
ACHIEVING CALIFORNIA'S CLIMATE, AIR QUALITY, AND OIL SAVING GOALS

**Rethinking Transportation In California
Governor's Office Five Pillars Symposium
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Current AB32 Measures:

Cleaner Cars, Lower Carbon Fuels, & More Transit-Friendly Communities

Low Carbon Fuels Standard



10% reductions in fuel carbon-intensity by 2020 versus 2010

Advanced Clean Car Standards



Nearly a 50% reduction in GHG emissions by 2025 versus 2010

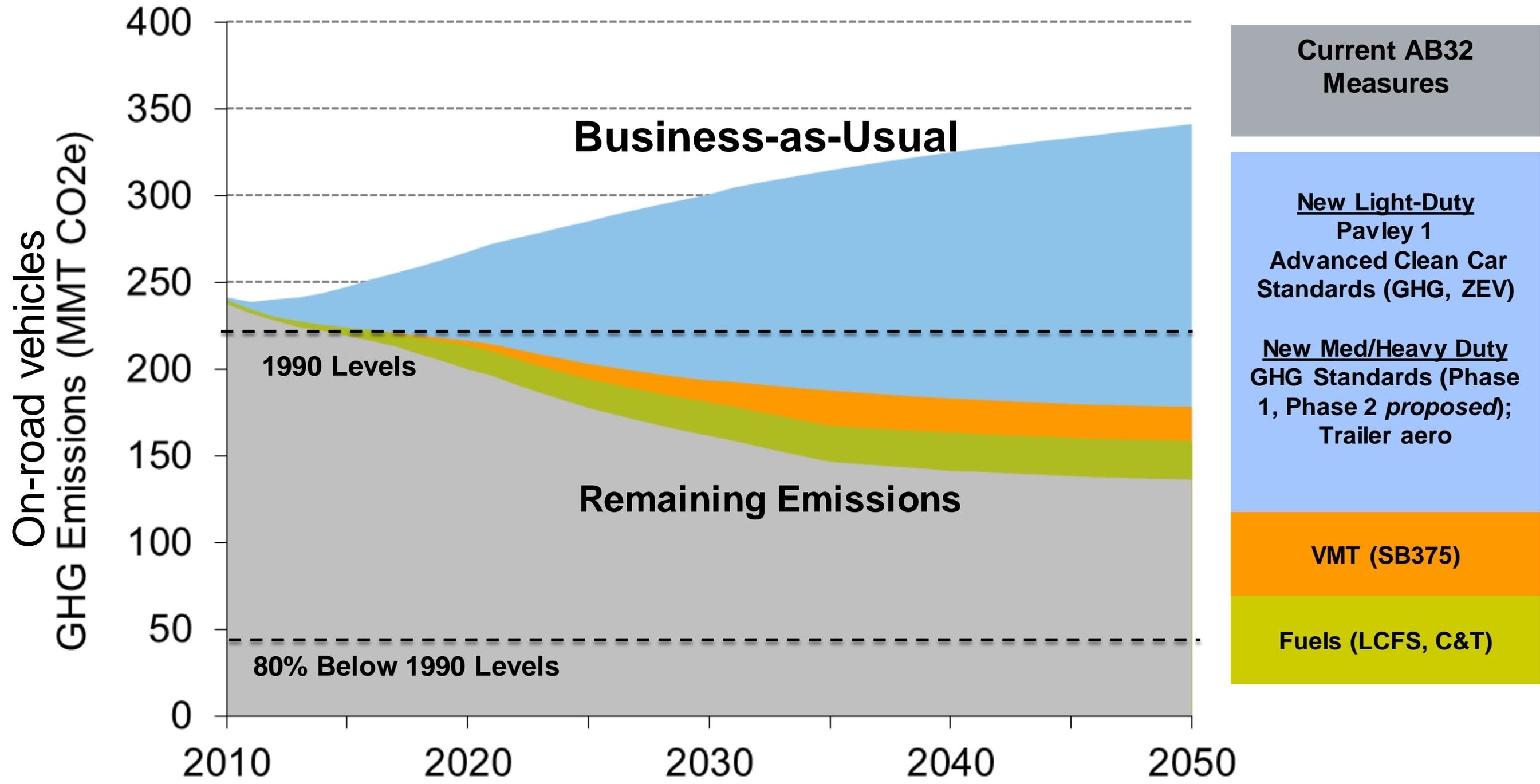
Sustainable Communities



11% reduction in emissions through less sprawl and more transit by 2035 (more is possible!)

Current AB32 Measures:

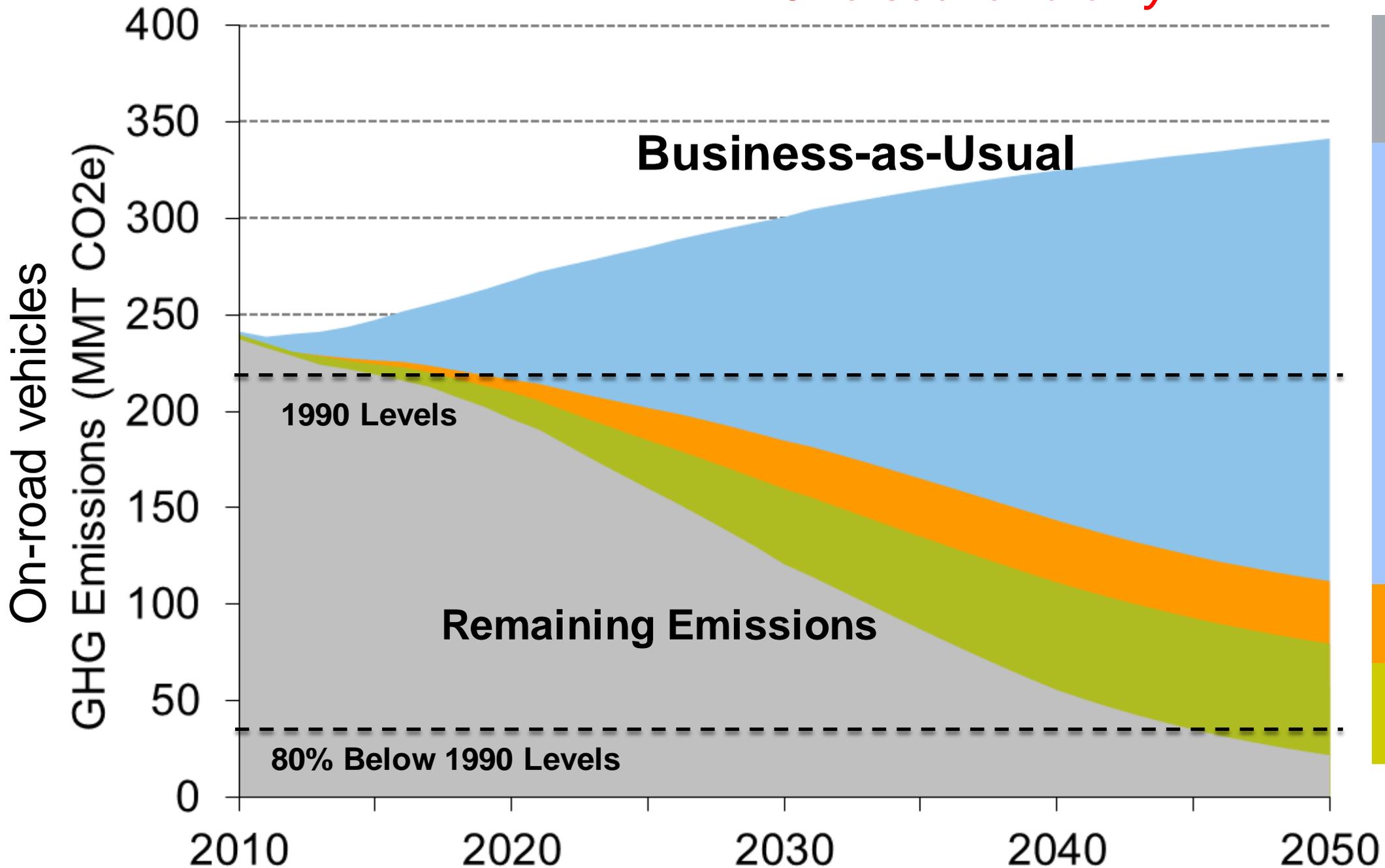
Cleaner Cars, Lower Carbon Fuels, & More Transit-Friendly Communities



Achieving 2030 and 2050 Goals:

Cleaner Cars, Lower Carbon Fuels, & More Transit-Friendly Communities

One scenario only



Where do we need to be by 2030?

Illustrative assumptions

Light-Duty

On-road: 3.7 million BEVs/PHEVs/FCVs

New ICE: 54% reductions in GHGs versus 2010

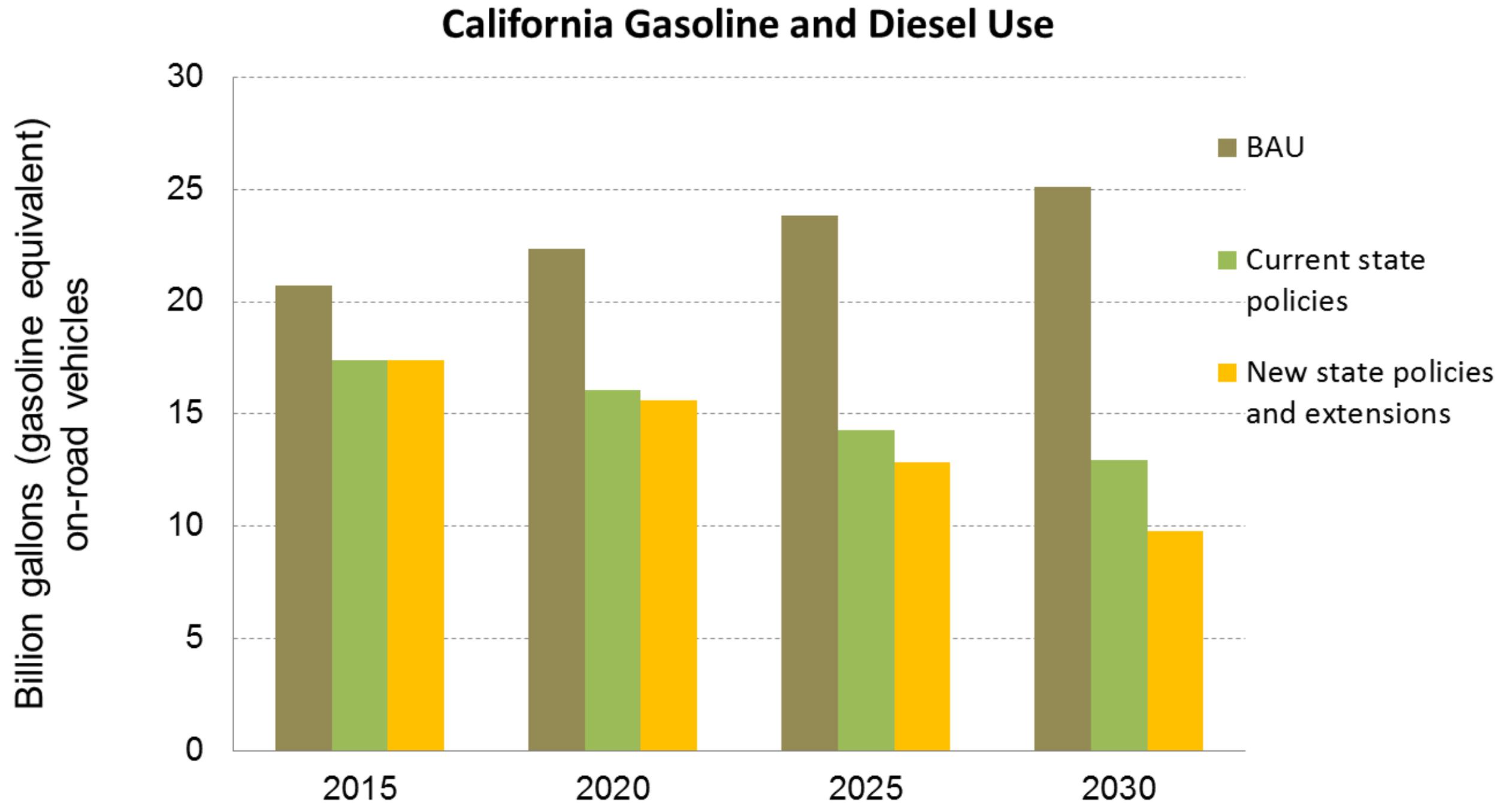
New Med/Heavy Duty

Continued improvements in vehicle efficiency, logistical/modal efficiency improvements, some electrification

VMT (SB375), doubling of current rate of progress)

Fuels (25% reduction in carbon-intensity, C&T)

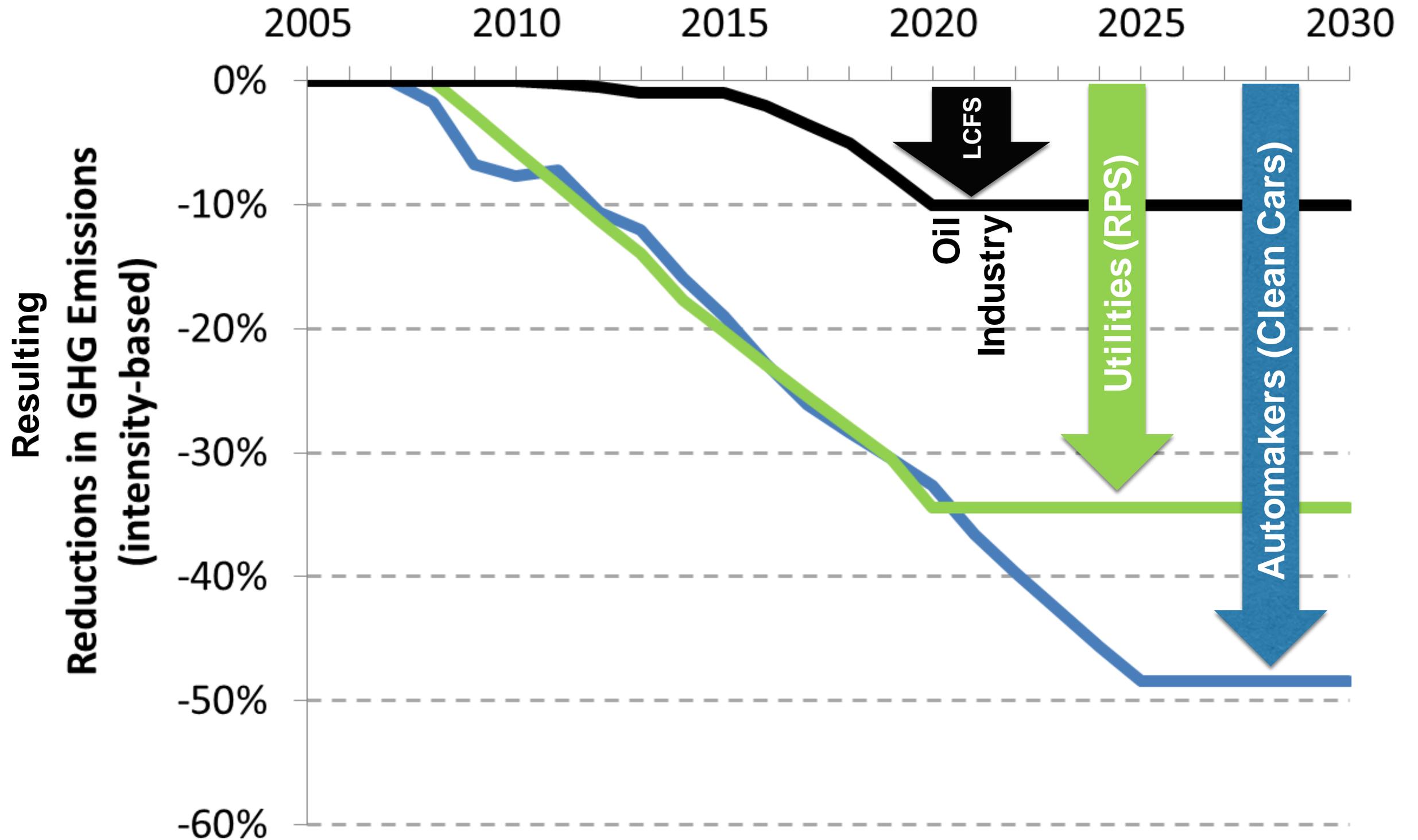
Halving the Need for Petroleum: Ambitious and Achievable



One scenario only

Modeling results do not include aviation, marine, and off-road consumption

Current requirements for sectors to transition to cleaner sources of energy and technologies



The LCFS Is Resulting in A Cleaner Fuel Mix Today

GHG Emissions

11 million MT CO₂e



Alternative Fuel Use

19%



Reductions in Carbon-Intensity of Alternatives

16%



Growth in Fuel Technology Pathways Identified

64 to 288



Industry Exceeding Standards

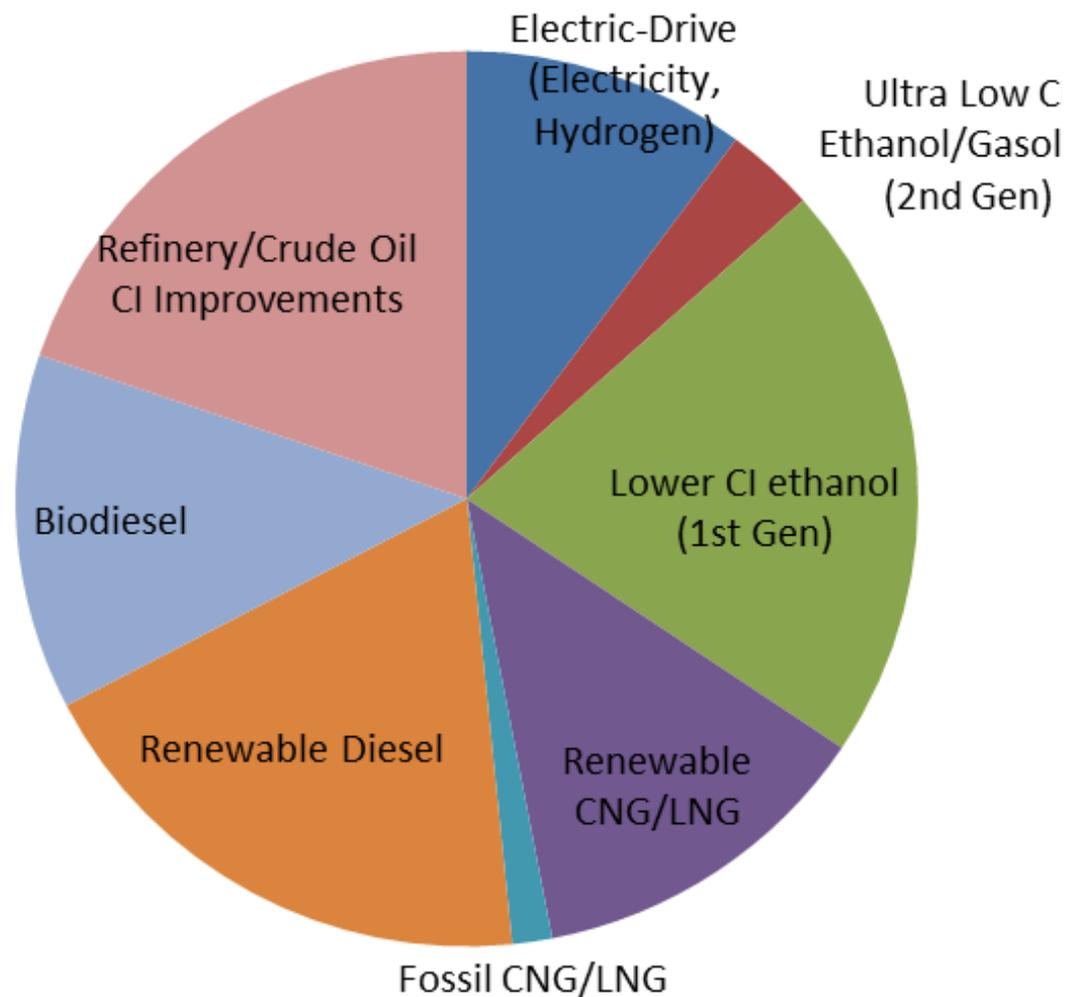
By 67%



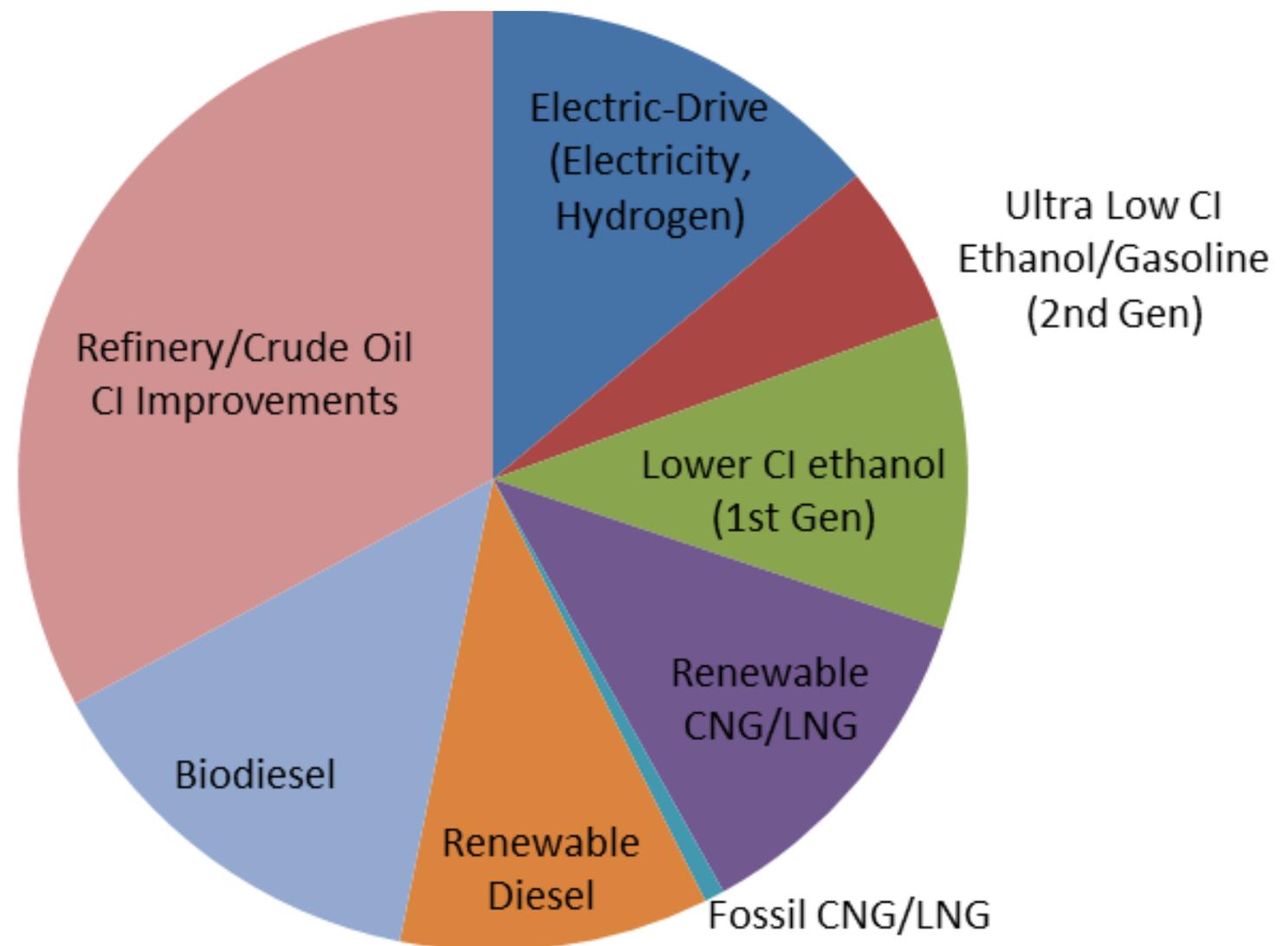
The LCFS Can Continue to Result in a Growing Market

Example LCFS compliance mixes

2020



2025



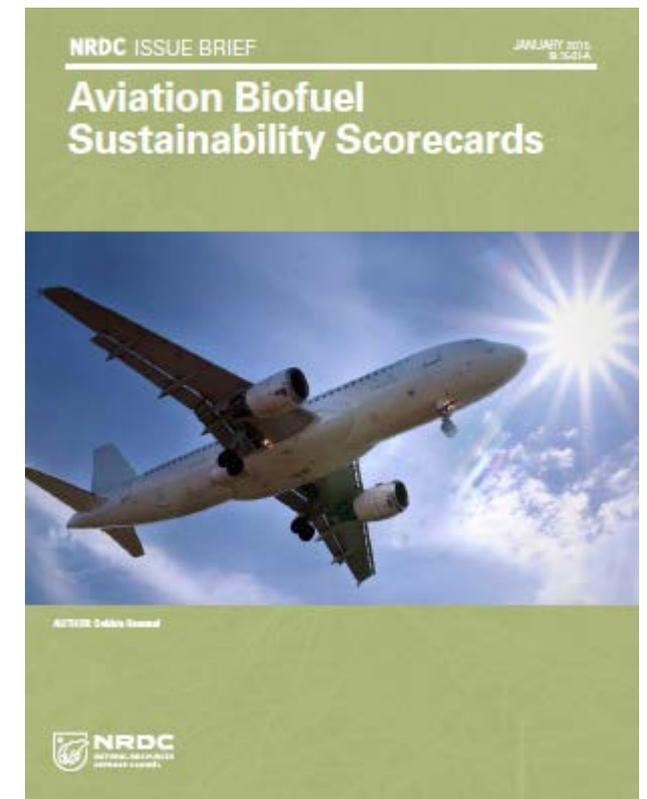
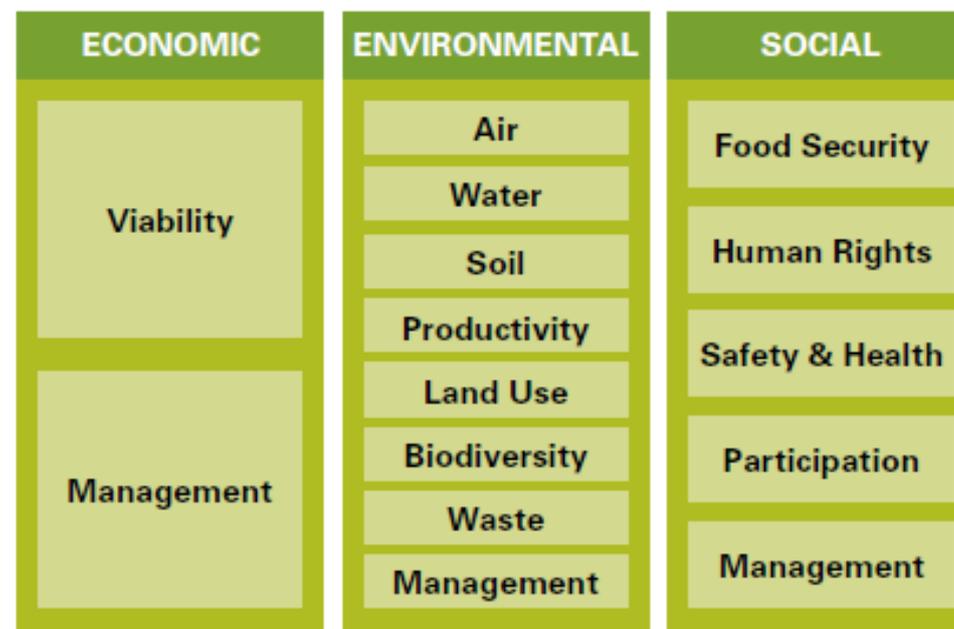
Next steps on the LCFS

Including broader sustainability considerations is critical

- Complete LCFS provisions to encourage sustainability certification involving third-party verification that biofuel feedstocks are grown and converted into fuel in a sustainable manner
- Not all certification systems are equal -- some are more environmentally protective than others. Cobenefits also include coverage of social/economic metrics
- Work to ensure best-use of resources: competition will grow for lowest carbon resources.



Figure 1. Sustainability Framework, Pillars, and Criteria



Next steps on the LCFS

Lower the carbon-intensity of existing petroleum supply chain

- Continue and strengthen accounting on the petroleum side
- Incorporate fuel-supply chain reduction opportunities on the crude oil and refinery-level

NRDC FACT SHEET OCTOBER 2013
FS-13-101

Cleaning Up California's Fuels: Technologies To Reduce The Oil Industry's Carbon Footprint And Meet The Low Carbon Fuel Standard

Since the adoption of the first-in-the-nation Low Carbon Fuel Standard (LCFS) in 2009, California continues to successfully reduce the carbon pollution of transportation fuels. The production and use of petroleum-based fuels are responsible for approximately half of the state's entire carbon emissions.¹ While the substitution of cleaner energy sources for crude oil, like advanced biofuels made from agricultural waste, is a key strategy to reduce carbon pollution, it is also important to employ technologies that can directly reduce the pollution generated from crude oil extraction and refining. A new report from Tetra Tech and NRDC, Carbon Reduction Opportunities in the California Petroleum Industry, looks at significant, concrete steps that the California oil industry can adopt today to curb its carbon emissions. These ready-to-deploy technologies could also go a long way to meeting the industry's responsibility under the LCFS.

The LCFS is a major component of California's Global Warming Solutions Act of 2006, known as A.B. 32, and requires the oil industry and other fuel providers to reduce the carbon footprint of transportation fuels by 10 percent by 2020. As a performance-based standard, the LCFS allows industry flexibility to invest in the most cost-effective technologies to reduce carbon pollution from fuels.

EVEN MORE OPPORTUNITIES TO REDUCE CARBON POLLUTION
Five approaches to reducing carbon pollution directly from the petroleum supply chain include:

- Renewable steam generation: using solar power to generate steam for enhanced oil recovery, rather than combusting fossil fuels for that purpose.
- Steam generation with carbon capture and sequestration (CCS): capturing and storing the flue gas emissions from once-through steam generators used in enhanced oil recovery.
- Refinery energy efficiency: enabling refineries to use less energy in their operations.
- Refinery CCS: capturing and storing carbon emissions resulting from the energy-intensive hydrogen processes needed for refining crude oil.
- Renewable refinery feedstocks: displacing part of the refinery's crude oil with renewable-based oils and waste oils.

The new report shows that modest adoption of the five carbon reduction technologies identified above could reduce emissions by nearly 3 million to 6.6 million metric tons annually in 2020. For a reference point, the full potential of these technologies—if adopted across the board—would result in 20 million metric tons of reduction annually, equivalent to the removal of nearly 5 million passenger vehicles from the road. Additional opportunities—such as



Solar thermal facility developed by BrightSource, Coalinga, California
Source: tech.fortune.cnn.com/2012/04/17/vergin-gas-solar-wind

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Thank You!



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