

California Energy Commission

California Perspective on Biofuels and Energy

USDA/USDOE Biomass Research and Development
Technical Advisory Committee Meeting
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Emeryville, California
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California and Federal Initiatives Related to Biofuels/Biomethane Transportation Energy

California Government Initiatives

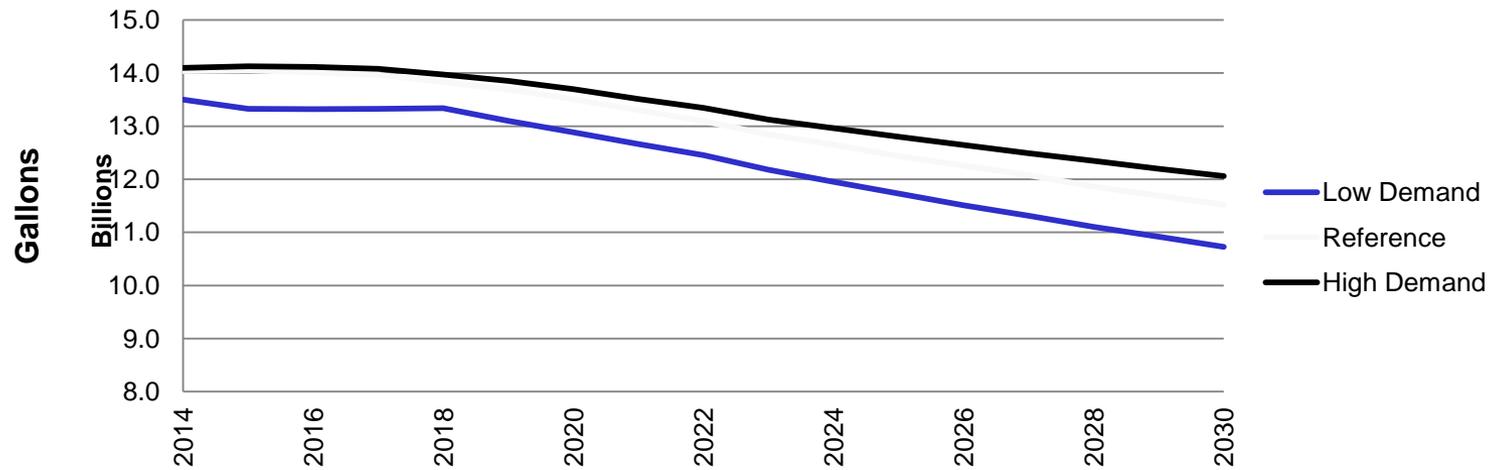
Global Warming Act (2006)	Reduce greenhouse gas emissions to 1990 levels by 2020 and 80% below 1990 levels by 2050
Low Carbon Fuel Standard (2007)	Reduce carbon intensity of transportation fuels sold in California by 10% by 2020
Petroleum Reduction and Alternative Fuel Goals (2003) and Alternative Fuels Plan (2007)	Reduce petroleum use to 15% below 2003 levels by 2020. Increase alternative fuel use to 9% of California's fuel consumption by 2012, 11% by 2017, and 26% by 2022. Governor Office direction (2015) to reduce petroleum use by up to 50% by 2030
SB 1257 Natural Gas Challenges/Opportunities	Identifies strategies to maximize the benefits obtained from natural gas, including biomethane, as an energy source in IEPR
Funding Incentives (AB 118, AB 8, Carl Moyer, Prop1B)	Energy Commission, ARB and local air districts provide financial incentives to vehicle, infrastructure and fuel production projects that reduce greenhouse gas emissions and air pollutants and increase the use of alternative fuels
CPUC Biomethane Pipeline Ruling	Establish standards for energy value and clean-up of contaminants for injection of biomethane in natural gas pipelines
CPUC Natural Gas Compressor Tariff	Allows Southern California Gas Company to impose tariff to cover investment costs in natural gas compressors

Federal Government Initiatives

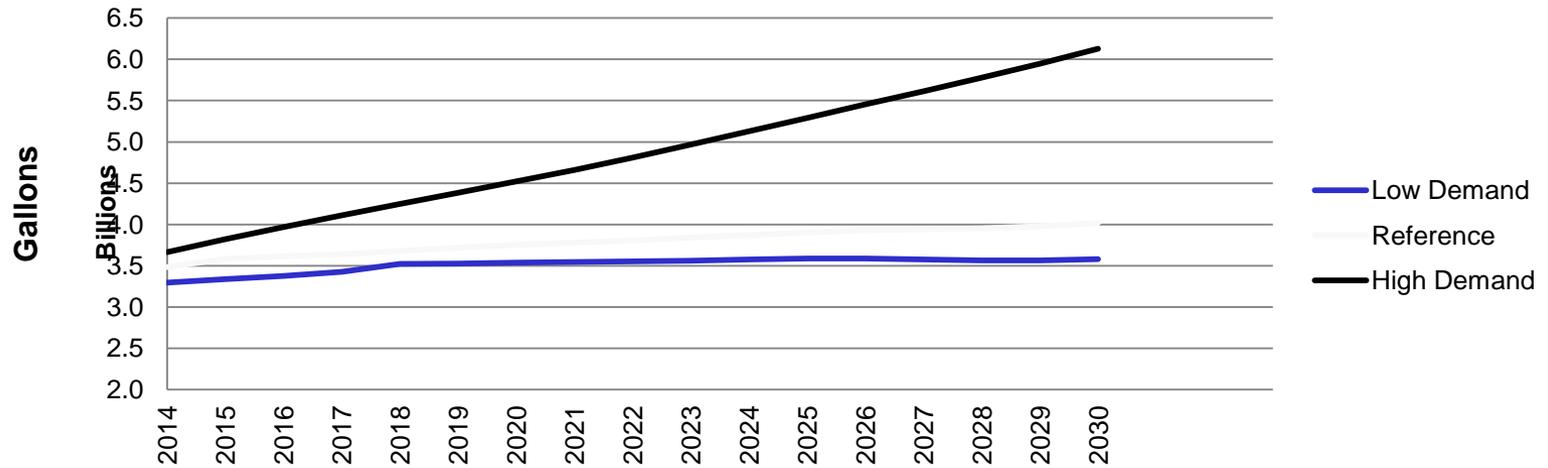
Renewable Fuels Standard	Requires annual specified levels of renewable fuels, including biomethane, as transportation fuel displacements of diesel and gasoline
National Ambient Air Quality Standards	Sets standards for tailpipe air pollutant emissions for vehicles by 2023



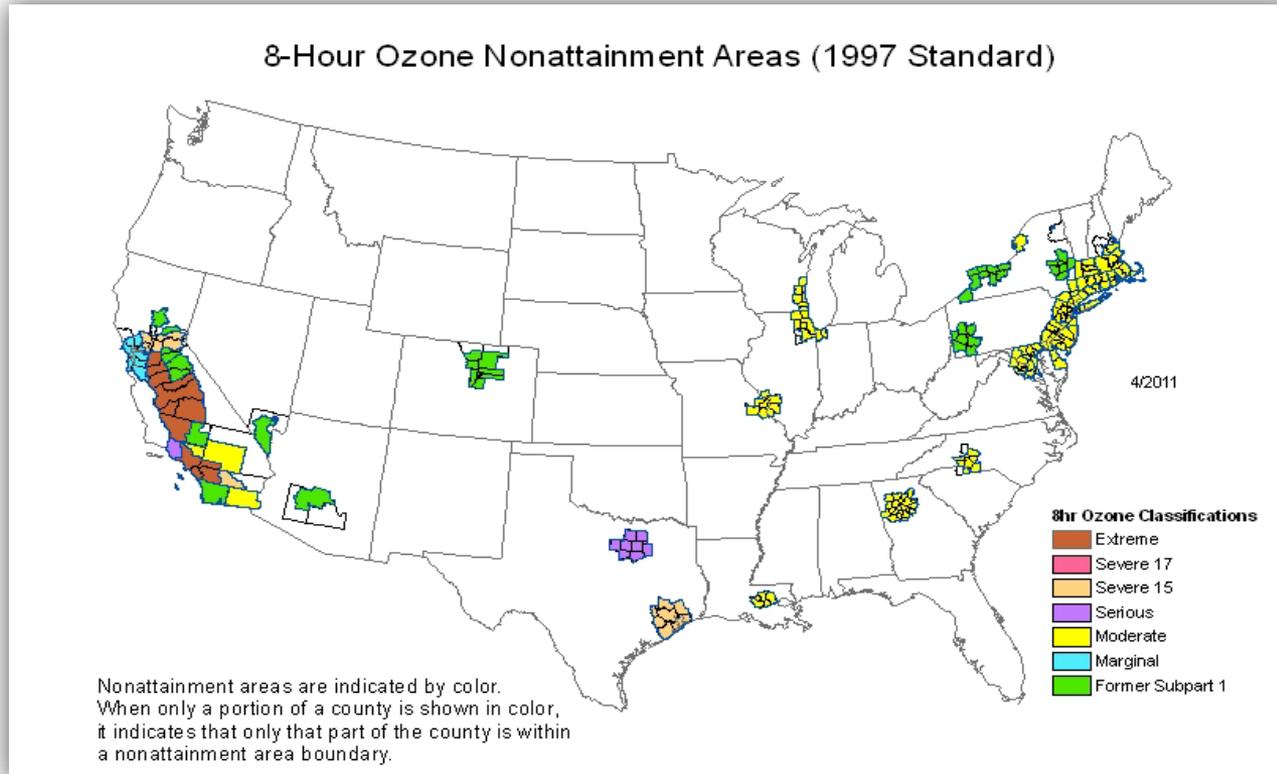
California Gasoline Demand



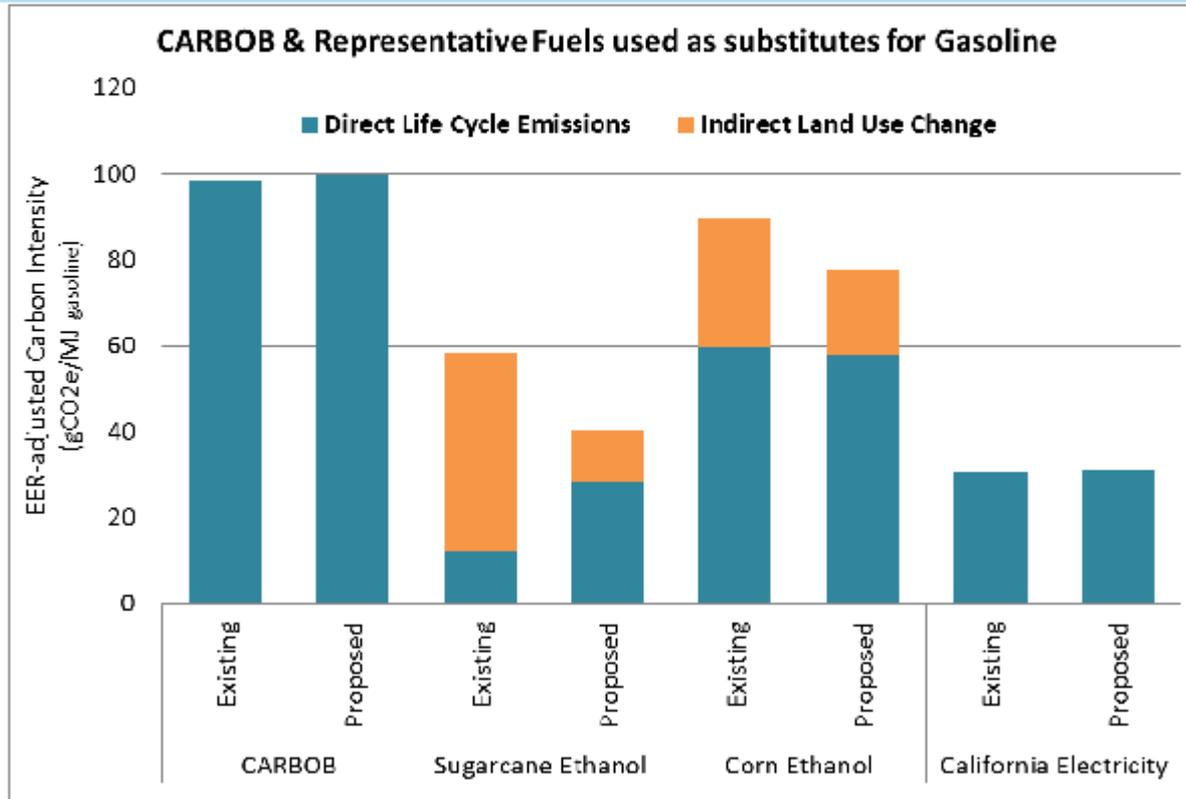
California Diesel Demand



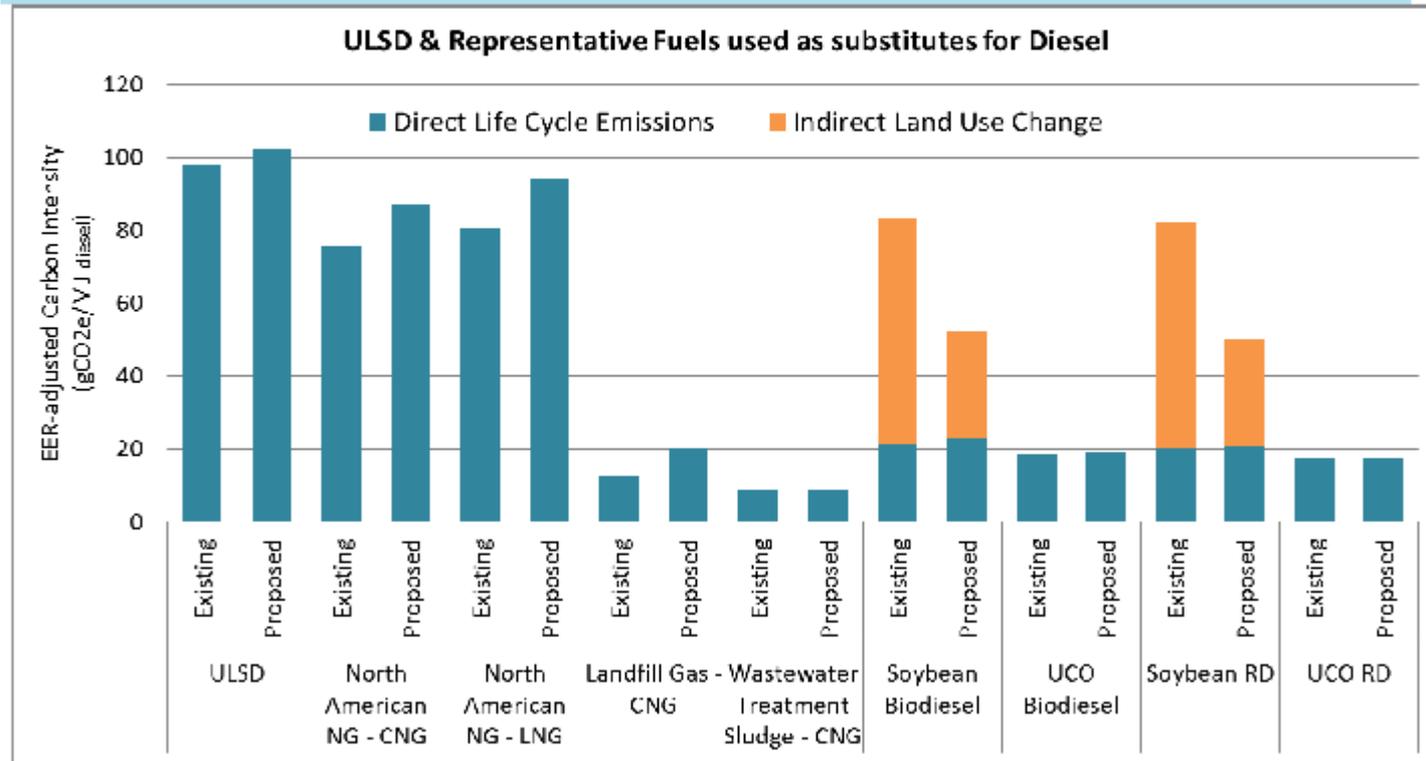
Eighteen of California's fifty-eight counties failed the ozone clean air test in the American Lung Association State of the Air 2011 report



Representative CIs for Gasoline Substitutes



Representative CIs for Diesel Substitutes



Waste Stream Feedstocks

Category	Gross Potential (MM BDT/yr)	Technical Potential (MM BDT/yr)	BioFuel Potential (gal. ethanol)	BioGas Potential (billion ft ³)	BioGas Potential (million GGE)
Agricultural Residues	10.4	5.1	~400 million		
Dairies & Feedlots	10.2	3.9		14.6	120
Forest Residues	26.8	14.3	~1 billion		
Municipal Solid Waste	35.6	9.6		79 (From gross)	647
Wastewater Treatment Plants				16 (From gross)	131
Totals	83	32.6	1.4 billion	110	898

Source: California Biomass Collaborative, 2008.

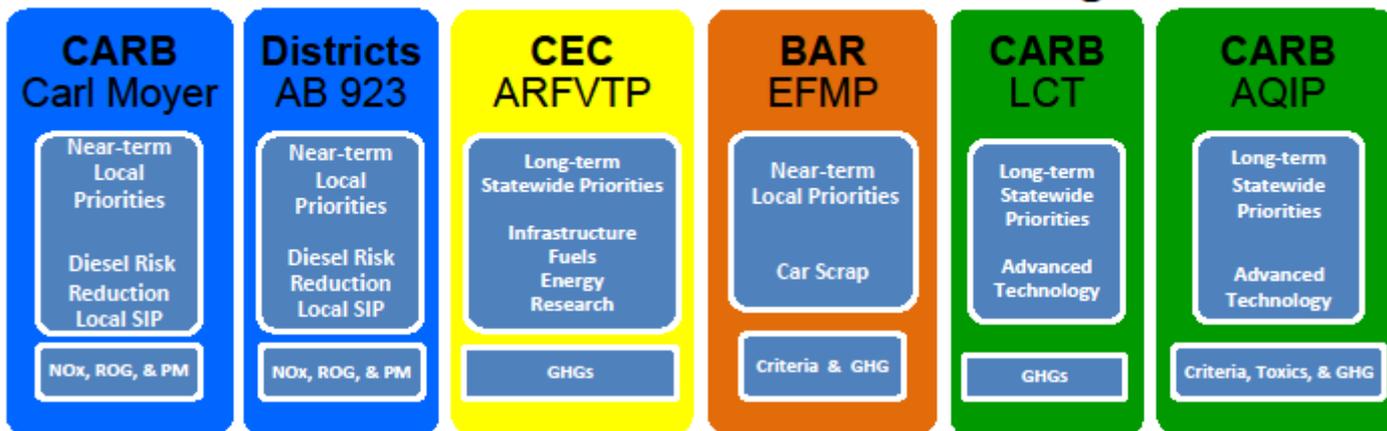


2020 Biofuel Supply Scenarios (40% Market Penetration)

Fuel Scenario	Biofuel Production Needed (Million Gal)	No. Of Projects	Investment Required (\$ Million)
Gasoline Substitutes		Size: 50 Million/Yr	
E10	600	12	2400
E15	880		3600
Diesel Substitutes		Size: 10 Million/Yr	
B5	80	8	320
B20	320	32	1280



California Mobile Source Incentive Programs

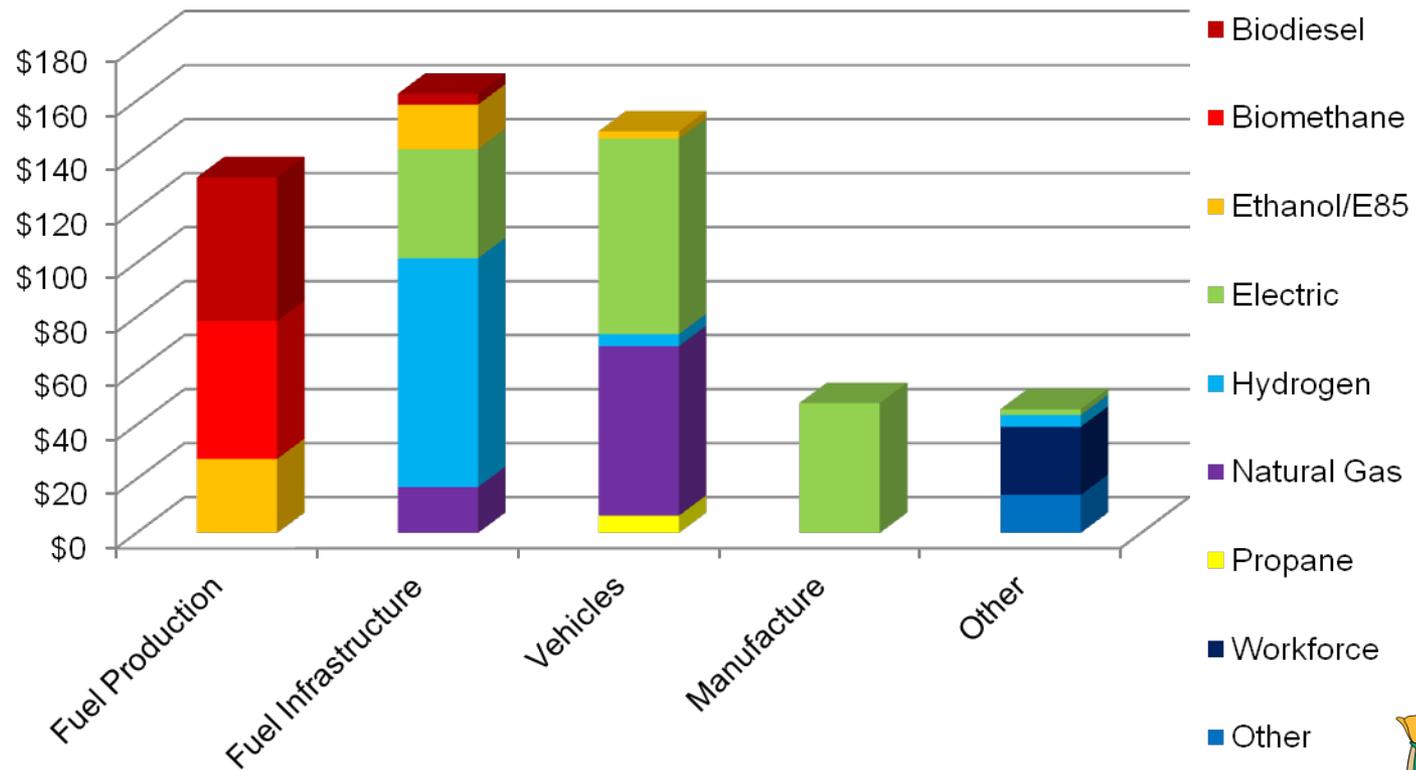


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
CARB Carl Moyer	\$69M/yr									\$48M/yr
Air Districts AB 923	\$50M/yr									?
CARB AQIP	\$25M/yr									?
CARB Low Carbon Transportation	\$200M	\$350M*	?	?	?	?	?	?	?	?
CEC ARFVTP	\$100M/yr									?
BAR EFMP	\$35M/yr									?
CARB GMERP/Prop 1B	\$240M									

*FY15-16 CARB LCT funding as proposed by Governor's Office

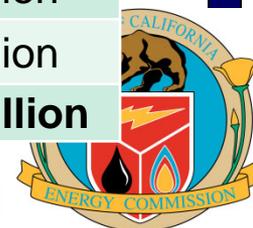


California Energy Commission Alternative Fuel Incentive Funding Encumbered

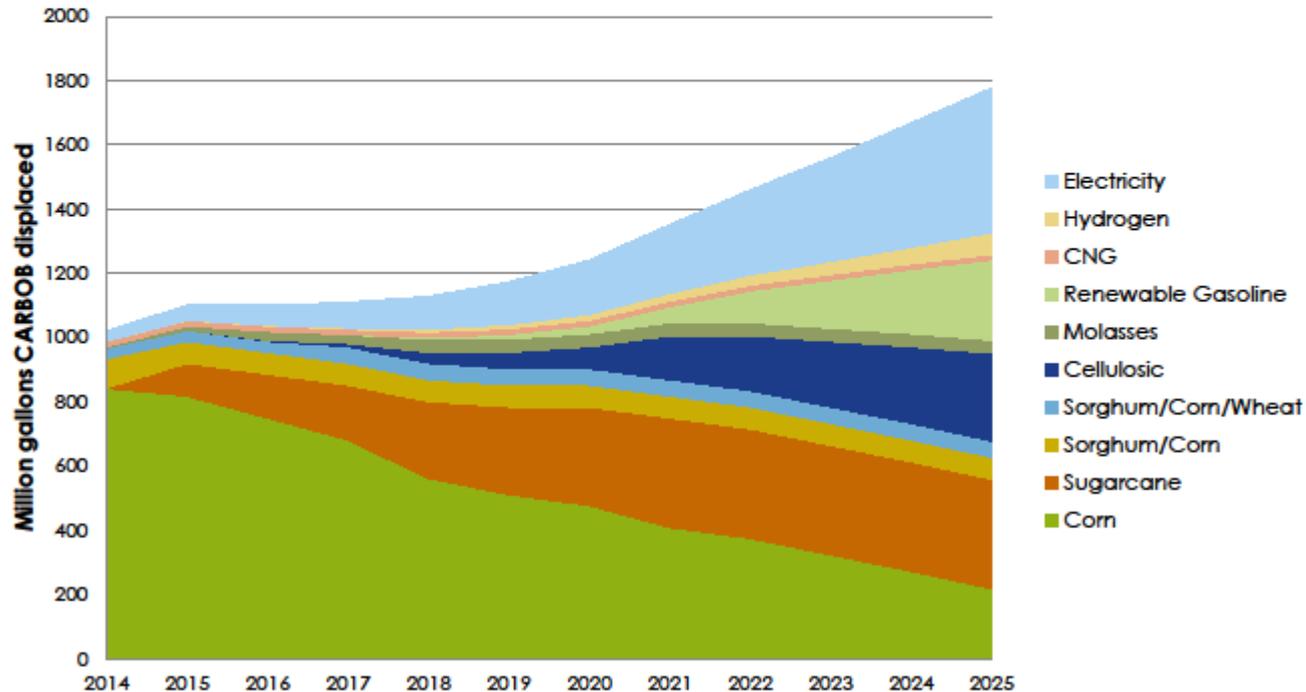


Funding Allocations for FY 15-16

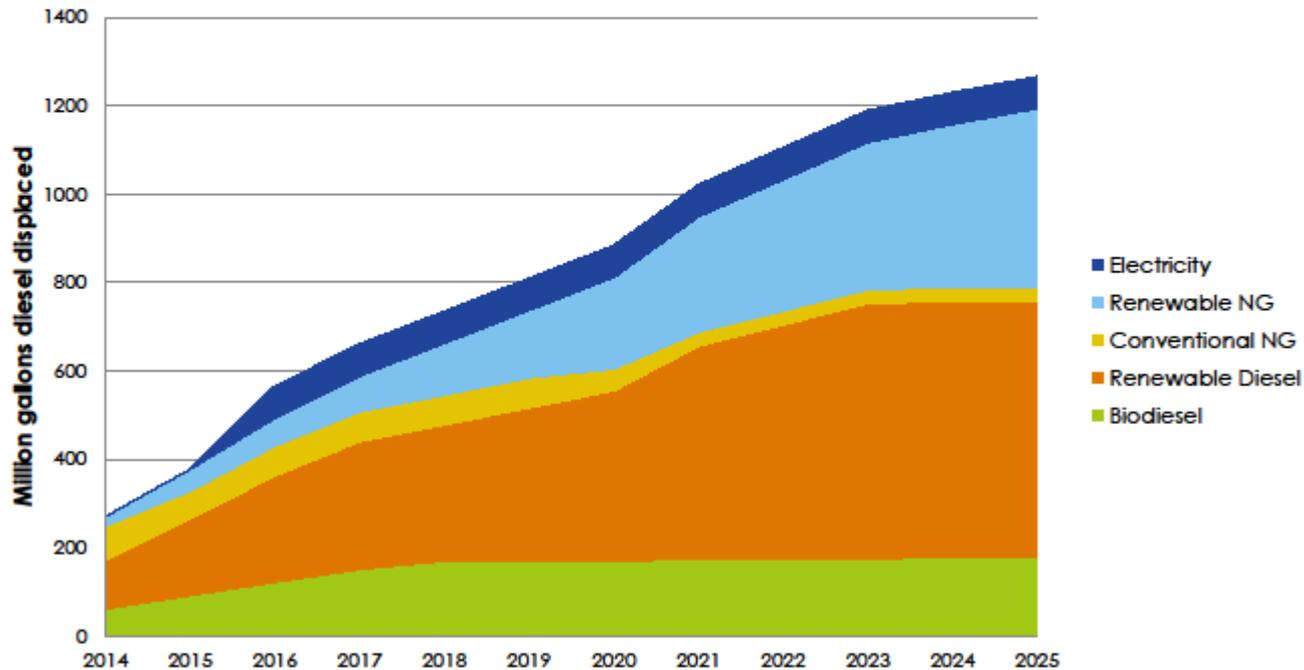
Category	Funded Activity	Proposed Funding Allocation
Alternative Fuel Production	Biofuel Production and Supply	\$20 Million
Alternative Fuel Infrastructure	Electric Charging Infrastructure	\$17 Million
	Hydrogen Refueling Infrastructure	\$20 Million
	Natural Gas Fueling Infrastructure	\$5 Million
Alternative Fuel and Advanced Technology Vehicles	Natural Gas Vehicle Incentives	\$10 Million
	Medium- and Heavy-Duty Advanced Vehicle Technology Demonstration and Scale-Up	\$20 Million
Related Needs and Opportunities	Manufacturing	
	Emerging Opportunities	
	Regional Planning and Readiness	\$2 Million
	Workforce Training and Development	\$3 Million
Total Available		\$100 Million



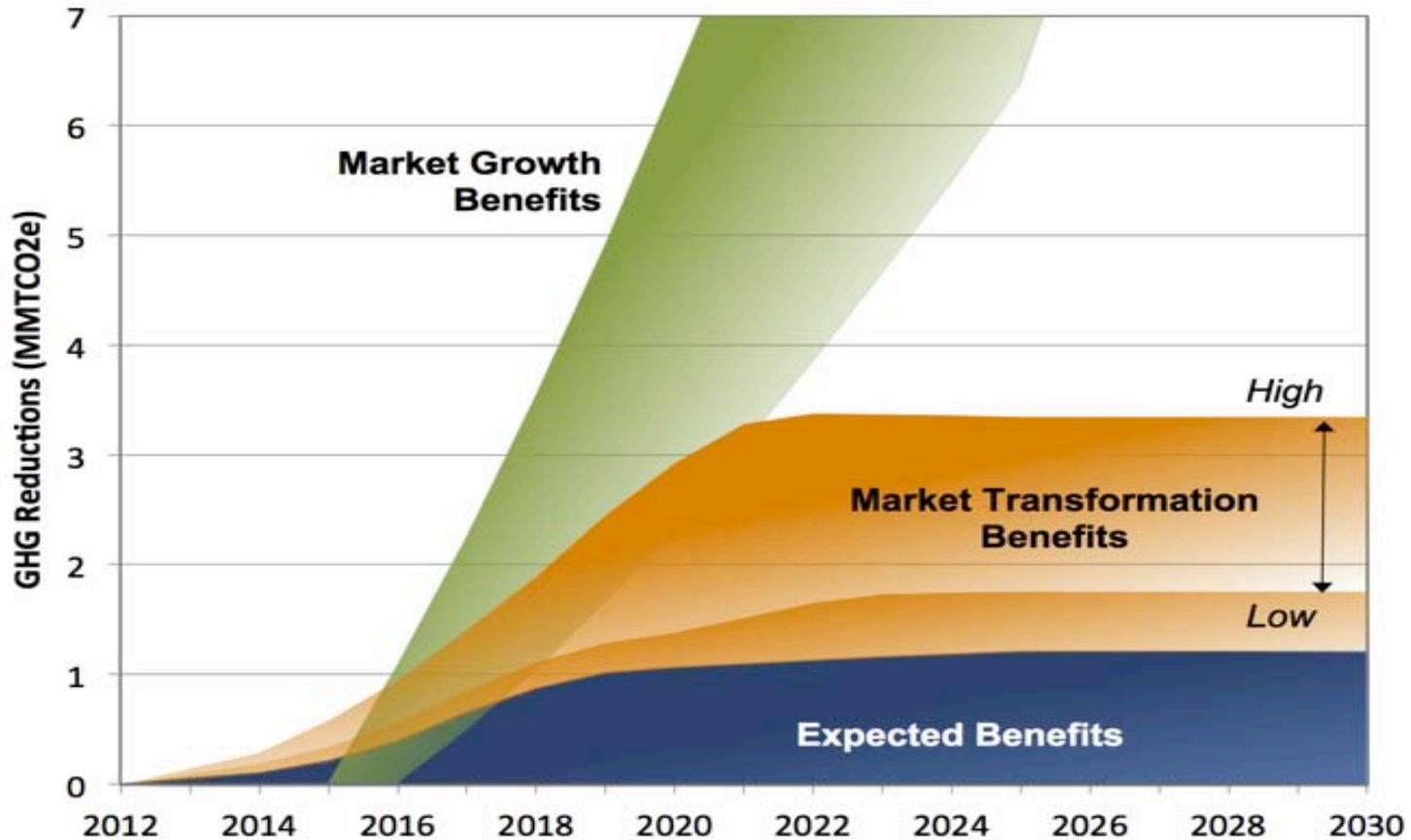
Illustrative Compliance Scenario: CARBOB Displacement



Illustrative Compliance Scenario: Diesel Displacement

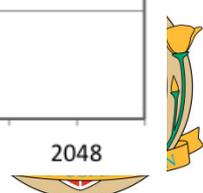
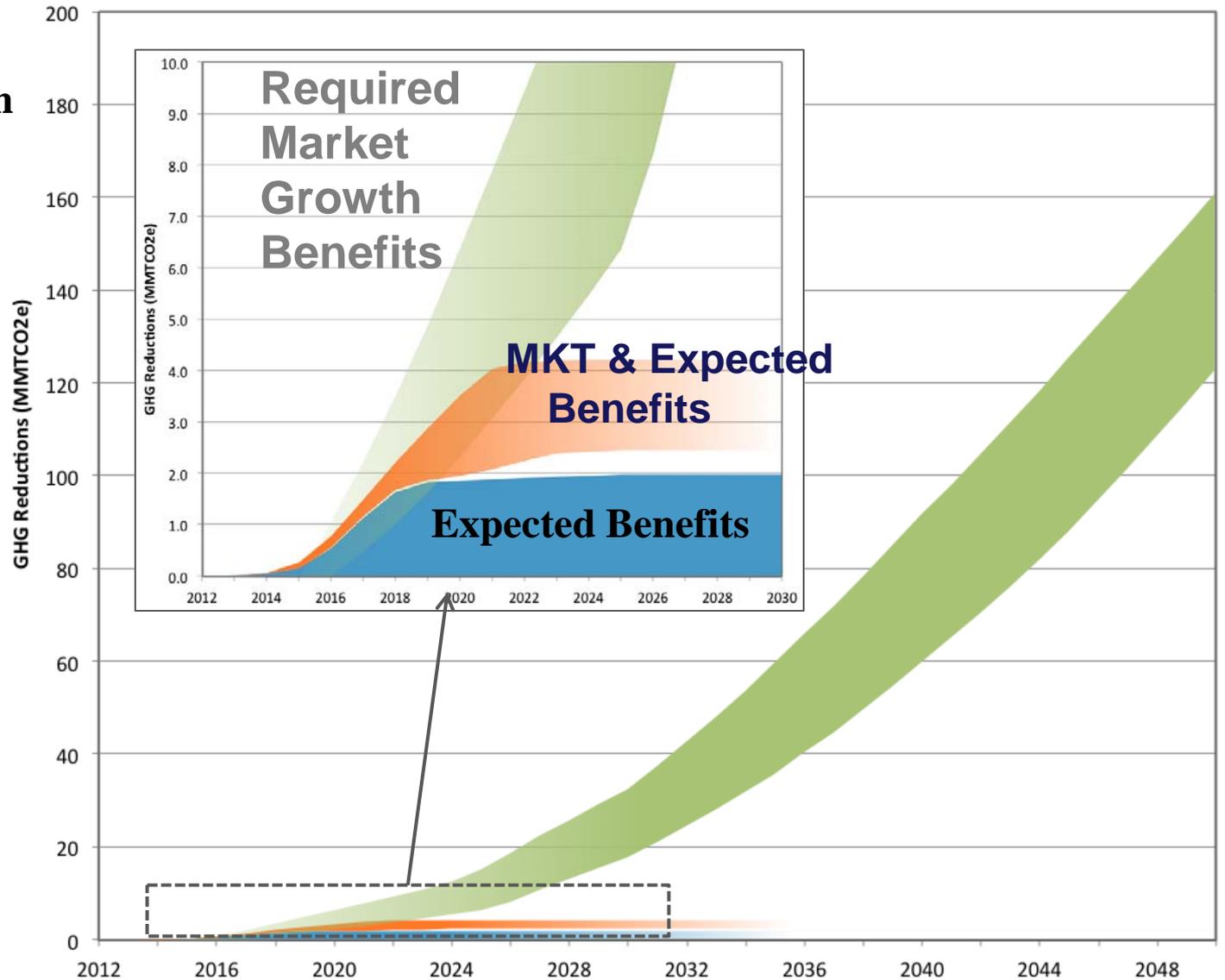


Progress in Context of Long-term GHG Goals



Progress in Context of Long-term GHG Goals

However, from a long-term perspective, significant future work remains to be done



Biofuel/Biomethane Transportation Trends

- ❑ California Growth Market for Low CI Biofuels and Biomethane
- ❑ Gasoline Biofuel Substitutes
 - Supply of Brazilian Sugar Cane Ethanol Fluctuates
 - No Significant Progress on In-State Low CI Feedstocks
- ❑ Convergence of Biomethane Business Models and Natural Gas Transportation System
- ❑ Low Nox 8.9 Liter Natural Gas Engine Certified at 0.01 g/bhp-hr - Provides Option to Meet NAAQS 2023 Standard
- ❑ Renewable Diesel Growth – Imports and In-State Development

