



Benefits Report for the Alternative and Renewable Fuel and Vehicle Technology Program

Staff Workshop Presentation
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AB 109 Legislative Requirement

Commission to Evaluate and Report on:

- List of funded projects
- Expected benefits
 - Petroleum reduction
 - GHG emissions reductions
 - Criteria emissions reductions
- Obstacles and challenges
- Recommendations for future action

In Addition:

- Job Creation Benefits



Alternative and Renewable Fuel and Vehicle Technology Program (AB118)

Purpose

To transform California's transportation market into a diverse collection of alternative fuels and technologies and reduce California's dependence on petroleum.

“...develop and deploy innovative technologies that transform California’s fuel and vehicle types to help attain the state’s climate change policies.” (Health and Safety Code Section 44272(a))

Up to \$150 Million in Annual State Funding Program

The Energy Commission will receive **\$100 million/year for 7 years** to implement the ARFVT Program: Fuel production, Infrastructure, Trucks

California Air Resources Board will receive **\$40 million/year for over 7 years** for *Enhanced Fleet Modernization* and *Air Quality Improvement*: Light Duty Vehicle, Buses and Trucks.



Staff Approach for First Benefits Report

- Use transparent methods and conservative assumptions
- Use data from grant recipients, vehicle manufacturers (OEMs), Air Resources Board and published reports
- Provide information that is reasonable and defensible
- Express projections in terms of ranges
- Do not over-state Program benefits



Benefits Report Elements

- Summary of Program Funding
- Near-Term Changes in Alternative Fueling Infrastructure and Vehicles
 - Directly Attributable to ARFVTP Funding
- Estimated Benefits 2012-2020
 - Fostered by ARFVTP Funding
- Anticipated Job Creation Benefits



General Program Status

- Beginning Year 4 of 7.5-Year Program
- 3 Investment Plans adopted by Commission allocating \$362 million
 - 4th Investment Plan proceeding underway for FY 2012-13
 - Additional \$100 million
 - Major “Lessons Learned” workshop in November 2010



California Transportation Context

- Population = 37.7 million
- State GDP = \$1.9 trillion
- Light duty vehicles = 26.5 million
- Trucks = 0.92 million
(4% of fleet uses 16% of total fuel)
- Annual fuel consumption = 18.8 billion gallons
(ethanol totals 1.6 billion gallons)
- Petroleum-based fuel = 91 percent of total
- Transportation GHGs = 42 percent of total



Program Investments by Fuel Type – 2008 to 2011

Fuel Type and Program Area	Total Funding Encumbered by July 2011 (\$ millions)	Percent of Total	No. of Projects
Electric Drive	62.4	31.6%	31.5
Biofuels	64.0	32.4%	25
Gaseous Fuels (Natural Gas and Propane)	31.3	15.9%	13.5
Hydrogen	22.7	11.5%	5
Workforce Development	15	7.6%	24
Program Support	2	1%	8
Totals	197.4		86



Program Investments by Fuel Type and Commercialization Phase

	Commercial Deployment and Production (\$ millions)	Pre-Commercial Demonstration (\$ millions)	Development (\$ millions)	Feasibility (\$ millions)	Fuel Support (\$ millions)	Total (\$ millions)
Electric Drive	\$47.8	\$13.6	\$1.0	\$0	\$0	\$62.4
Biofuels	\$32.8	\$16.9	\$7.1	\$5.7	\$1.5	\$64.0
Gaseous Fuels	\$29.6	\$1.8	\$0	\$0	\$0	\$31.3
Hydrogen	\$18.7	\$0	\$0	\$0	\$4.0	\$22.7
Workforce Development						\$15
Program Support						\$2
Totals	\$128.9	\$32.3	\$8.1	\$5.7	\$5.5	\$197.4



Leveraging Private and Public \$\$\$

**Combined Public and Private Match for 65
ARFVTP Projects Totaling \$175.5 million**

= \$375.5 million

= Leverage Ratio of 1:2.1

**Public Match on 9 ARRA Projects with \$36.5 million
in ARFVTP Funding**

ARRA Match = \$105.3 million



Changes in Alternative Fueling Stations and Alternative Vehicle Deployment in California due to ARFVT Program Funding

	Fuel Area	Existing 2009-2010 Baseline Levels	Additions from ARFVT Program Funding	Percent Increase
Alternative Fueling Infrastructure	Electric	1,270 charging stations	4,375 charging stations (public and residential)	344%
	E85	39 fueling stations	85 fueling stations	218%
	Natural Gas	443 fueling stations	20 stations	5%
	Hydrogen	6 public fueling stations <i>(plus 5 more under construction)</i>	11 fueling stations	100%
Alternative Fuel Vehicles	Electric Cars	13,268	379	3%
	Electric Trucks	1,409	160	11%
	Natural Gas Trucks	13,995	898	6%



ESTIMATED BENEFITS 2012-2020

Electric Drive

Biofuels

Natural Gas

Hydrogen

Jobs and Workforce Training



Context for Alternative Fuel and Vehicle Technology Changes

Rate of Change for Alternative Fuels and Vehicle Technologies Driven Largely by:

Regulation

- Climate Change and Air Quality Regulations
- Vehicle Efficiency Laws and Standards

Market Factors

- Petroleum fuel prices and supplies
- Differential life cycle costs

ARFVT Program Fosters Market Adoption and Advancement:

- Provides seed funding to spur innovation & deployment



Methods and Assumptions

- Conservative approach and assumptions used
 - Avoid over-claiming credit for benefits
- All primary data comes from grant recipients, OEMS, recognized 3rd party stakeholders, public agencies
- Data collected from grant proposals, grant files, grantee survey instrument and phone interviews
- Projected fuels and vehicle petroleum and GHG reduction benefits expressed in High and Low Case scenarios through 2020
 - High-Low scenario intended to reflect optimal and challenging market and technology conditions
- Job Estimates Based on Grantee Data
 - Best available option without post-construction verification



EV and FCV Benefits Methods

Assumptions

- Appropriate metric is vehicle deployment and use, not use of chargers or fuel stations – “Top Down” approach
- ARFVTP funding can help expand California markets for EVs and FCVs
 - Many grants for battery, controller, motor and EV drivetrain development are targeting specific technology and cost hurdles
- Vehicle deployment projections into California serves as proxies for other ARFVTP investments in batteries, controllers or manufacturing
 - Difficult to identify and quantify specific benefits for batteries and components

Data

- EV High-Low scenario comes from PEV Collaborative
- FCV High-Low estimate comes from OEM survey, ARB Clean Fuels Outlet draft regulation and historic data



Natural Gas Trucks

Methods

- Benefits based on vehicle deployment data
 - “Bottoms Up” approach
- Current baseline vehicle counts and ARFVTP benefits included
 - Low-case represents baseline of currently registered natural gas trucks and vehicles deployed through AB118 projects
 - High-case represents low-case values and additional sales through market promotion and new technology advancements funded through the AB118 Program
 - Does not include market expansion from other government programs



Fuel Production

Methods and Assumptions

- The 17 ARFVTP-funded fuel production projects are assessed in “Bottoms Up” approach
 - Not a state-level biofuels production estimate
- Underestimates the total potential in-state fuel production potential
- Low case scenario reflects current funding levels
- High case scenario reflects grantee estimates of how many more production plants could be built under optimal market conditions



Electric Vehicle Estimated Benefits



Electric Vehicle Investment Summary: \$62.4 Million Total

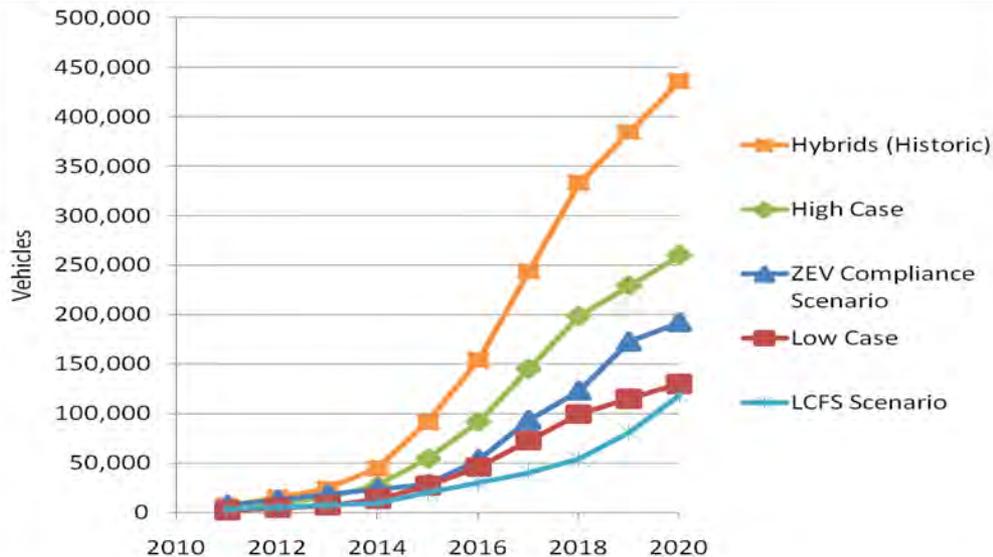
- EV Chargers \$17.4 M
- Vehicles \$16.5 M
 - Light Duty and Heavy Duty Commercial
 - Medium Duty-Heavy Duty Demonstration
- Manufacturing \$25.9 M
 - Vehicles, Batteries, Components

CALIFORNIA ENERGY COMMISSION

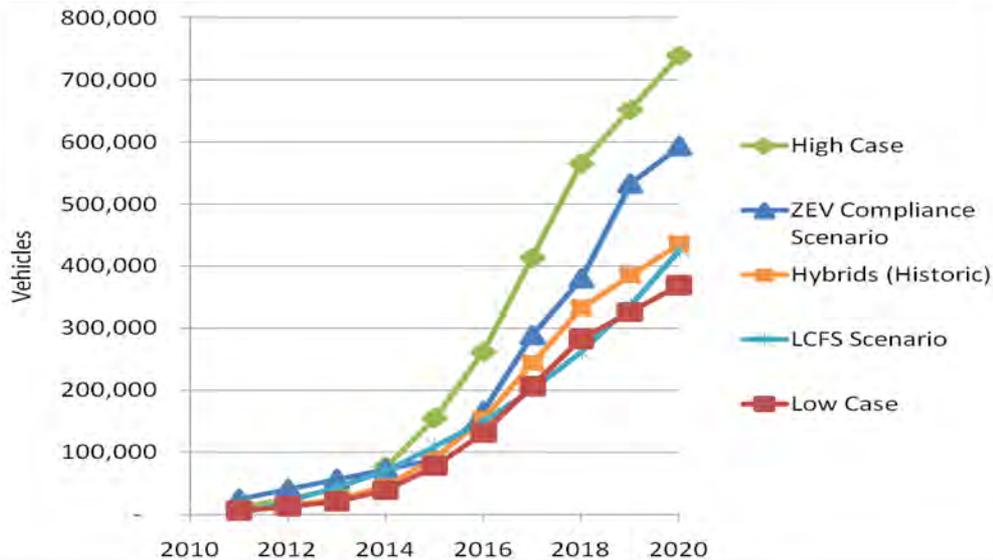


PEV
Collaborative
Estimates

500,000
To
1,000,000
EVs
By 2020



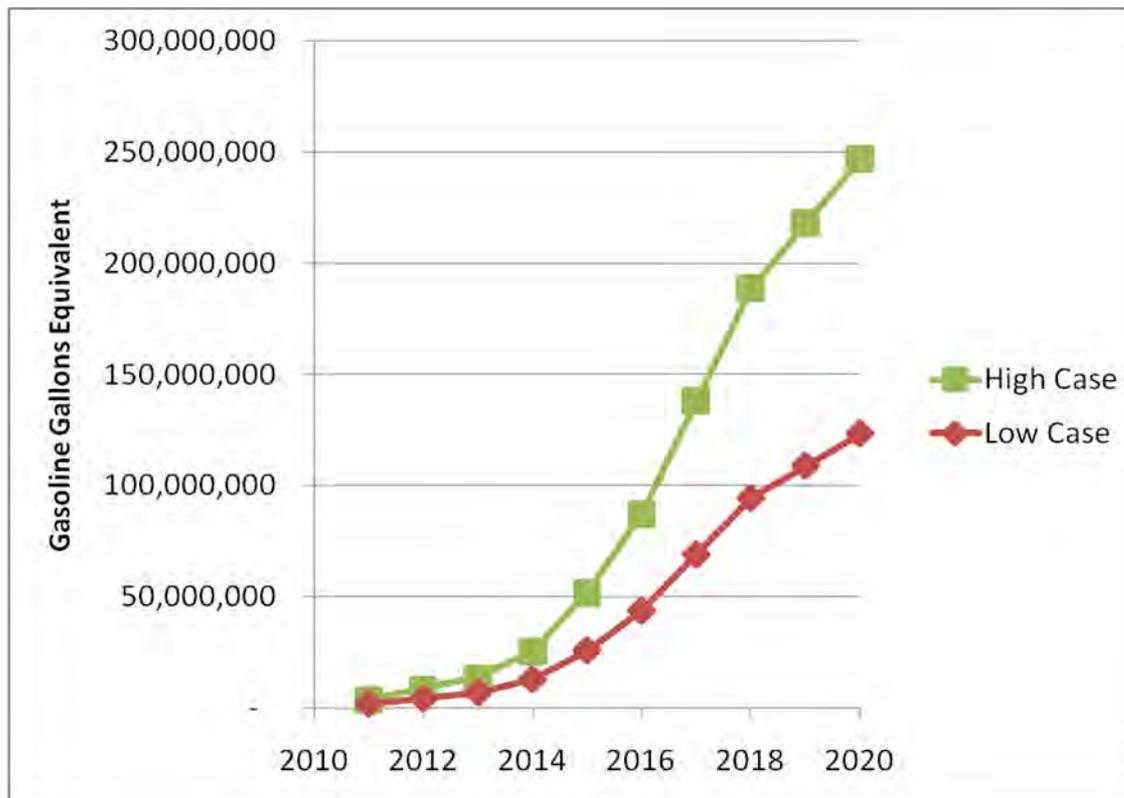
BEVs



PHEVs



Electric Vehicle High and Low Petroleum Reduction





Biofuels Production Estimated Benefits

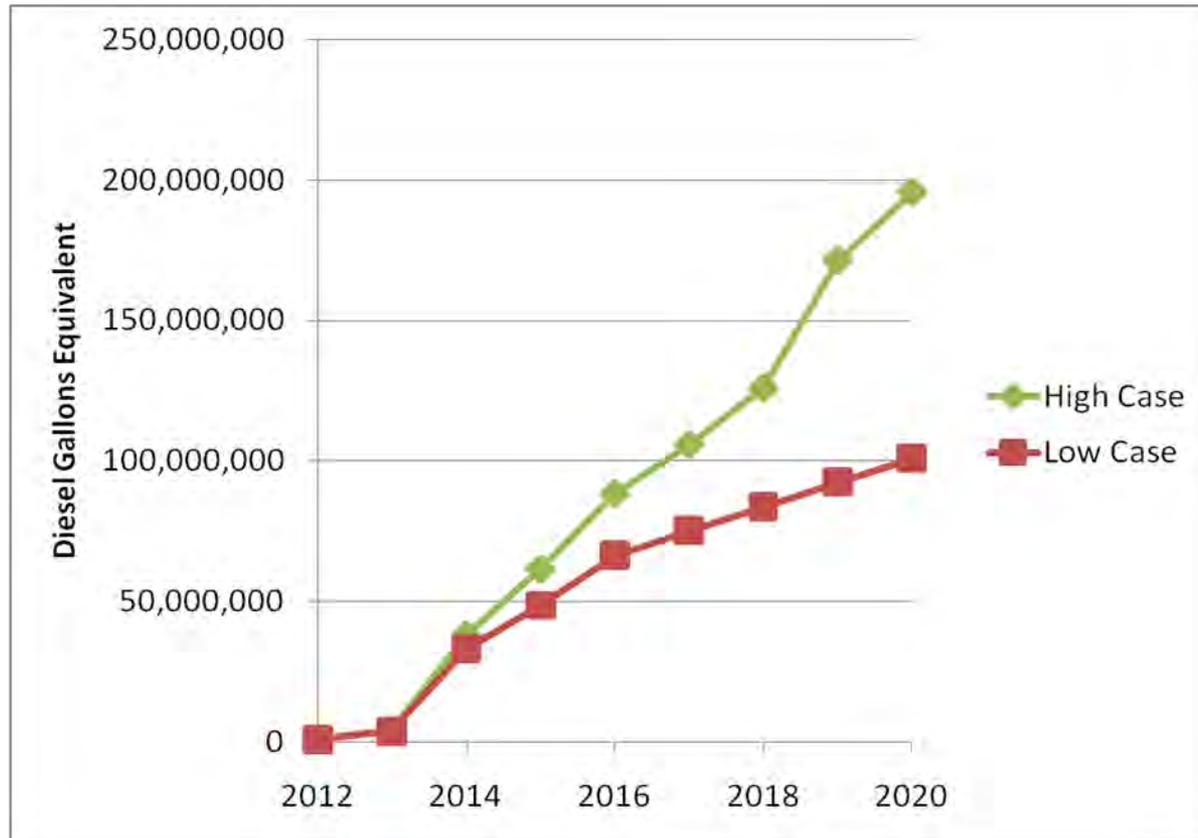


High and Low Scenario Biogas Production from 9 ARFTVP Projects – 2012 to 2020

6 Production
Projects

3 Pilot /
Feasibility
Projects

\$35.3 M
Total
Investment



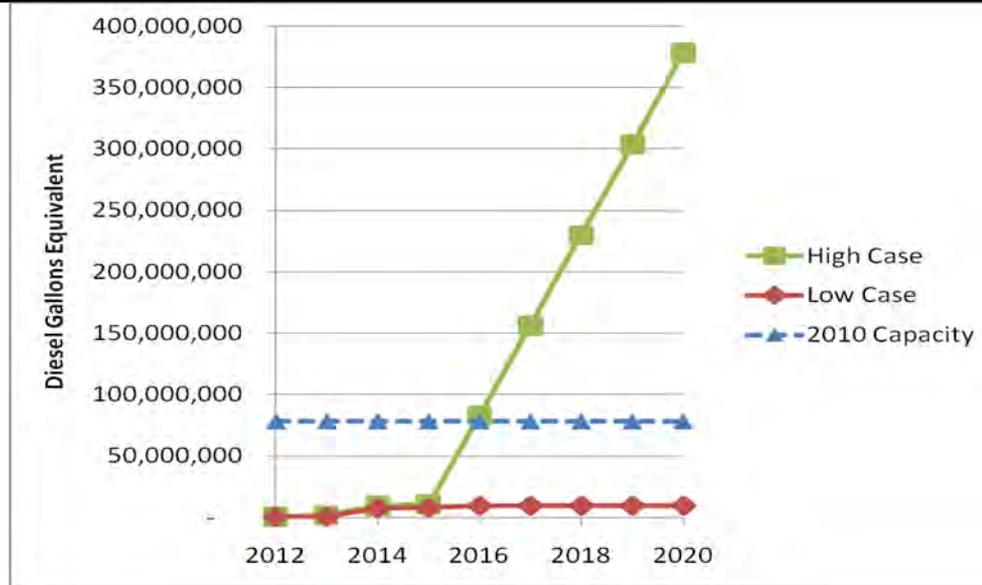


5
Feasibility
and Pilot
Projects

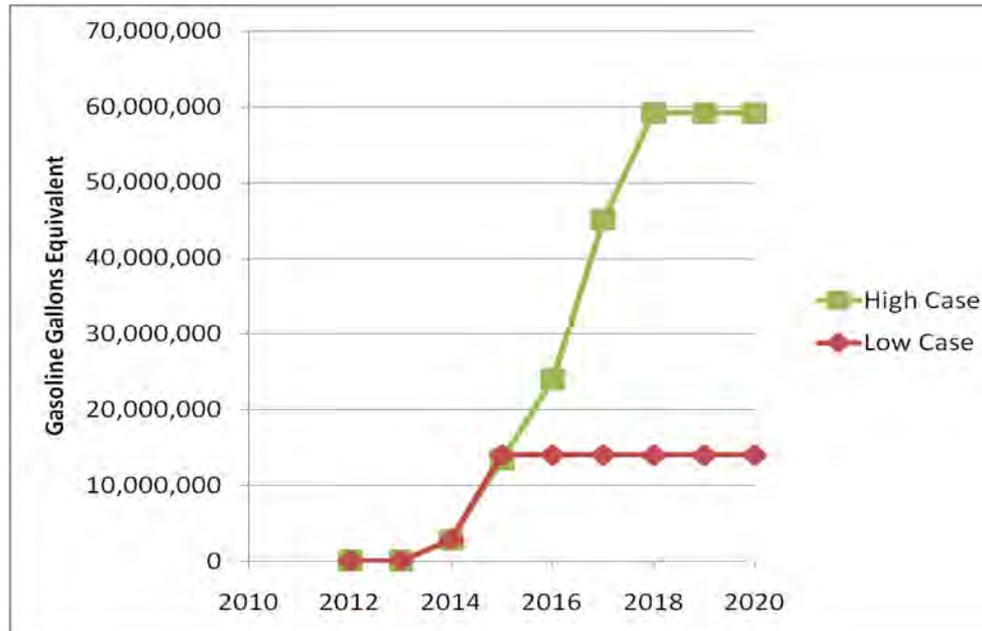
\$4.3 M
Investment

1
Commercial
Project
2 Feasibility
Projects

\$5.4
Investment



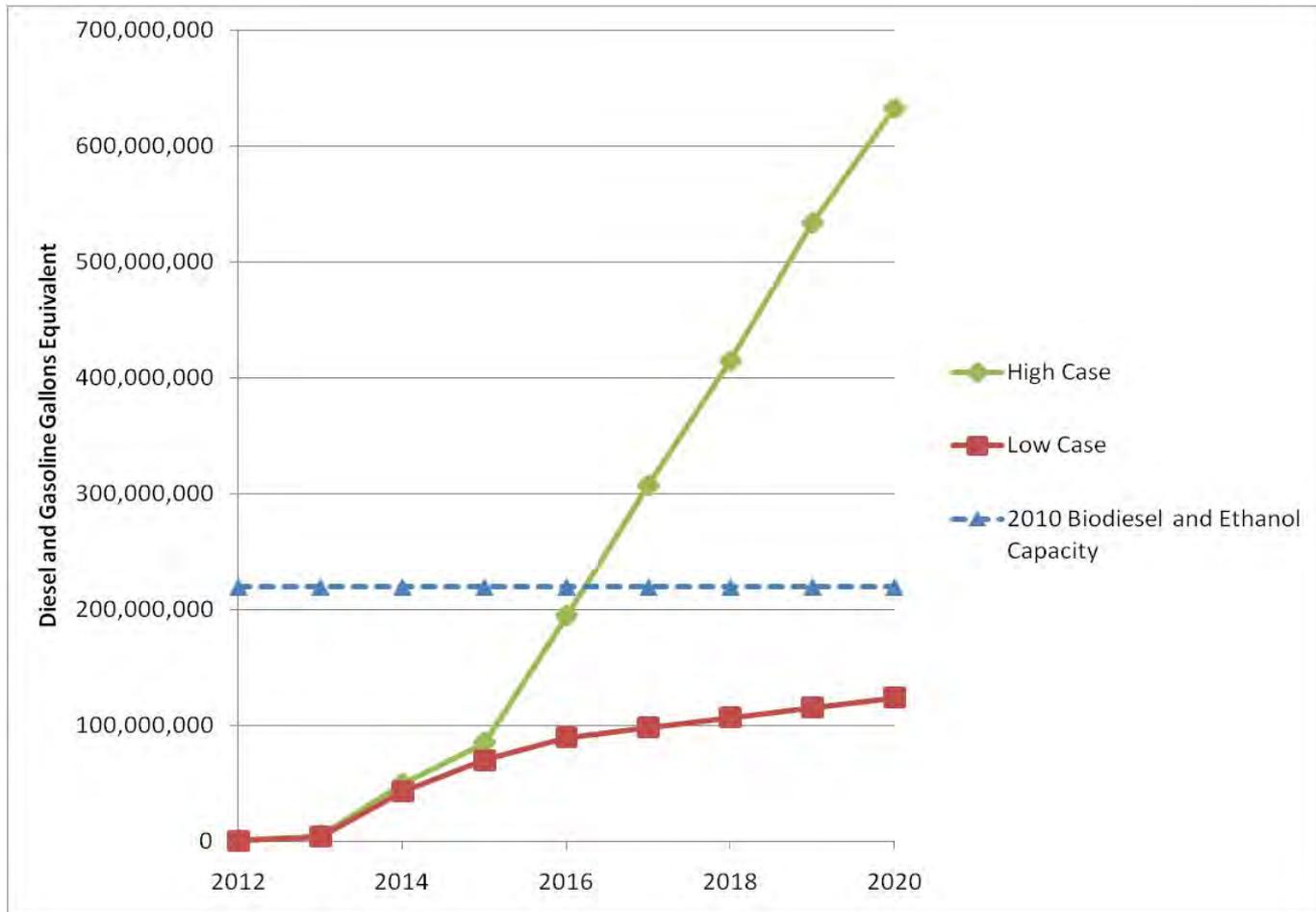
Hi-Lo
for 5
Biodiesel
Projects



Hi-Lo
for 3
Ethanol
Projects



Estimated Total Petroleum Reduction Through 2020 from 17 ARFVT Program-Funded Biofuel Production Projects



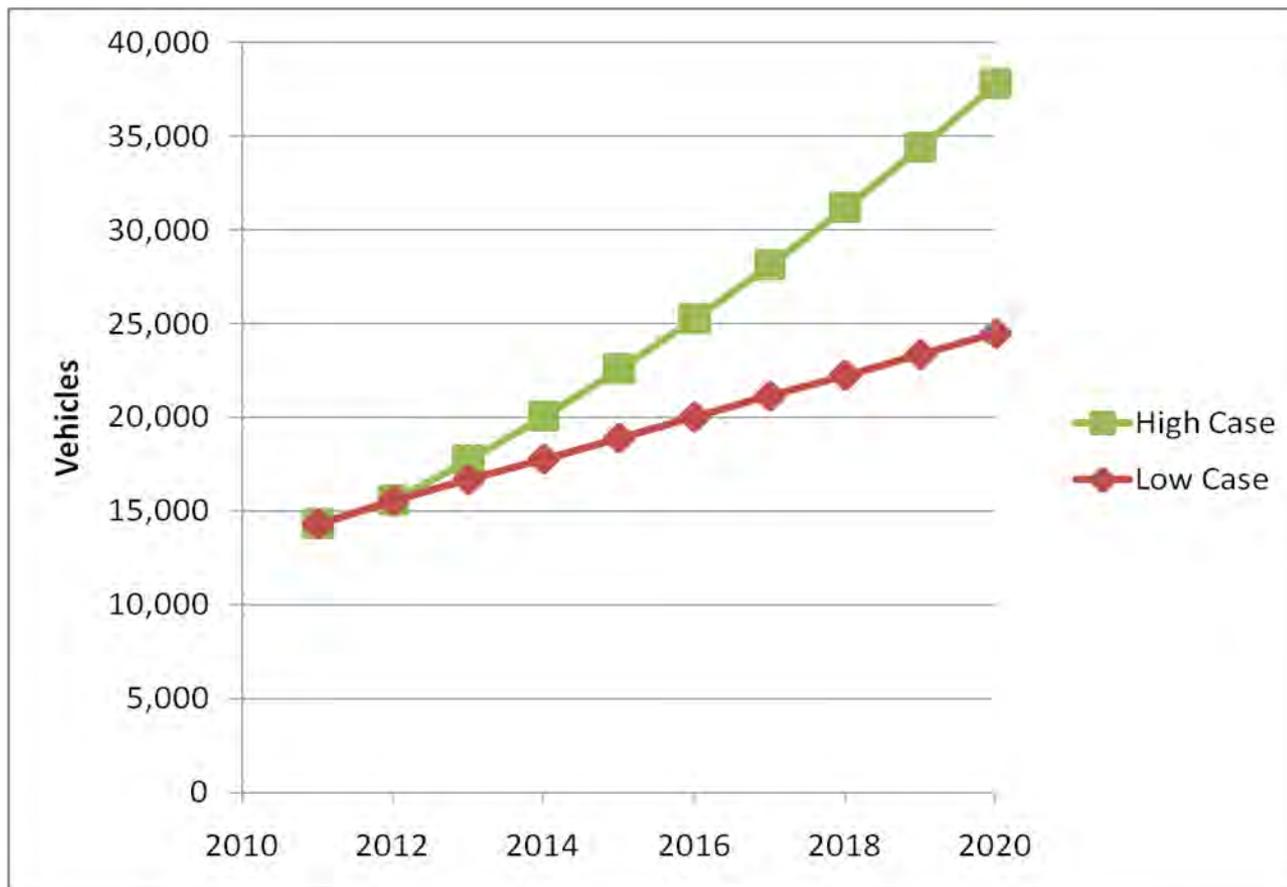


Natural Gas Trucks Estimated Benefits

898 Trucks Deployed from ARFVTP
ARRA Grants and Buydown Program

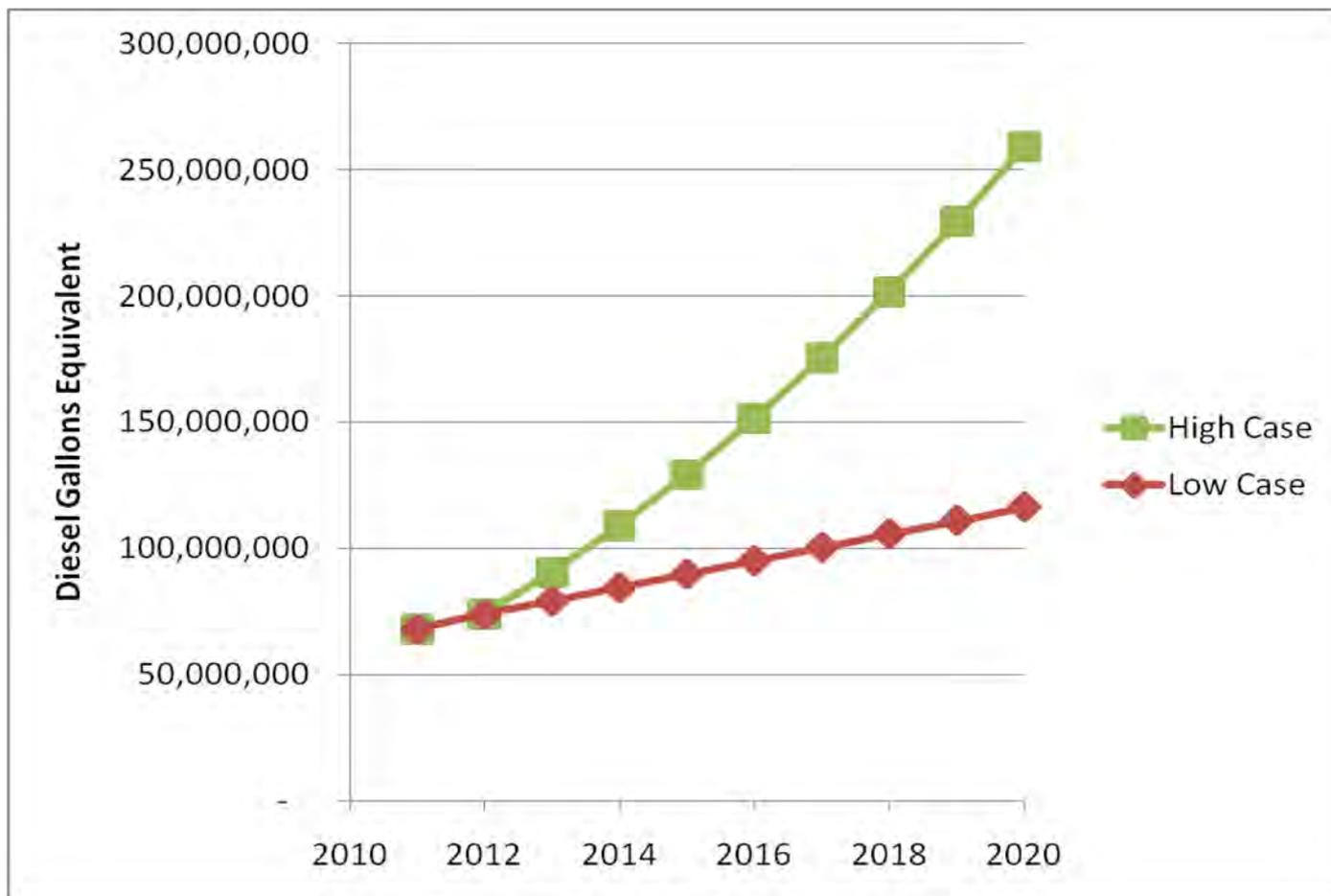


High and Low Case Scenarios for MD-HD Natural Gas Trucks – 2011 to 2020





Natural Gas Truck Petroleum Reduction



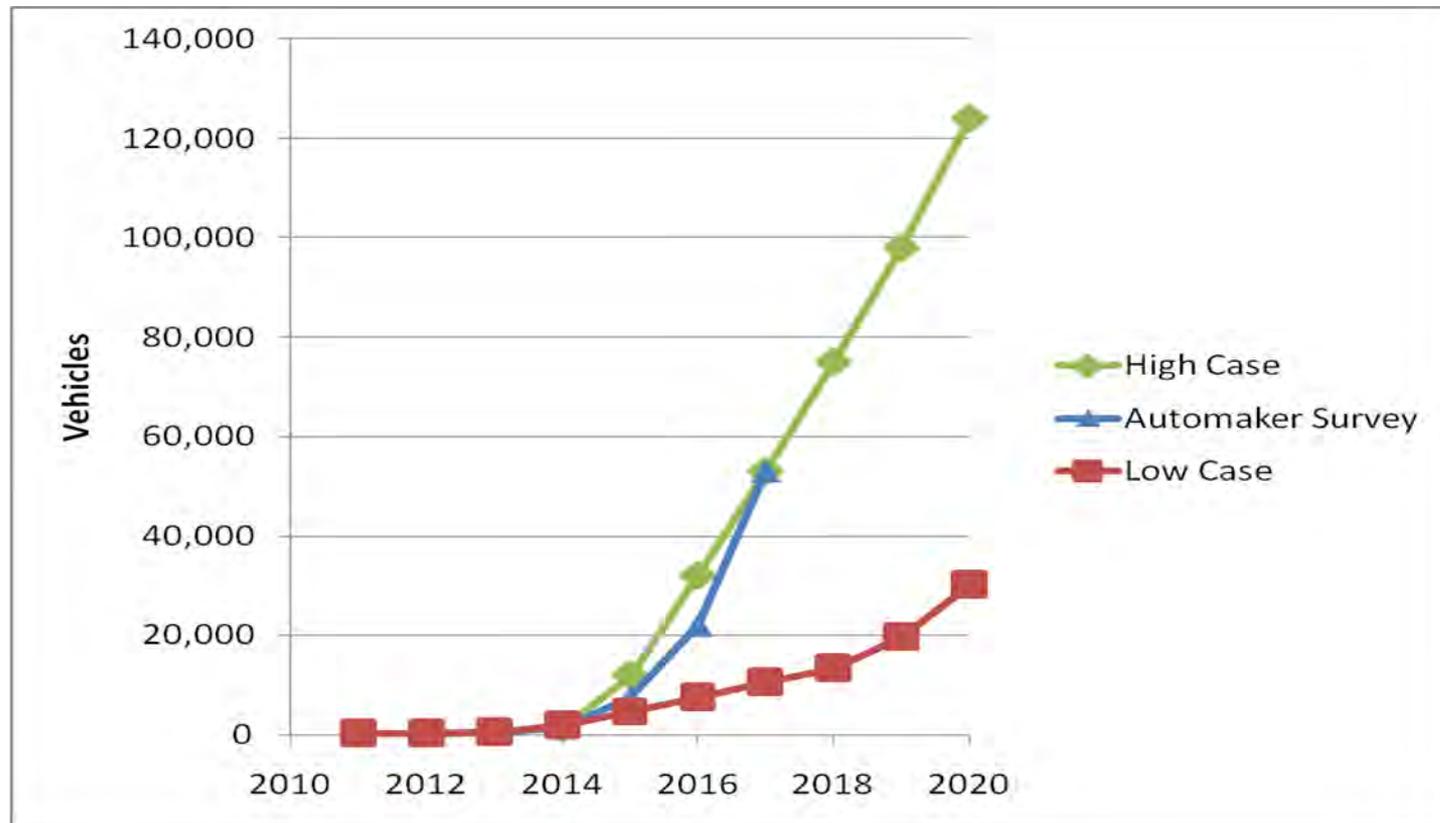


Fuel Cell Vehicle Estimated Benefits

\$15.7 Million Invested in Infrastructure

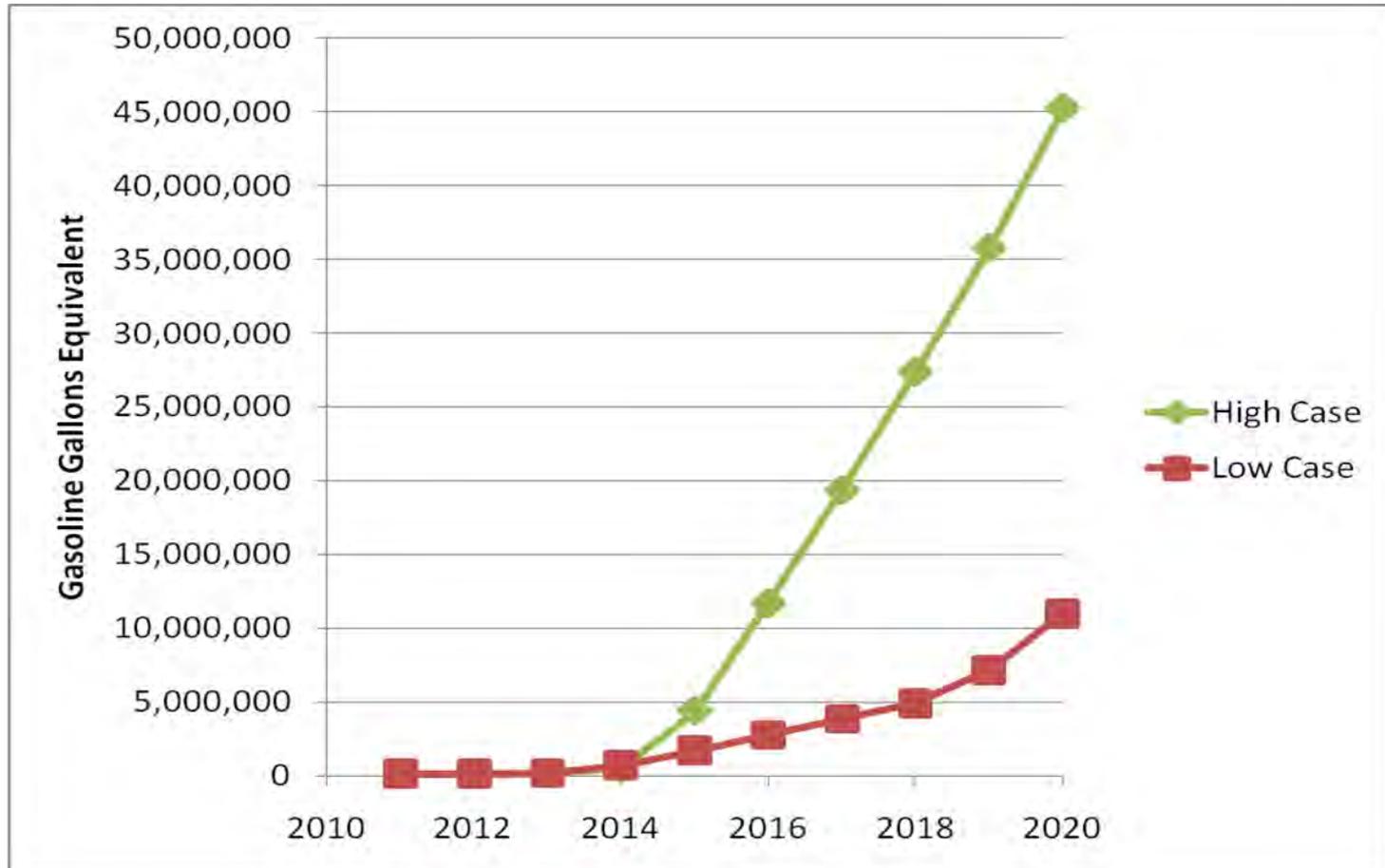


High and Low Case Scenarios for Light Duty Fuel Cell Vehicles





Petroleum Displacement from Fuel Cell Vehicles (in Gallons)





Total Estimated 2020 Benefits



Total Estimated Petroleum and GHG Reductions in 2020 Fostered by ARFVT Program Investments

2020 Petroleum Reductions (Millions of Gallons)

Low Range: 374.9

High Range: 1,184.2

2020 GHG Reductions (Millions of Metric Tonnes)

Low Range: 2.5

High Range: 9.3



Progress Towards 2020 State Policy Goals

Policy Target	Benefits Supported by the ARFVT Program
<p align="center">AB 32</p> <p>Reduce GHG emissions to 1990 levels by 2020.</p>	<p>Assuming 189.3 million metric tons of CO₂e by 2020, these fuels and technologies could represent a one to four percent reduction from the business-as-usual case by 2020.</p>
<p align="center">Petroleum Reduction</p> <p>Reduce petroleum fuel dependence to 15 percent below 2003 levels by 2020.</p>	<p>Assuming a demand of roughly 18.8 billion gallons of diesel and gasoline per year by 2020, these fuels and technologies can displace roughly two to six percent of petroleum fuels by 2020.</p>
<p align="center">Bioenergy Action Plan</p> <p>Meet 40 percent (or roughly 820 million gasoline gallons equivalent) of in-state biofuel demand with in-state biofuel production by 2020.</p>	<p>The biofuel production potential supported by the ARFVT Program would represent 15 to 77 percent of this target.</p>



Job Creation and Workforce Training Benefits

\$15 Million Investment



Workforce Training Delivery Data

	Allocations for Workforce Training Delivery (in millions)	Match Contributions to Date (in millions)	Trainees to be Trained	Businesses Assisted to Date	Municipalities Assisted to Date
ETP	\$5.4	\$5.8	4,327	78+	12+
EDD	\$3.8	\$7.5	999	36+	
Totals	\$9.2	\$13.2	5,326	114+	12+



Estimated Job Creation from ARFVT Program-Funded Projects

	Manufacturing	Construction	Engineering	Operation and Maintenance	Other	Total
Short-Term	416	610	241	55	590	1,912
Long-Term	638	1,306	384	410	744	3,482
Total	1,054	1,916	625	465	1,334	5,394



Challenges and Recommendations

High Volumes of Proposal Applications

- ARRA: 112 full applications with 12 California awards
- AB 118: 200 proposals with 69 awards
40 to 80 days to review and rank
- Continuous improvement to proposal review and grant development processes

Permitting

- Proof of compliance required prior to Business Meeting Approval
- Long permit review periods for some projects



Remedies

Remedies

Wieckowski (AB 1314)

- Grantees can expend funds at own risk at date of Notice of Proposed Award
- Investment Plan can be “updated”

CEQA and Permitting

- Clear direction to applicants on legal requirements