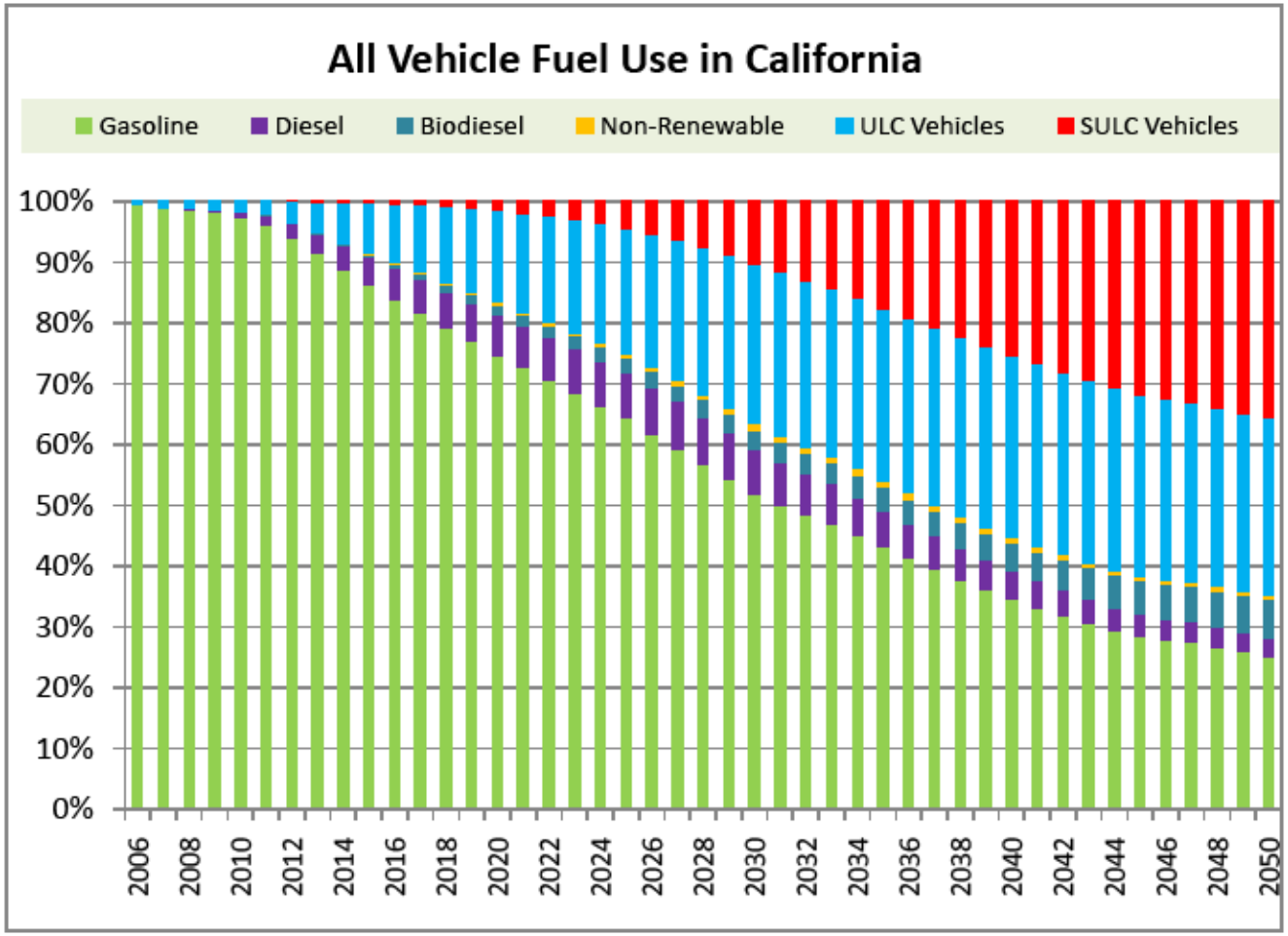
All Vehicle Fuel Use in California
Gasoline
Diesel
Biodiesel
Non-Renewable
ULC Vehicles
SULC Vehicles
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2006
2008
2010
2012
2014
2016
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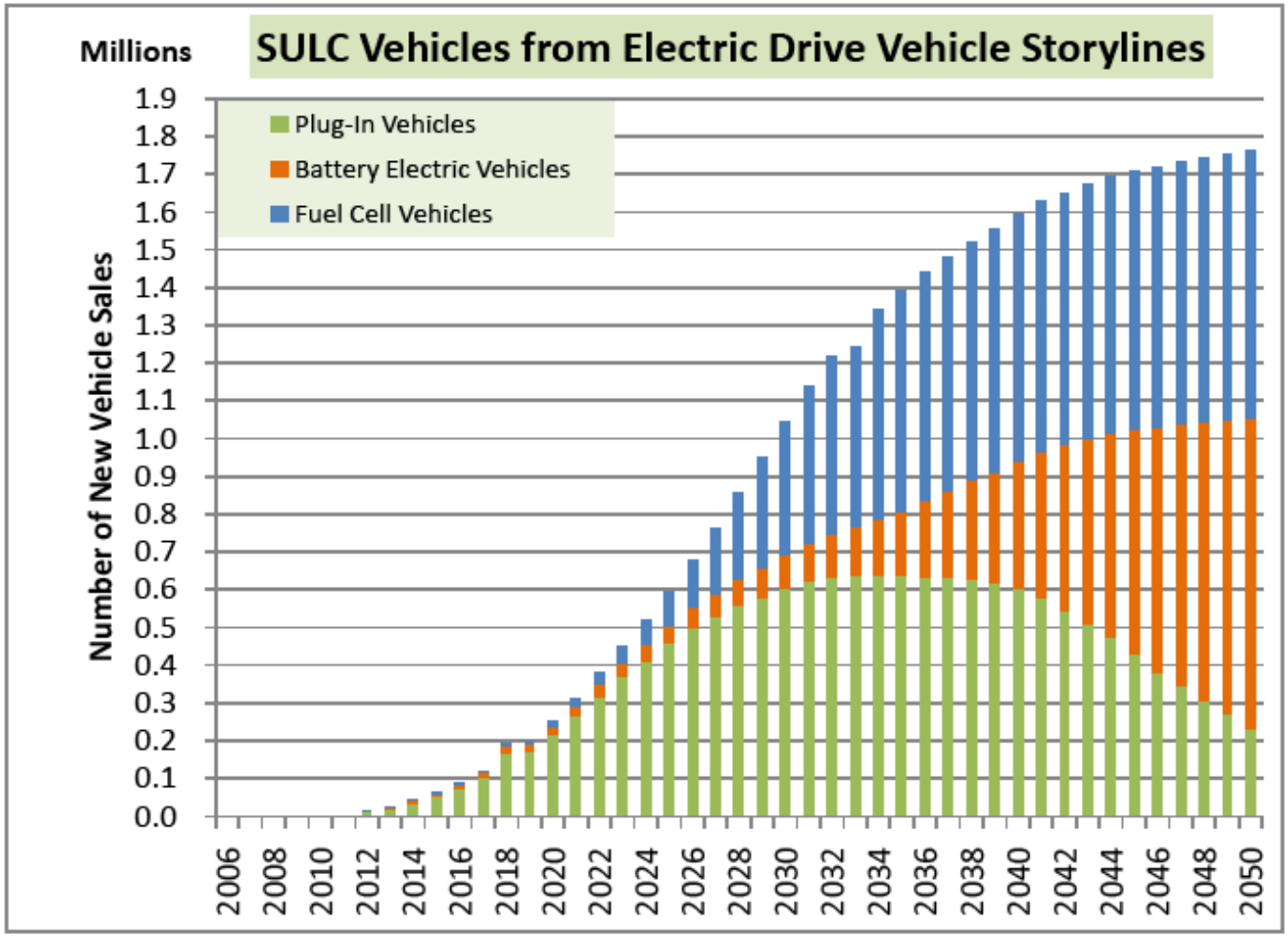
9/18/2008


SULC Vehicles from Electric Drive Vehicle Storylines
Millions
Number of New Vehicle Sales
Plug-In Vehicles
Battery Electric Vehicles
Fuel Cell Vehicles
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2006
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2048
2050

9/18/2008

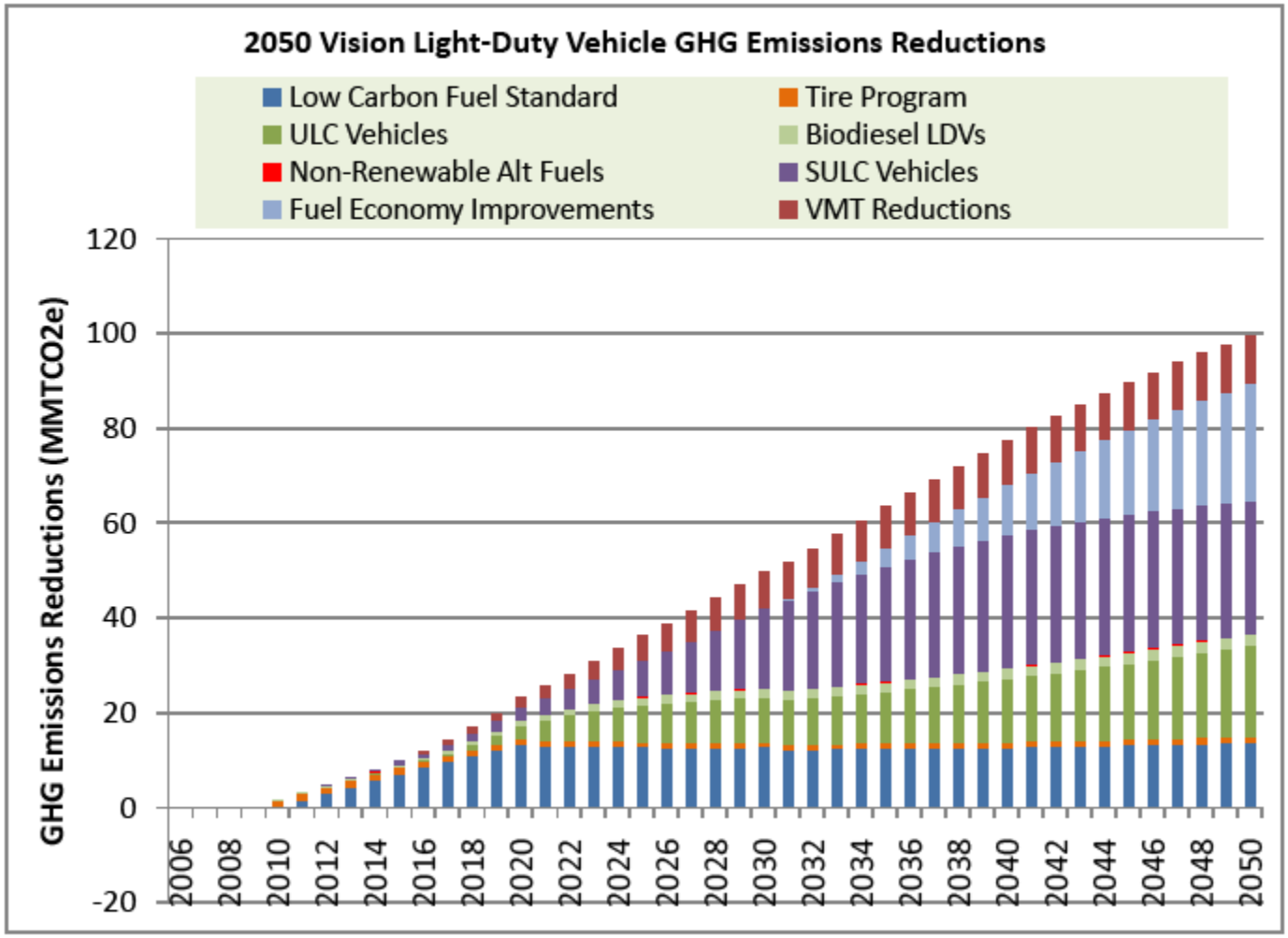
Summary of Changes Since 9-2-08

- Corrected BAU-projected VMT
- Reduced new vehicle sales to keep VMT per vehicle constant
- SULC Vehicles used “Story Line” market penetrations for Flex-Fuel, Plug-In Hybrids, Battery Electric and Fuel Cell Vehicles.

Summary of Changes Since 9-2-08

- Used Fuel Cycle GHG emissions carbon intensity corresponding to specific vehicles rather than the generic “SULC Vehicles”
- Used biodiesel to displace petroleum diesel based upon estimated light-duty supply.
- Reduced effect of Tire Program to 1% to avoid double-counting AB 1493/Pavley

9/18/2008


2050 Vision Light-Duty Vehicle GHG Emissions Reductions
Low Carbon Fuel Standard
Tire Program
ULC Vehicles
Biodiesel LDVs
Non-Renewable Alt Fuels
SULC Vehicles
Fuel Economy Improvements
VMT Reductions
GHG Emissions Reductions (MMTCO2e)
120
100
80
60
40
20
0
-20
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
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2042
2044
2046
2048
2050

Thank You For Your Attention!

- Any Remaining Questions???

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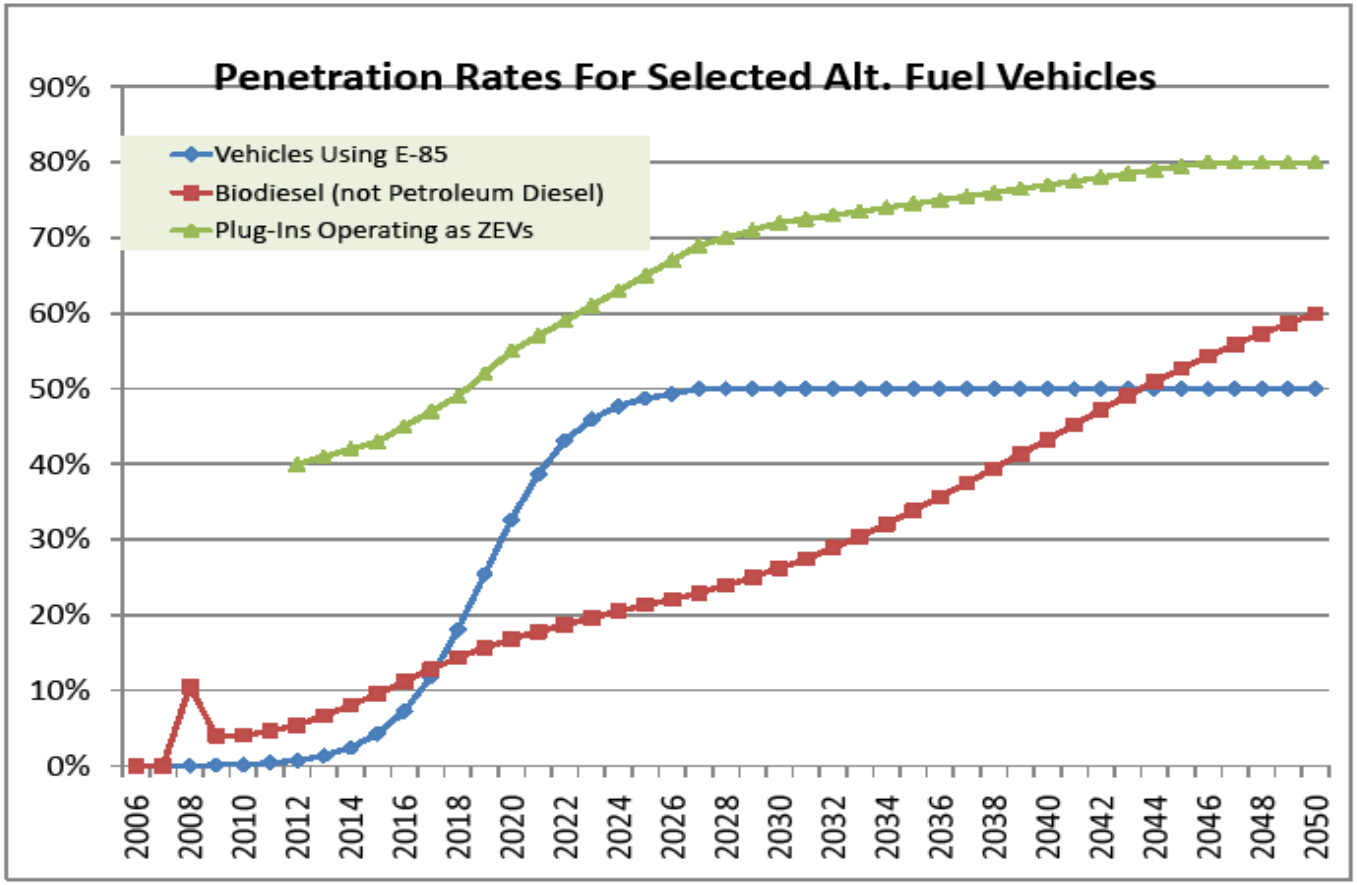
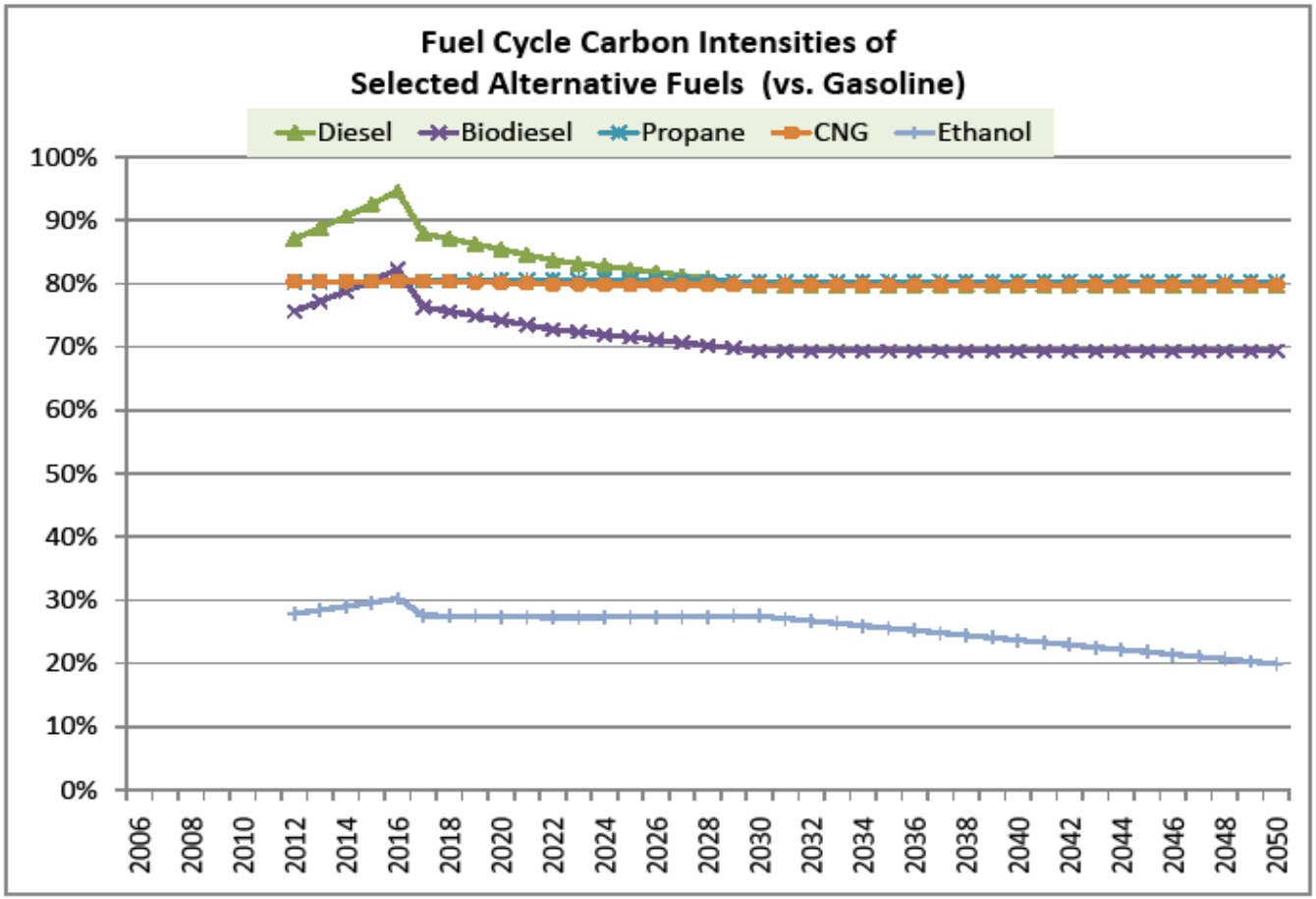
Market Penetration Rates



Assumed Carbon Intensities