The California Approach

Overview of the Global Warming Solutions Act (AB 32) and Strategies to Reduce Transportation Emissions

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Outline

- California Emission Targets and Greenhouse Gas Inventory
- The Global Warming Solutions Act of 2006 (AB 32)
- Key Transportation Sector Strategies
- Low-Carbon Fuel Standard (LCFS)

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California's Global Warming Targets

- California's new law, the Global Warming Solutions Act (AB 32), sets an ambitious, but achievable cap that will return GHG emissions to 1990 levels by 2020 (estimated 29% cut)
- Governor's Climate Action Plan also has a longer-term target of 80% reduction by 2050 consistent with USCAP and Safe Climate Act (Waxman)
- California also has goal of displacing 20% of on-road transportation petroleum fuels with alternative fuels by 2020 ("Integrated Energy Policy Report")

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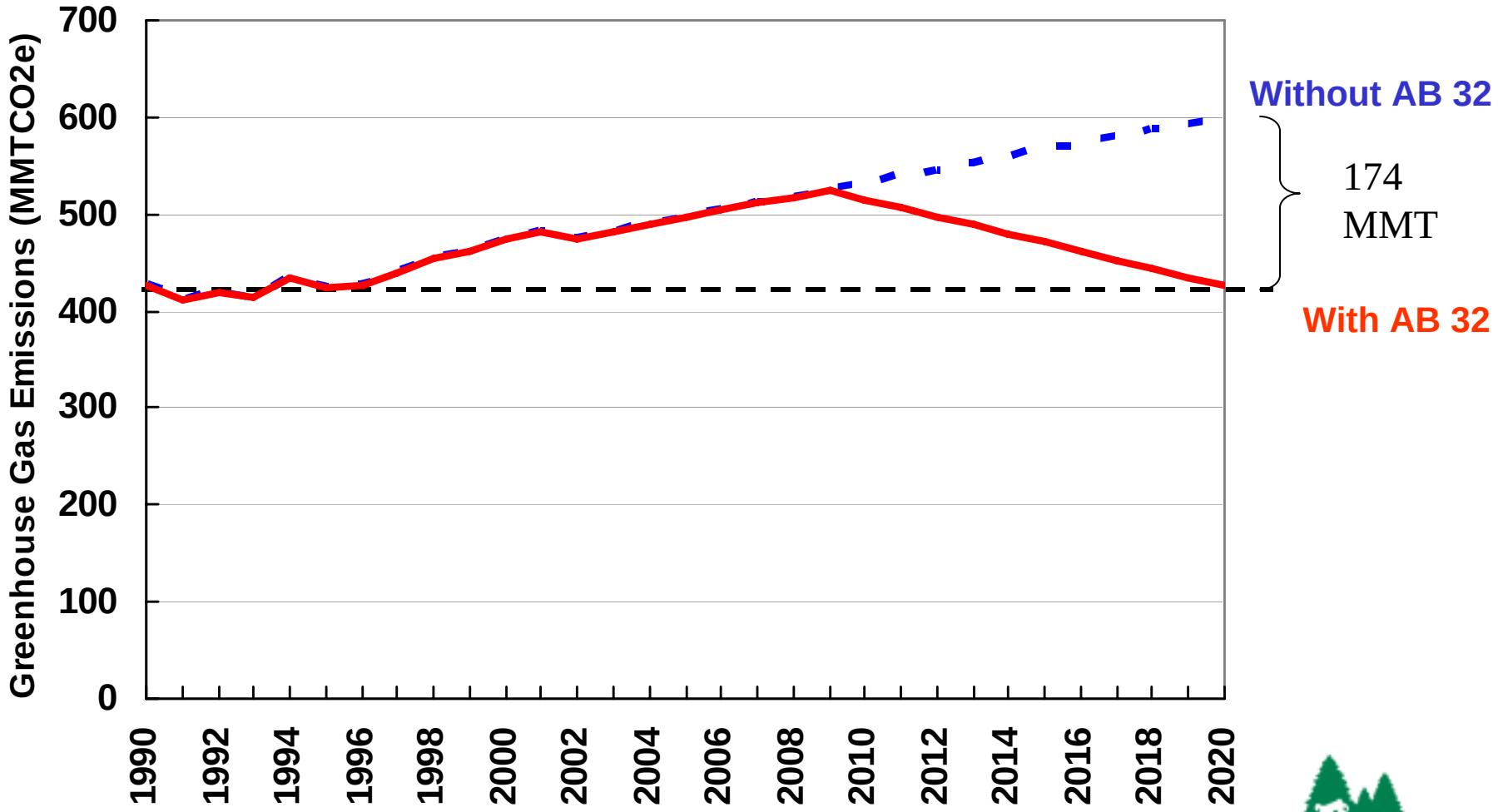
AB 32 Requires 1990 Levels by 2020



Sources: Climate Action Team, *Report to Governor Schwarzenegger and the Legislature*, March 2006; Assembly Bill 32 (Nunez-Pavley, 2006)

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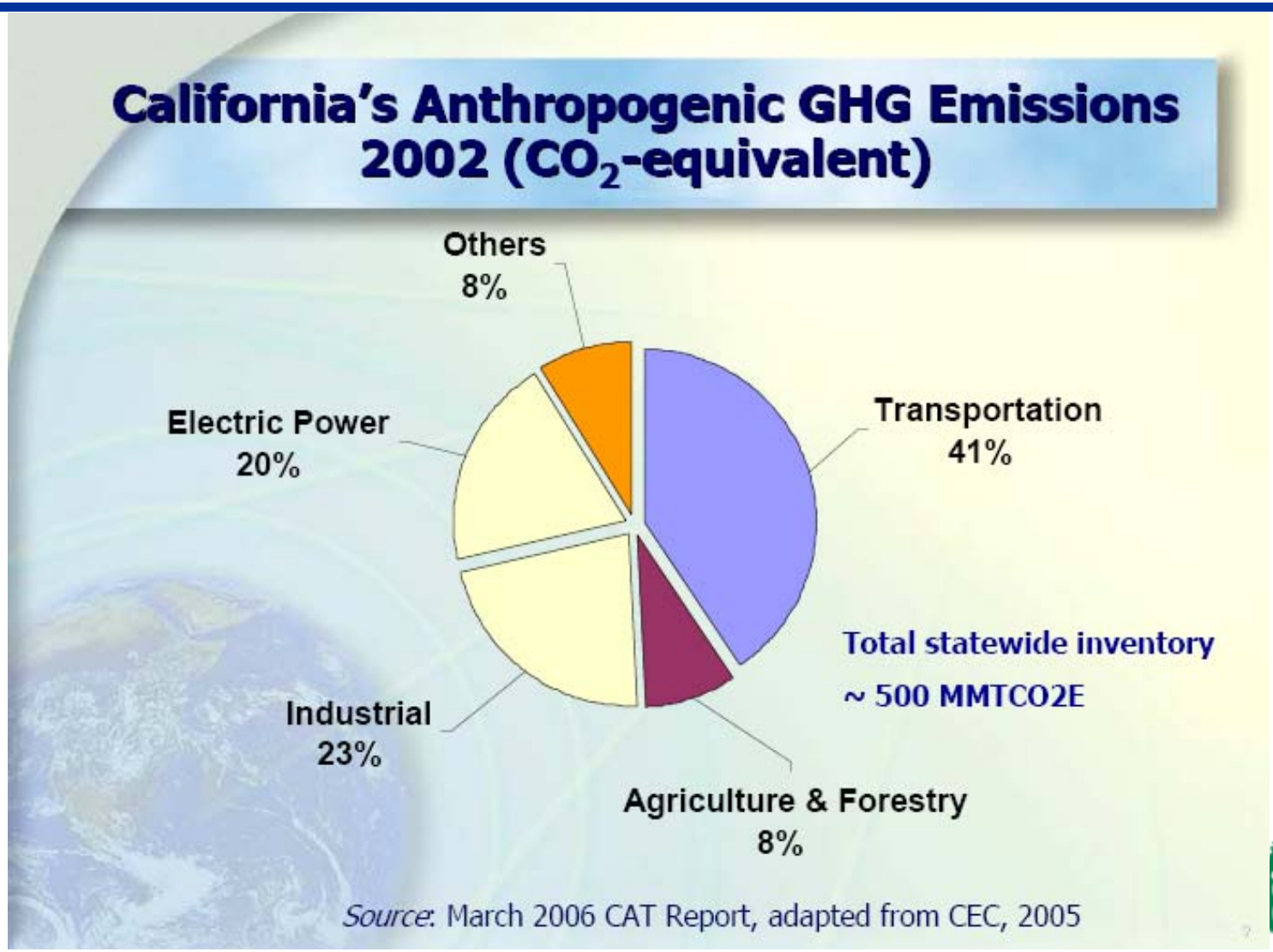
Transportation is 41% of GHG Emissions



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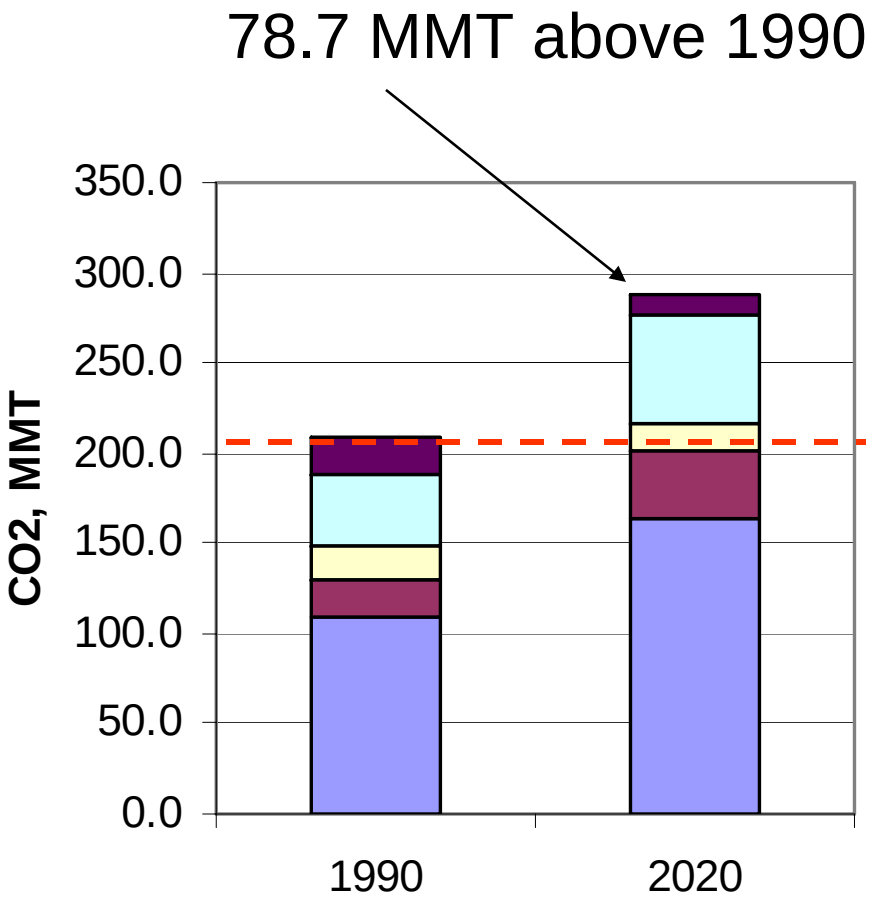
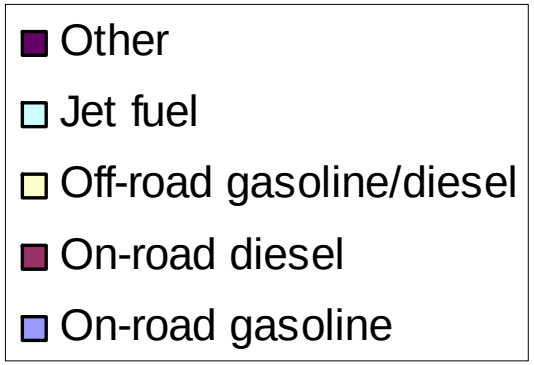
Transportation CO_2 Inventory





	1990	2020
On-road gasoline	110.0	163.7
On-road diesel	18.9	37.3
Off-road gasoline/diesel	20.1	15.3
Jet fuel	38.3	60.3
Other	21.5	10.9
Total	208.8	287.5

Source: California Climate Action Team

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AB 32 Key Requirements

- Establish 2020 GHG Statewide Cap
  - Establish 2020 GHG emissions cap based on 1990 emissions by January 1, 2008
- Adopt Reporting Requirements
  - Adopt mandatory reporting rules for significant sources of greenhouse gases by January 1, 2008
- Adopt Overall Scoping Plan for Attainment of 2020 Cap
  - Adopt a plan by January 1, 2009 indicating how emission reductions will be achieved from significant GHG sources via regulations, market mechanisms and other actions

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AB 32 Key CARB Requirements

- Adopt Early Action Measures
  - Adopt a list of discrete, early action measures by July 1, 2007 that can be implemented before January 1, 2010 and adopt such measures
- Adopt GHG Rules and Market Mechanisms to Meet Statewide Cap
  - Adopt regulations by January 1, 2011 to achieve the maximum technologically feasible and cost-effective reductions in GHGs, including provisions for using both market mechanisms and alternative compliance mechanisms
  - Regulations take effect and enforceable by January 1, 2012

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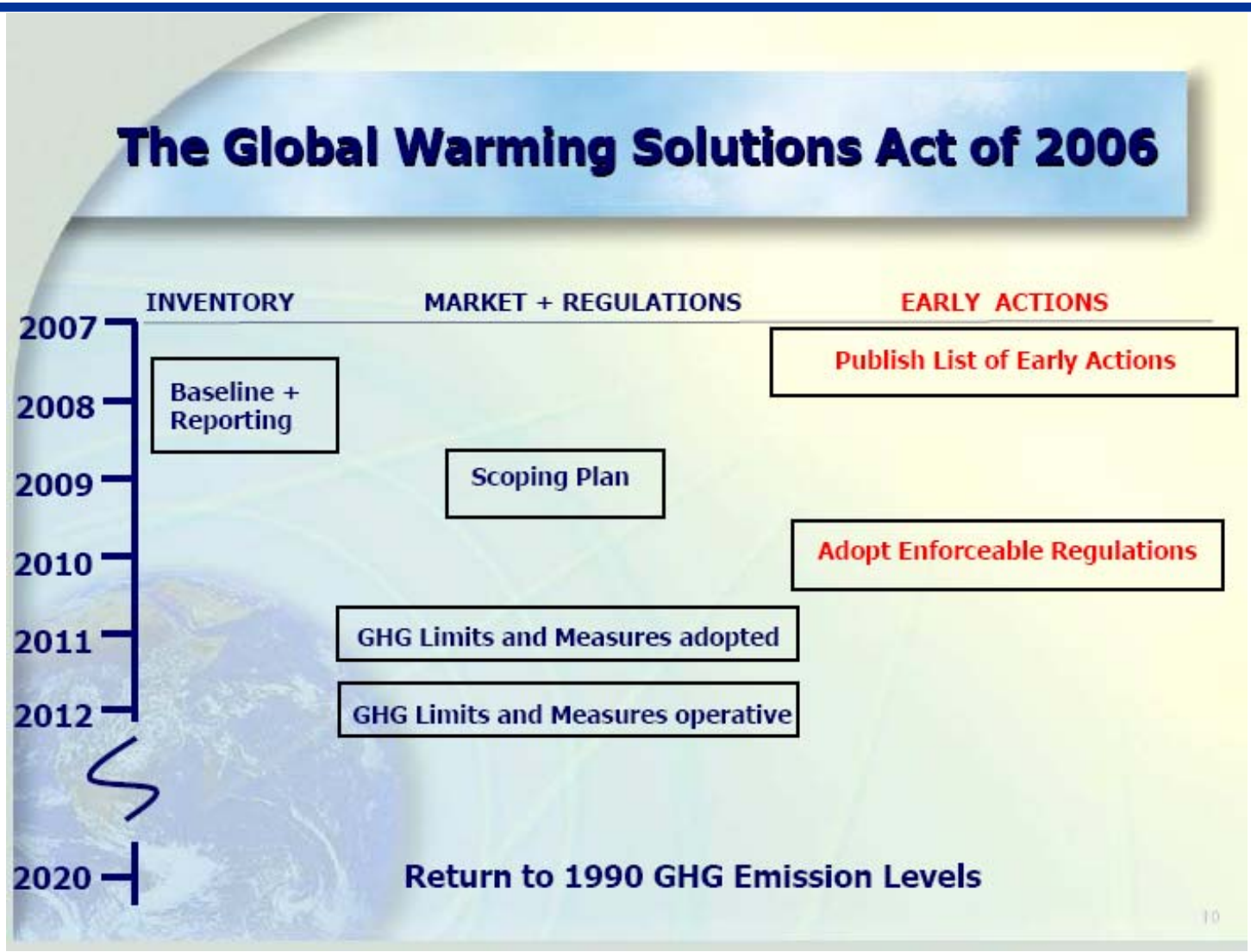
AB 32 Process



Source: CARB

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Three Key Strategies to Meet Targets

- Cleaner Cars and Trucks
  - Current CO2 emission standards for passenger vehicles (AB 1493)
  - New program to improve Heavy Duty Trucks
- Low-Carbon Fuels
  - Recently announced Low-Carbon Fuel Standard to ensure supply of low-carbon fuels
- Reduction in Travel Demand
  - $42.3B in bond money for highway and other infrastructure, a portion of it can be spent on projects that help reduce travel demand

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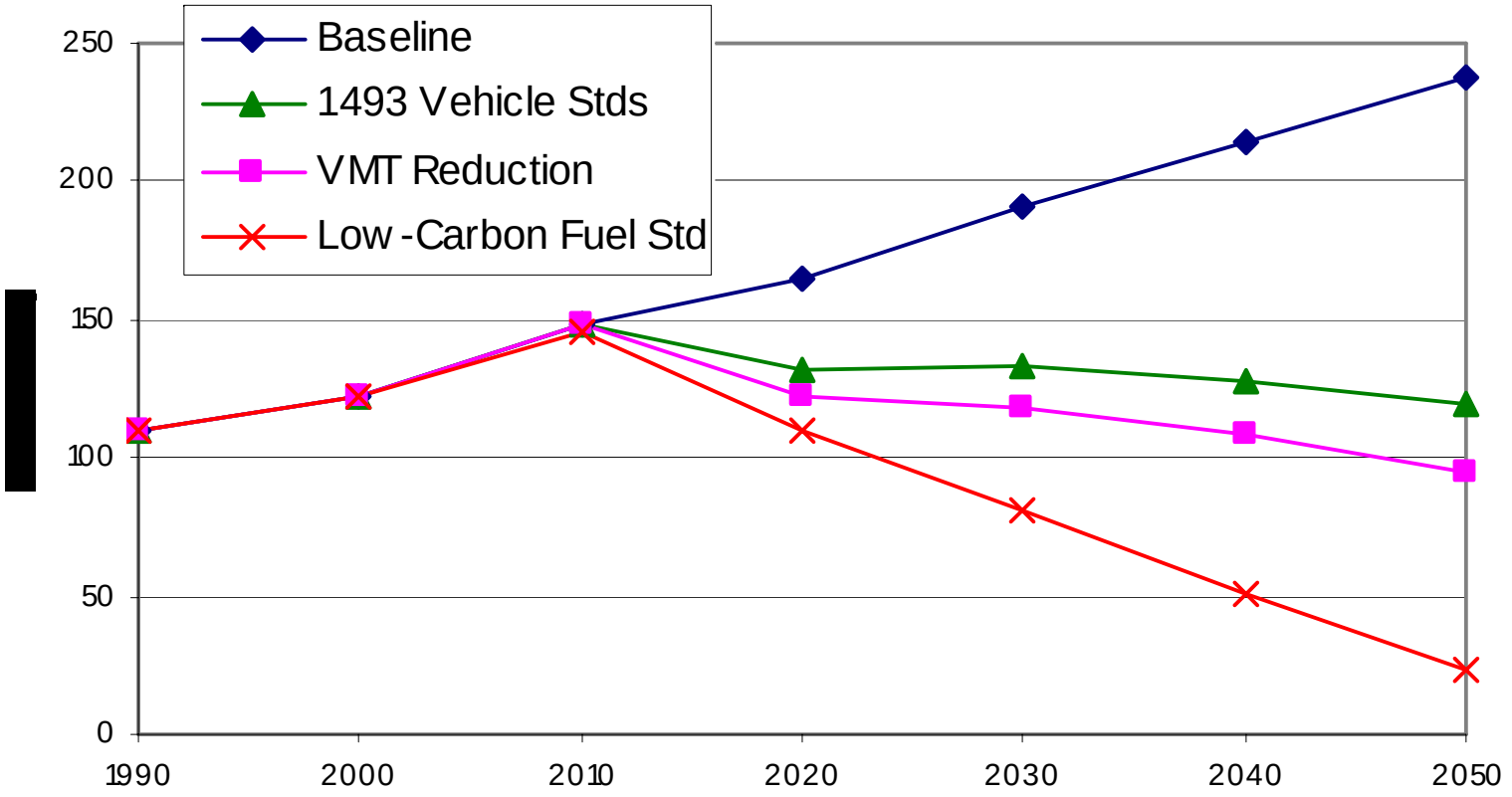
3 Key Strategies: Cleaner Cars, Reduce Driving, and Low-Carbon Fuels

Passenger Vehicles CO_2 Emissions, End-Use Only



Levels Necessary to Meet 2020 and 2050 Goals for Passenger Vehicles

- New Passenger Vehicle Emission Standards
  - 30% reduction by 2016 (current standards under Clean Cars Law, AB 1493)
  - 50% reduction by 2020
- Travel reduction
  - 7% reduction by 2020
  - 20% reduction by 2050
- Low-Carbon Fuel Standard
  - 10% reduction in carbon intensity by 2020
  - 75% reduction by 2050

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Rationale for Low-Carbon Fuel Standard

- A cap-and-trade system is unlikely to create a large enough price signal to induce sufficient, timely investments in new fuel and vehicle technologies
- LCFS creates a substantial, certain market for low-carbon fuels and a stable investment environment
- Benefits versus Renewable Fuel Standard
  - More flexible since it includes electricity, hydrogen, natural gas, etc, rather than just biofuels
  - Ensures GHG reductions
  - Penalizes the use of high carbon, fossil fuels

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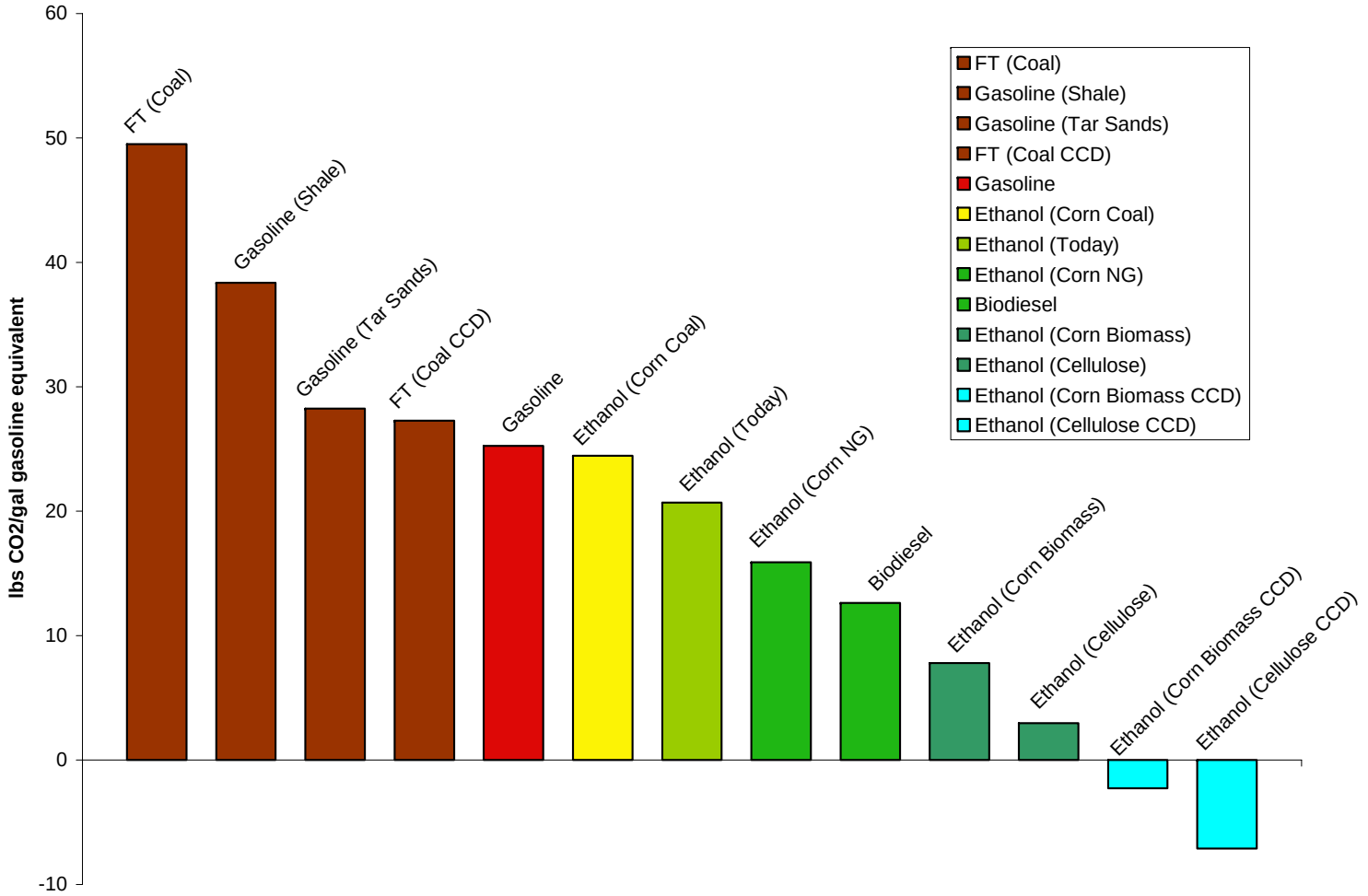
An Alternative Fuel is Not Necessarily a Low-Carbon Fuel



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Low-Carbon Fuel Standard

- Governor Executive Order establishes a goal of 10% reduction in transportation fuel carbon intensity by 2020
- CARB to consider as Early Action Measure with possible adoption by end of 2008
- Measured on full fuel cycle, CO_2-eq/btu
- Performance-based, inclusive off all fuels
- Requirement on refiners, producers, blenders and importers of transportation fuels

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Possible Scenarios to Meet 10% Carbon Intensity Reduction Standard

Scenario Number-->	1	2	3
Total Petroleum Displaced by Low-Carbon Fuels (B gal)	3.0	3.1	3.2
Low-Carbon Fuels			
Total Ethanol Demand (B gal)	2.7	3.8	4.7
Number of FFVs (millions)	3.0	6.0	8.5
Number of PHEVs (millions)	4.1	1.7	0.0
FCVs (millions)	0.5	0.5	0.2

Key assumptions for these scenarios:

- Baseline gasoline contains 5.7 percent ethanol derived from corn.
- All fuel providers increase the blending of ethanol to 10 percent by volume from today's 5.7 percent. The remainder of the ethanol is sold as E85 for use in flex fuel vehicles (FFVs.)
- On average, the ethanol mix used reduces GHGs by 50 percent compared to gasoline. This can be achieved through 50/50 mixture of corn ethanol at about 20 percent reduction and a cellulosic ethanol at 80 percent reduction.
- Plug-in hybrids (PHEVs) use electricity for 50 percent of their driving and using electricity reduces GHG emissions by 67 percent compared to gasoline.
- Hydrogen fuel cells reduce GHG emissions by at least 30 percent compared to gasoline, based on the goals of California Hydrogen Highway Network.

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Benefits of 10% Reduction Goal by 2020

- Cut global warming pollution from the passenger vehicle fleet by 10 percent, equivalent to removing 3 million cars from the road.
- Displace 20 percent of on-road gasoline consumption with low-carbon fuels, reducing consumption by up to 3.2 billion gallons of gasoline per year, equivalent to the output of 2.5 average-sized California refineries.
- Expand the size of the current renewable fuels market in California (already the largest in the nation) by 3 to 5 times. Instead of today's corn, over half of the ethanol is likely to be made from extremely low-carbon, cellulosic feedstocks such as agricultural waste and switchgrass.
- Place on California's roads more than 7 million alternative fuel and hybrid vehicles, approximately 20 times the number of such vehicles on California's roads today.

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LCFS Implementation Process

- By June 30, 2007, CalEPA develop and propose draft compliance schedule to meet 2020 target based on studies by University of California and CEC (and ARB)
- CEC incorporates draft compliance schedule into its State Alternative Fuel Plan required by AB1007 (Pavley, 2005) and submit to CARB
- After submission of Plan, ARB to initiate regulatory proceedings to establish and implement the LCFS
- Anticipated adoption by late 2008

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Conclusions

- California approach is comprehensive, and will use a combination of market-based programs and performance-based standards
- Transportation must contribute its fair share and the three key strategies are: cleaner cars, low-carbon fuels, and reduce travel demand
- Low-Carbon Fuel Standard ensures we can meet twin goals of reducing petroleum dependency and GHG emissions

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