



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

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**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
  - 4<sup>th</sup> 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

<b>Fuel Type and Program Area</b>	<b>Total Funding Encumbered by July 2011 (\$ millions)</b>	<b>Percent of Total</b>	<b>No. of Projects</b>
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
<b>Totals</b>	<b>197.4</b>		<b>86</b>



## 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
<b>Totals</b>	<b>\$128.9</b>	<b>\$32.3</b>	<b>\$8.1</b>	<b>\$5.7</b>	<b>\$5.5</b>	<b>\$197.4</b>



## 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
<b>Alternative Fueling Infrastructure</b>	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 (plus 5 more under construction)	11 fueling stations	100%
<b>Alternative Fuel Vehicles</b>	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 3<sup>rd</sup> 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

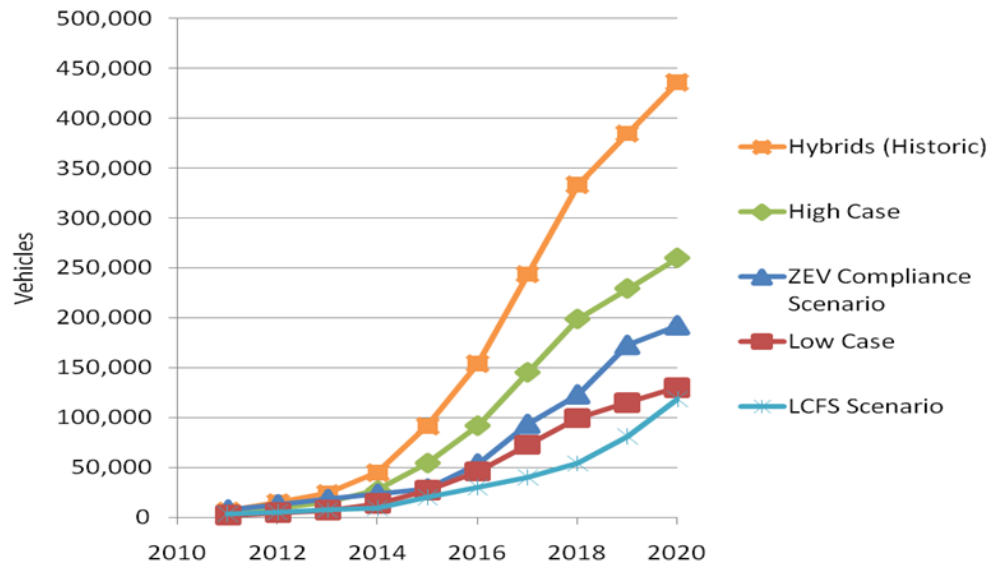
- EV Chargers \$17.4 M
- Vehicles \$16.5 M
  - Light Duty and Heavy Duty Commercial
  - Medium Duty-Heavy Duty Demonstration
- Manufacturing \$25.9 M
  - Vehicles, Batteries, Components



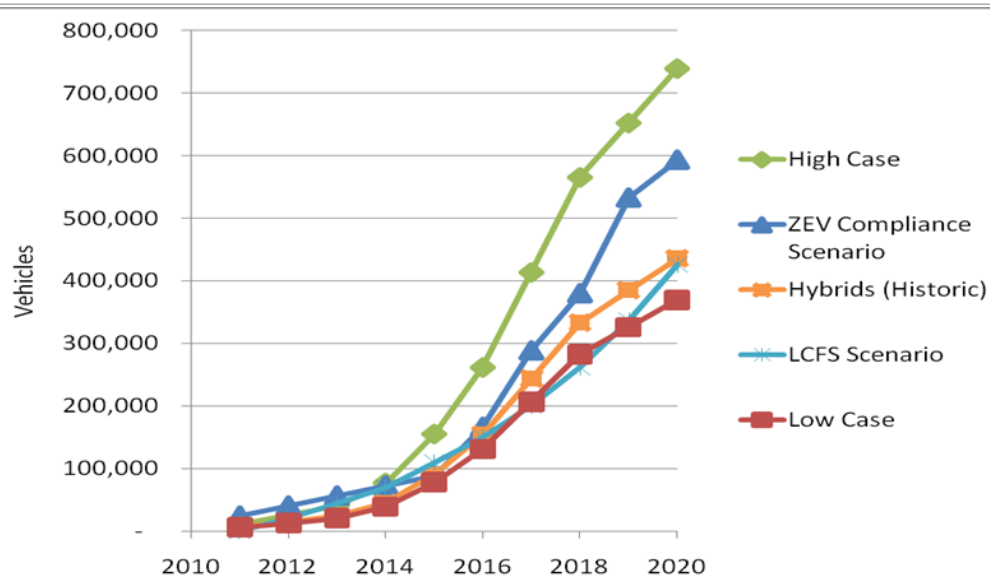
# CALIFORNIA ENERGY COMMISSION

PEV  
Collaborative  
Estimates

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



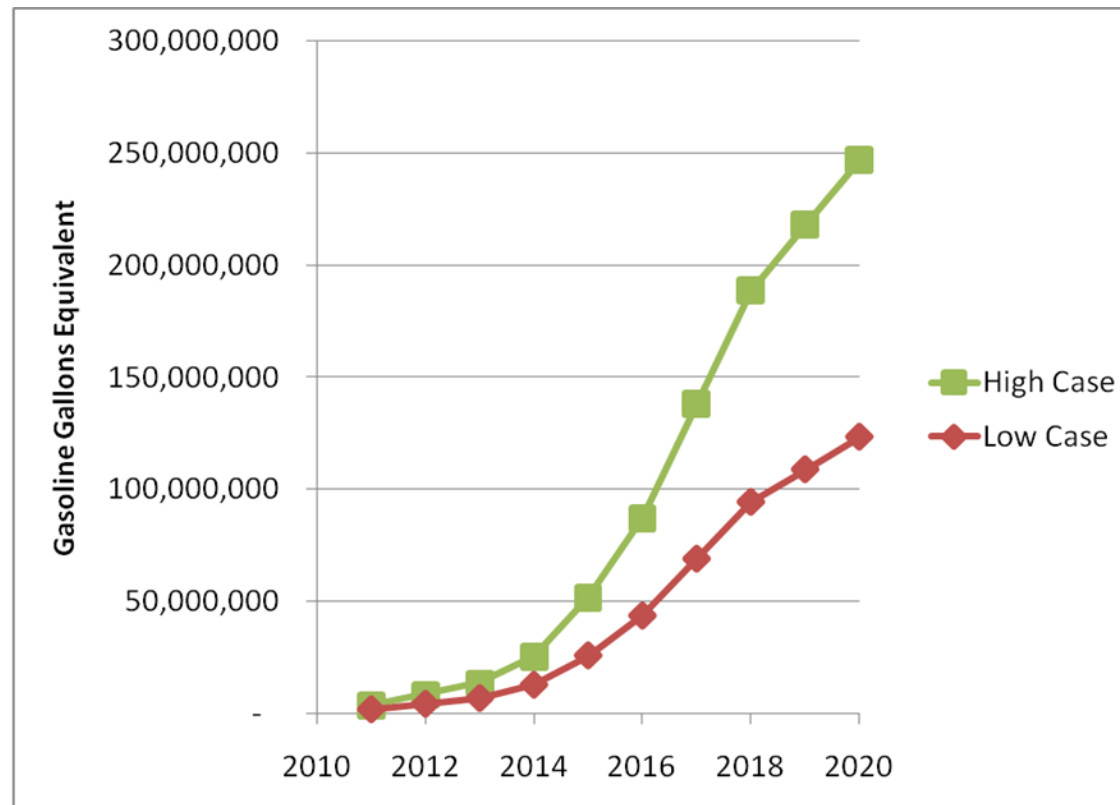
BEVs



PHEVs



## Electric Vehicle High and Low Petroleum Reduction





# Biofuels Production Estimated Benefits

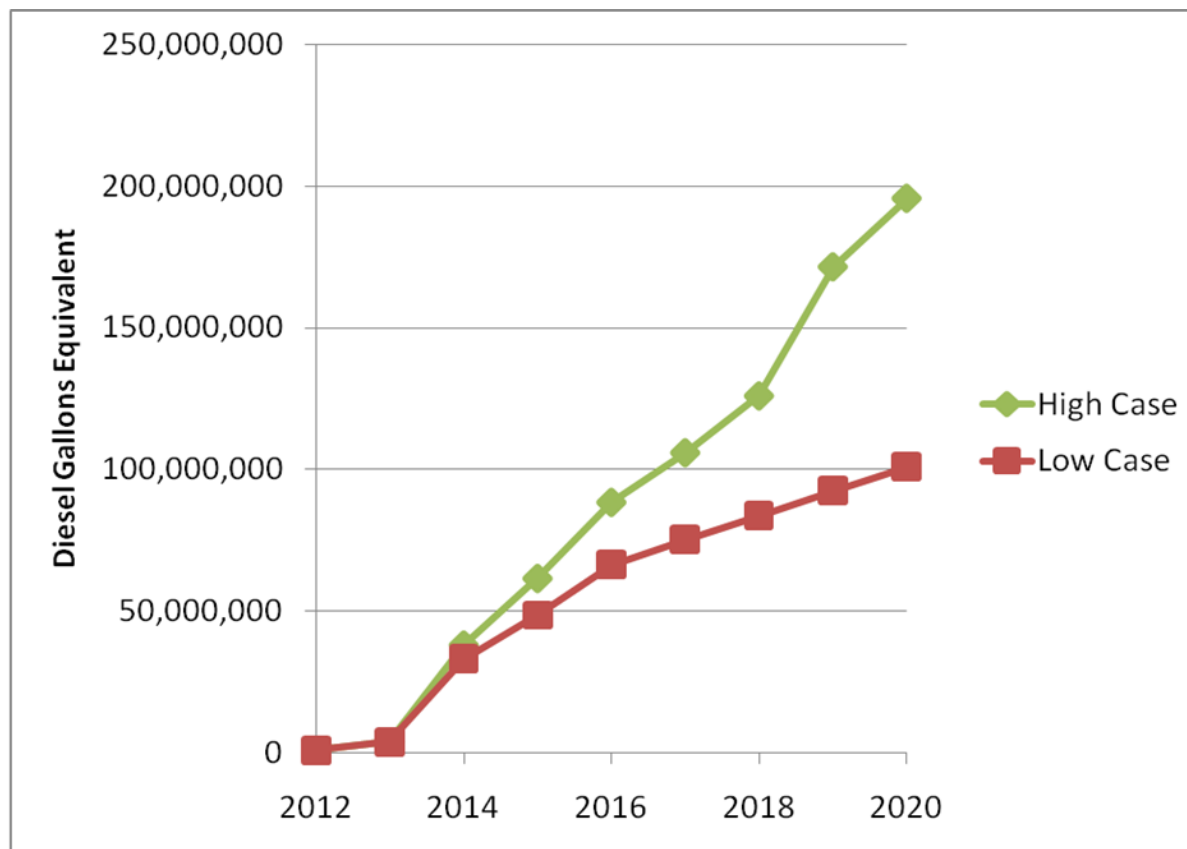


## High and Low Scenario Biogas Production from 9 ARFTVP Projects – 2012 to 2020

6 Production  
Projects

3 Pilot /  
Feasibility  
Projects

\$35.3 M  
Total  
Investment





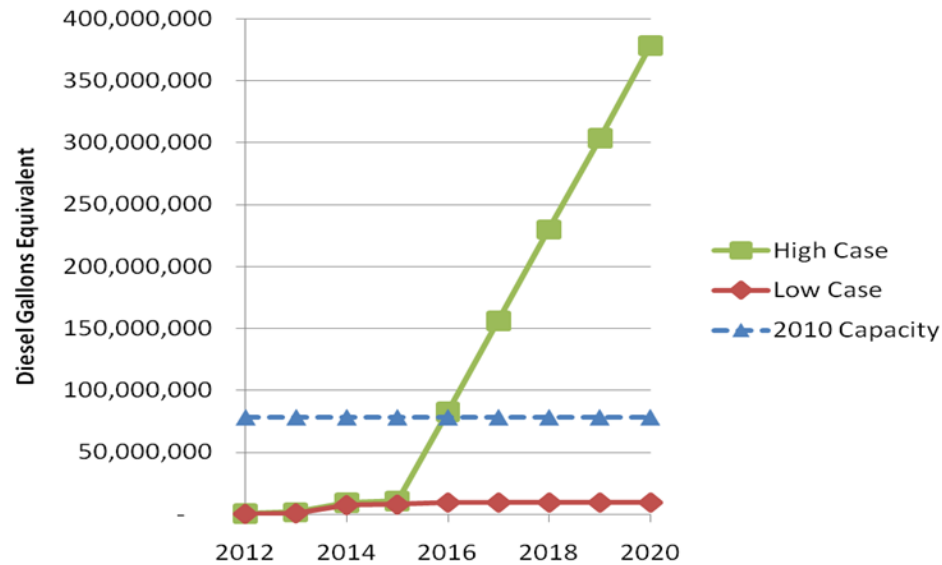
# CALIFORNIA ENERGY COMMISSION

5  
Feasibility  
and Pilot  
Projects

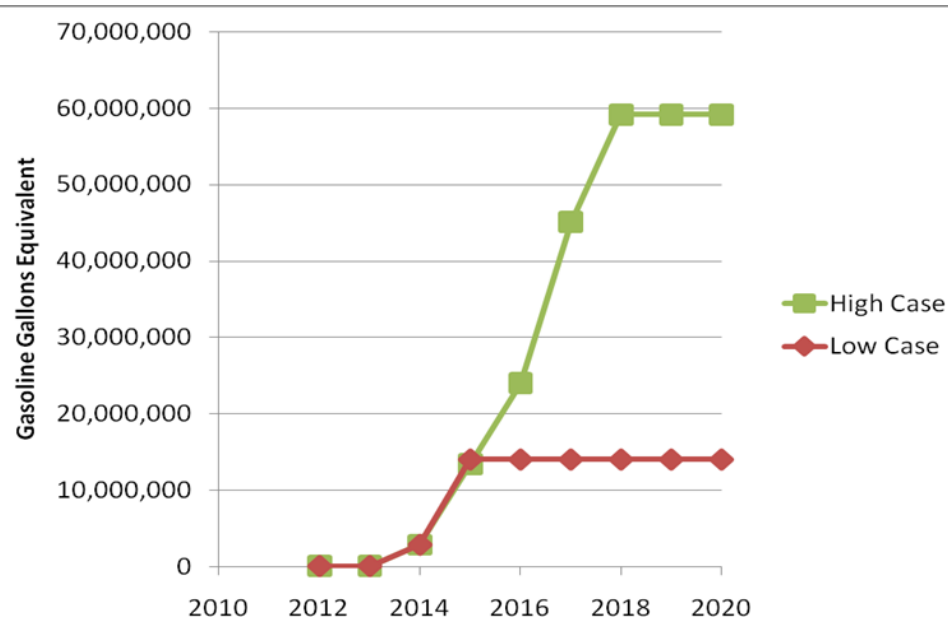
\$4.3 M  
Investment

1  
Commercial  
Project  
2 Feasibility  
Projects

\$5.4  
Investment



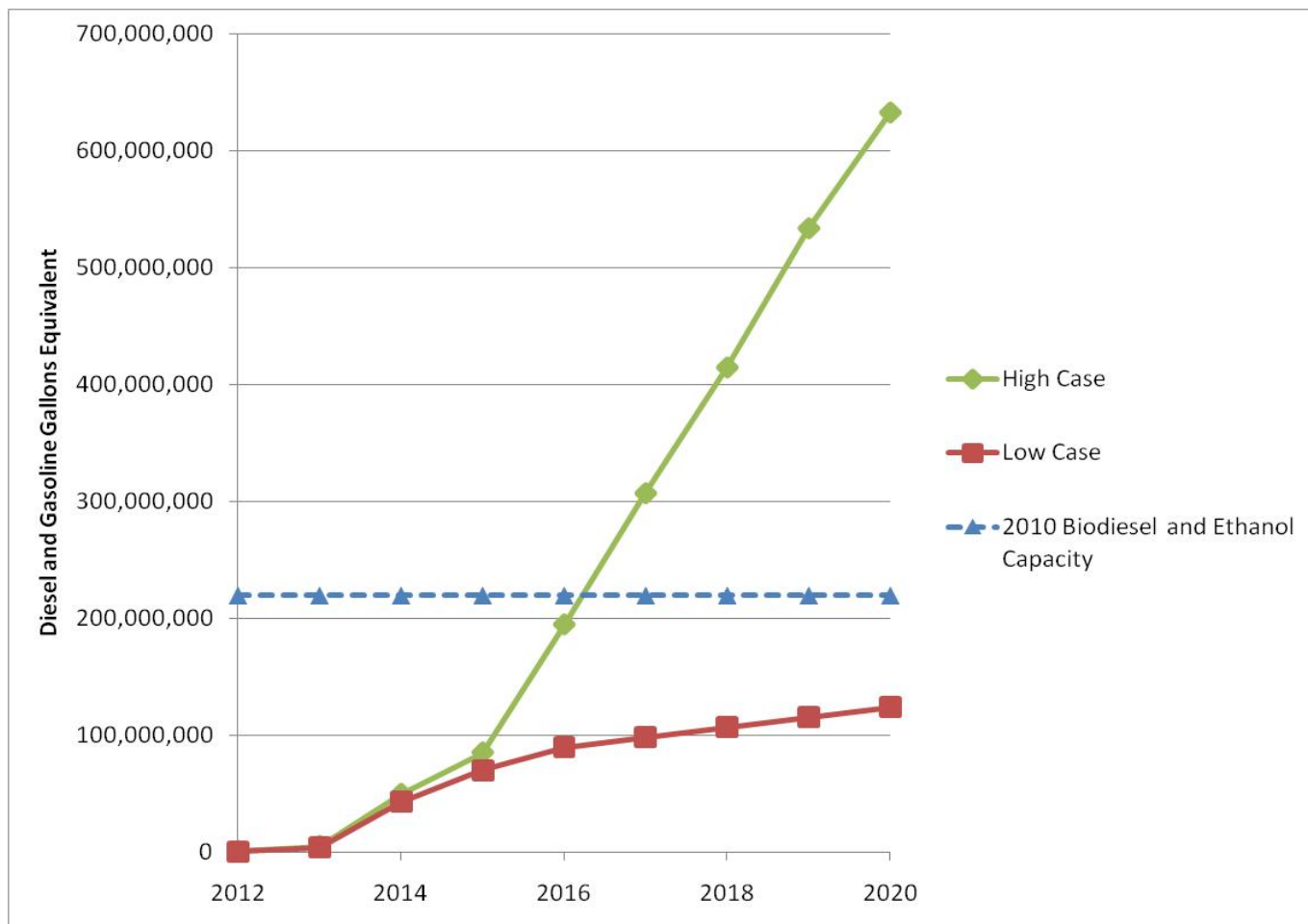
Hi-Lo  
for 5  
Biodiesel  
Projects



Hi-Lo  
for 3  
Ethanol  
Projects



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



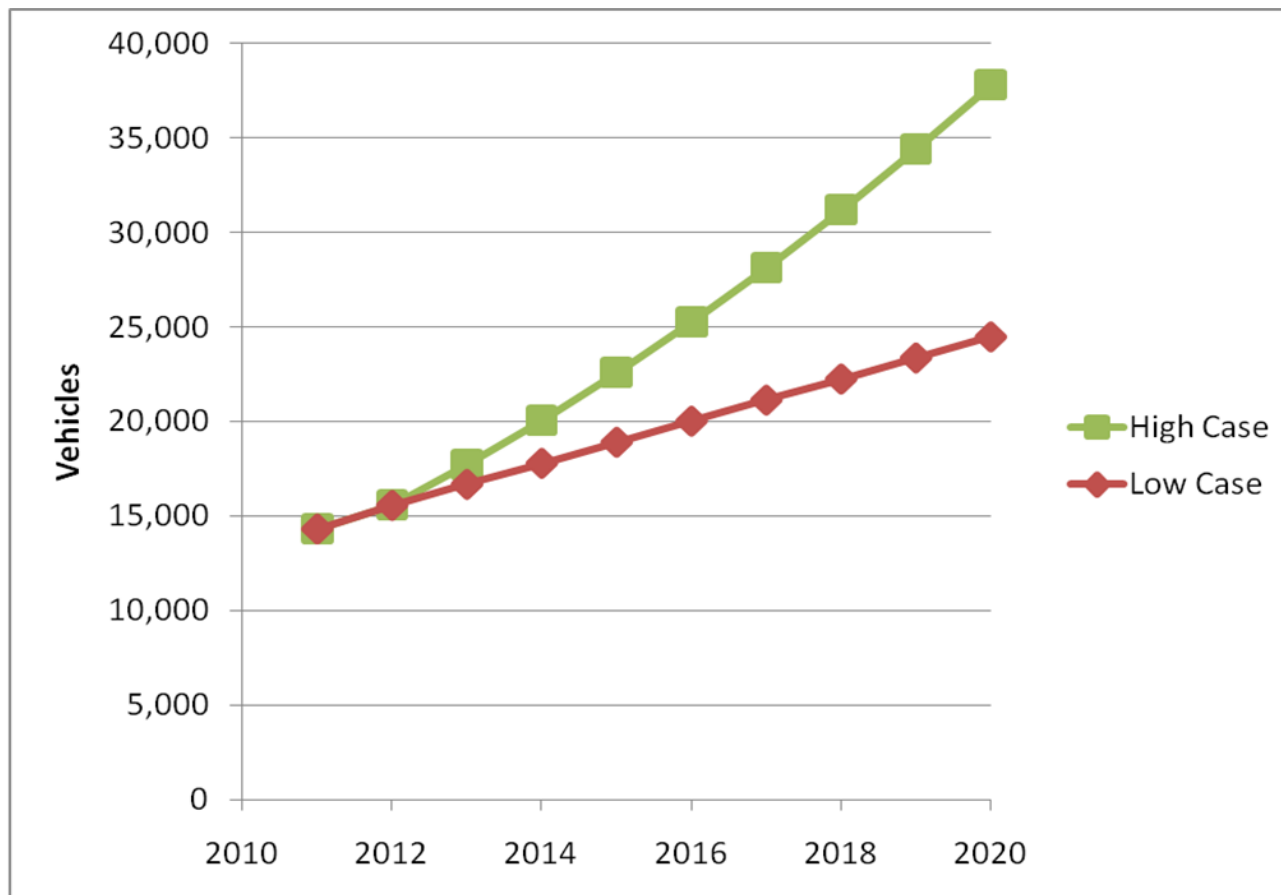


# Natural Gas Trucks Estimated Benefits

898 Trucks Deployed from ARFVTP  
ARRA Grants and Buydown Program

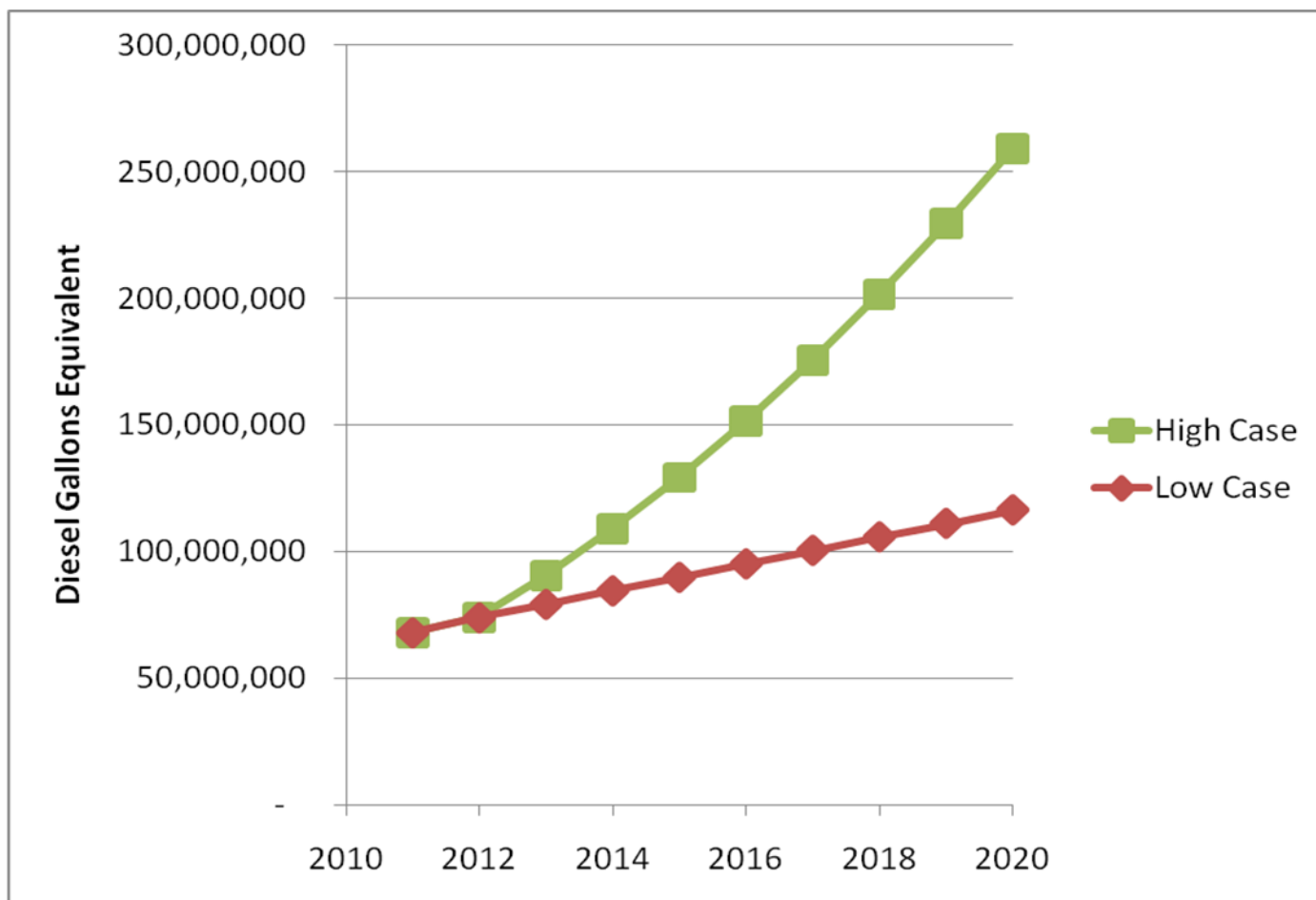


## High and Low Case Scenarios for MD-HD Natural Gas Trucks – 2011 to 2020





## Natural Gas Truck Petroleum Reduction



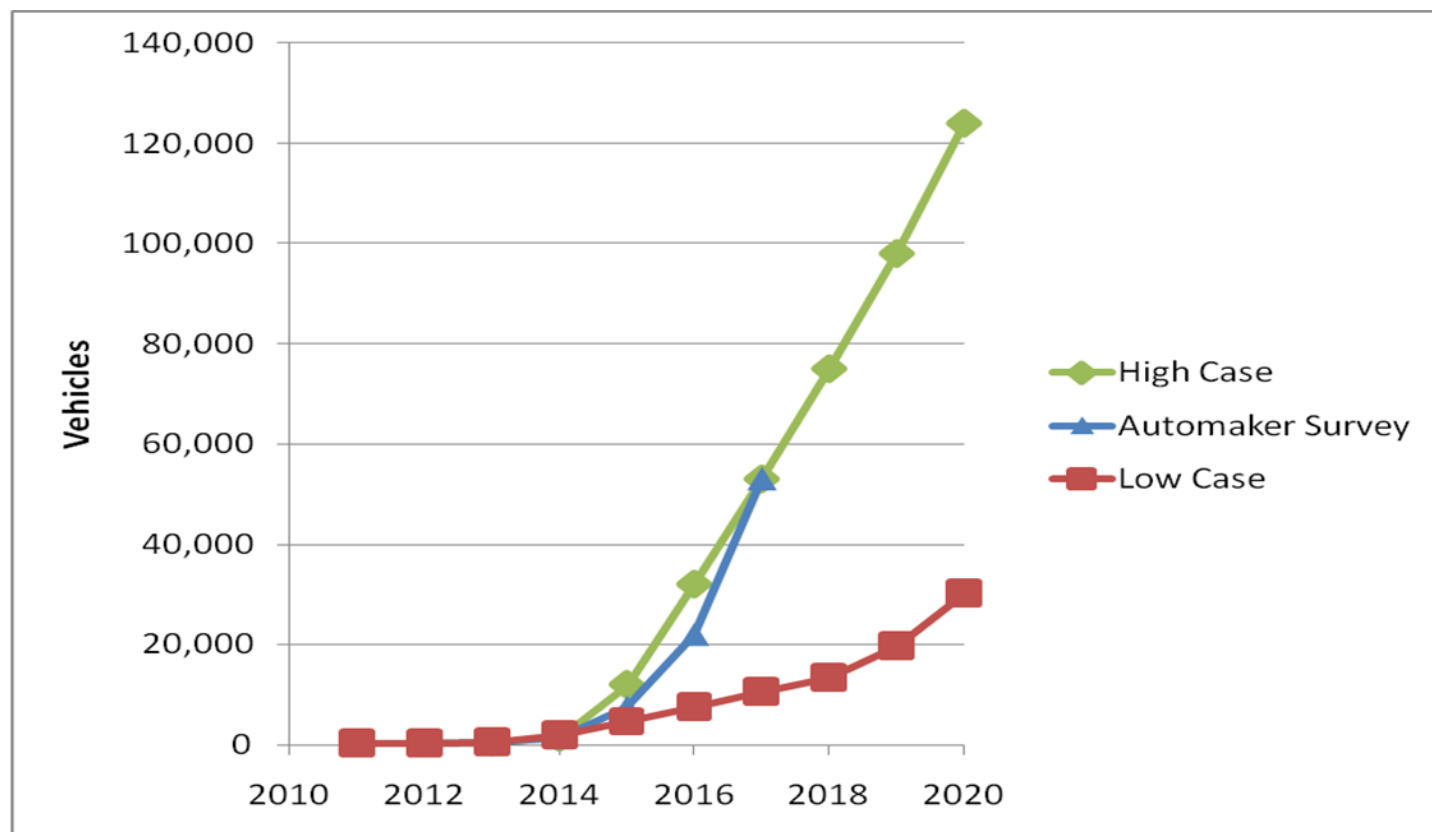


# Fuel Cell Vehicle Estimated Benefits

**\$15.7 Million Invested in Infrastructure**

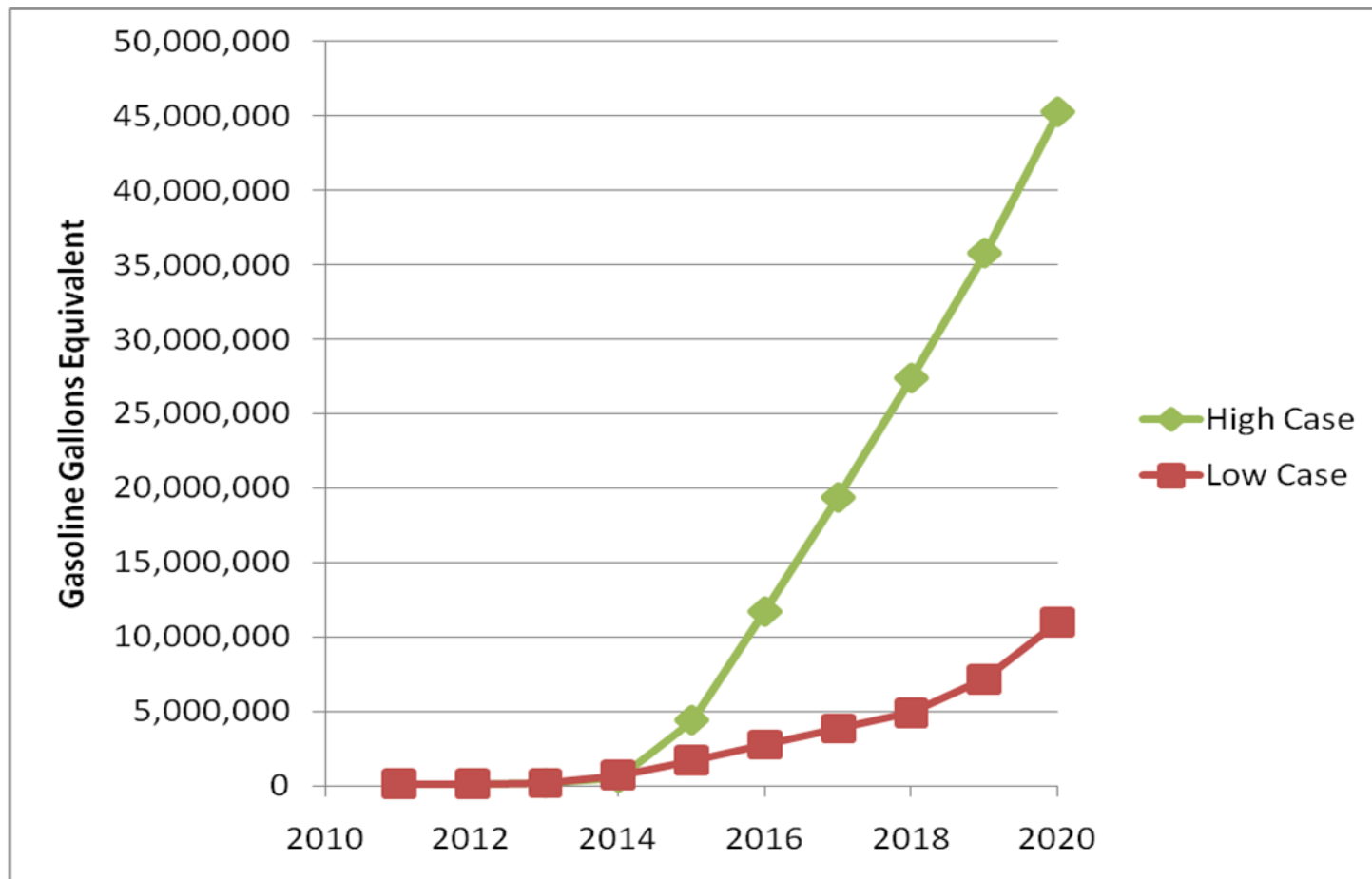


## High and Low Case Scenarios for Light Duty Fuel Cell Vehicles





## 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
<b>AB 32</b> Reduce GHG emissions to 1990 levels by 2020.	Assuming 189.3 million metric tons of CO <sub>2</sub> e by 2020, these fuels and technologies could represent a one to four percent reduction from the business-as-usual case by 2020.
<b>Petroleum Reduction</b> Reduce petroleum fuel dependence to 15 percent below 2003 levels by 2020.	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.
<b>Bioenergy Action Plan</b> Meet 40 percent (or roughly 820 million gasoline gallons equivalent) of in-state biofuel demand with in-state biofuel production by 2020.	The biofuel production potential supported by the ARFVT Program would represent 15 to 77 percent of this target.



# 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