



# Measuring Success: An ARFVTP Perspective

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## Purpose of the ARFVTP

- Health and Safety Code 44272(a)
  - “...to develop and deploy innovative technologies that transform California’s fuel and vehicle types to help attain the state’s climate change policies... without adopting any one preferred fuel or technology.”
- Complementary state goals
  - Reduce emissions of criteria pollutants and air toxics
  - Halve petroleum use by 2030
  - 1.5 million ZEVs by 2025



## Program Status Update

- Now in eighth fiscal year (2016-2017)
- Through December 2015, \$606 million awarded to more than 545 projects

50 Biofuel Production Projects	7,490 EV Chargers
49 Hydrogen Refueling Stations	65 Natural Gas Fueling Stations
21,000 Electric Vehicle Rebates	2,809 Natural Gas Vehicles
22 Manufacturing Projects	14,762 Workforce Trainees
44 Advanced Technology Truck Demonstrations	34 Regional Readiness Grants

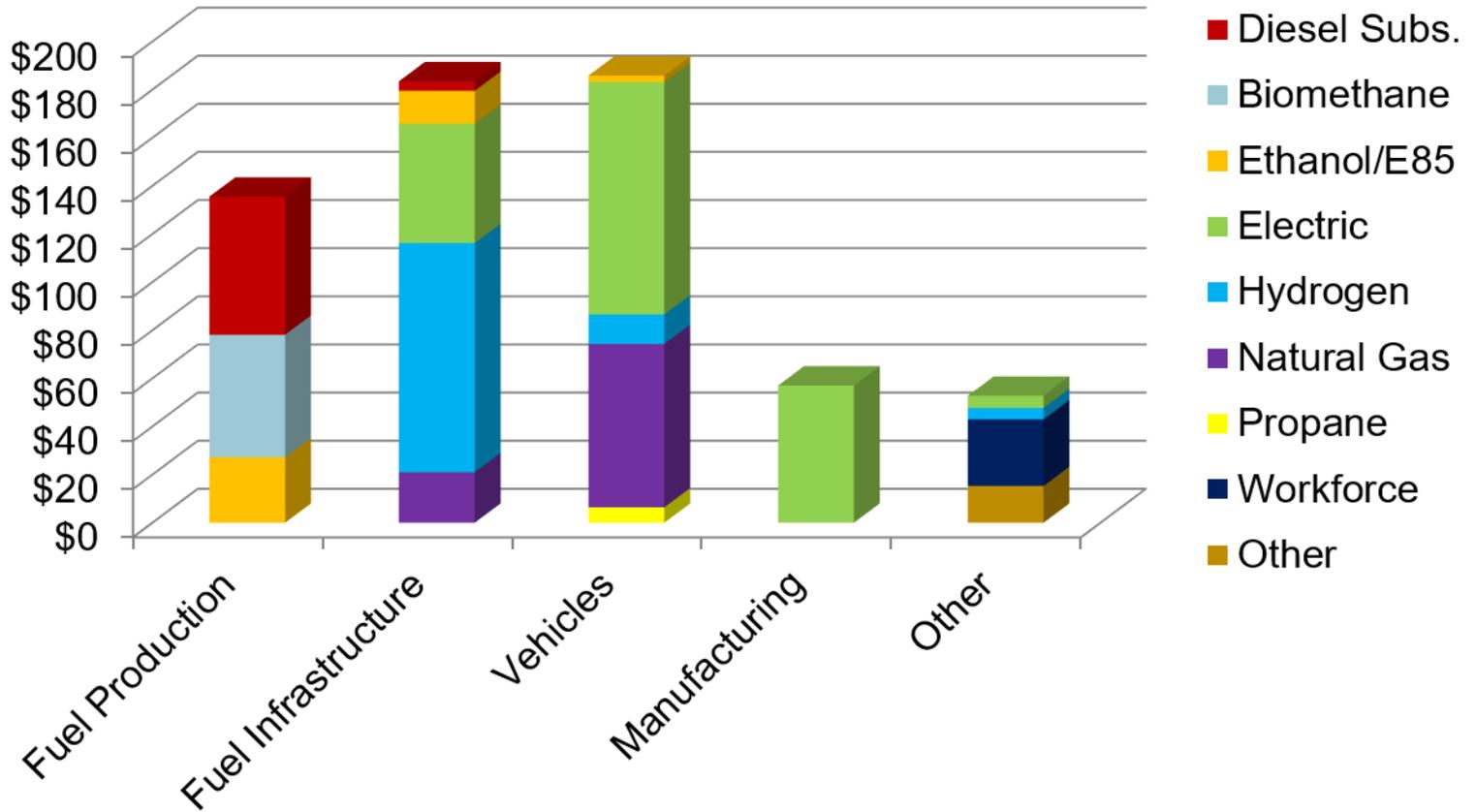


# Project Criteria in Statute

<p>Sec. 44272(c)(1)</p> <p><b>Transition to Alternative Fuels</b></p>	<p>The project's ability to provide a measurable transition from the nearly exclusive use of petroleum fuels to a diverse portfolio of viable alternative fuels that meet petroleum reduction and alternative fuel use goals.</p>	<p>Sec. 44272(c)(7)</p> <p><b>Economic Benefits</b></p>	<p>The project provides economic benefits for California by promoting California-based technology firms, jobs, and businesses.</p>
<p>Sec. 44272(c)(2)</p> <p><b>Consistency with Climate Policy</b></p>	<p>The project's consistency with existing and future state climate change policy and low-carbon fuel standards.</p>	<p>Sec. 44272(c)(8)</p> <p><b>Use of Existing Infrastructure</b></p>	<p>The project uses existing or proposed fueling infrastructure to maximize the outcome of the project.</p>
<p>Sec. 44272(c)(3)</p> <p><b>Reduce Criteria Pollutants</b></p>	<p>The project's ability to reduce criteria air pollutants and air toxics and reduce or avoid multimedia environmental impacts.</p>	<p>Sec. 44272(c)(9)</p> <p><b>Reduce Lifecycle GHG Emissions</b></p>	<p>The project's ability to reduce on a life-cycle assessment greenhouse gas emissions by at least 10 percent, and higher percentages in the future...</p>
<p>Sec. 44272(c)(4)</p> <p><b>Decrease Water Pollutants and Others</b></p>	<p>The project's ability to decrease, on a life-cycle basis, the discharge of water pollutants or any other substances known to damage human health or the environment...</p>	<p>Sec. 44272(c)(10)</p> <p><b>Alternative Fuel Use</b></p>	<p>The project's use of alternative fuel blends of at least 20 percent, and higher blend ratios in the future, with a preference for projects with higher blends.</p>
<p>Sec. 44272(c)(5)</p> <p><b>Natural Resource Sustainability</b></p>	<p>The project does not adversely impact the sustainability of the state's natural resources, especially state and federal lands.</p>	<p>Sec. 44272(c)(11)</p> <p><b>Technology Advancement</b></p>	<p>The project drives new technology advancement for vehicles, vessels, engines, and other equipment, and promotes the deployment of that technology in the marketplace.</p>
<p>Sec. 44272(c)(6)</p> <p><b>Matching Funds</b></p>	<p>The project provides nonstate matching funds. ...</p>	<p>Sec. 44272(d)</p> <p><b>Benefit-Cost Scores</b></p>	<p>The commission shall rank applications for projects proposed for funding awards based on solicitation criteria developed in accordance with subdivision (c), and shall give additional preference to funding those projects with higher benefit-cost scores.</p>



# ARFVTP Funding to Date





## Commitment to Diversity

The Energy Commission adopted a resolution on April 8, 2015, to firmly commit to:

- Increase participation of women, minority, disabled veteran and LGBT business enterprises in program funding opportunities
- Increase outreach and participation by disadvantaged communities
- Increase diversity in participation at Energy Commission proceedings
- Increase diversity in employment and promotional opportunities



## Commitment to Diversity, cont.

**Fairness** – Increase funding accessibility to all Californians

**Inclusion** – Small businesses make up a significant portion of the U.S. economy.

**Job Creation** – Projects can create jobs for residents of the underserved communities.

**Diversity of Ideas** – Great ideas occur in a variety of areas.

**Diversity in Communities' Needs** – Needs vary widely from one area to the next (air quality, socioeconomic, etc.).



## ARFVTP in Disadvantaged Communities

- Energy Commission uses CalEnviroScreen to identify and target investment into disadvantaged communities (DACs)
- Preliminary estimate: 38% of ARFVTP funding has been awarded to projects in DACs
- Large share of funding for biofuel production projects (~65%) is within DACs



## June 2014: Workshop Recap

- AB 8 (2013) added “Benefit-Cost Score” to scoring criteria for ARFVTP funding solicitations
- Benefit-Cost Score is a useful but incomplete measure of ARFVTP successes
- NREL’s benefit analysis of ARFVTP included both “Expected Benefits” and “Market Transformation”



## June 2014: Recurring Comments

- General support for ARFVTP's initial approach to metrics and the robustness of those metrics
- Focus on data for fuel- and technology-specific metrics
- “Policy Metrics” should precede “Project Metrics” in setting funding priorities
- Look at long-term market potential and policy requirements
- Quantitative metrics can inform qualitative judgment, but cannot replace it



## GHG Benefit-Cost Score

- Definition: “...a project’s expected or potential greenhouse gas emissions reduction per dollar awarded by the Commission to the project.” (Health and Safety Code, Sec. 44270.3[a])

$$\begin{aligned} \mathbf{Benefit} &= \text{GHG emissions reduced (metric tons)} \\ &= \text{Fuel amount} \times \text{carbon intensity reduction} \end{aligned}$$

$$\mathbf{Cost} = \text{ARFVTP award amount (\$)}$$

$$\mathbf{Benefit-Cost} = \mathbf{Benefit} \div \mathbf{Cost} \text{ (metric tons / \$)}$$

- “Establish a competitive process for the allocation of funds for projects... which considers, among other factors, the benefit-cost score...” (Sec. 44271[a][2])



# June 2014: Benefit-Cost Examples

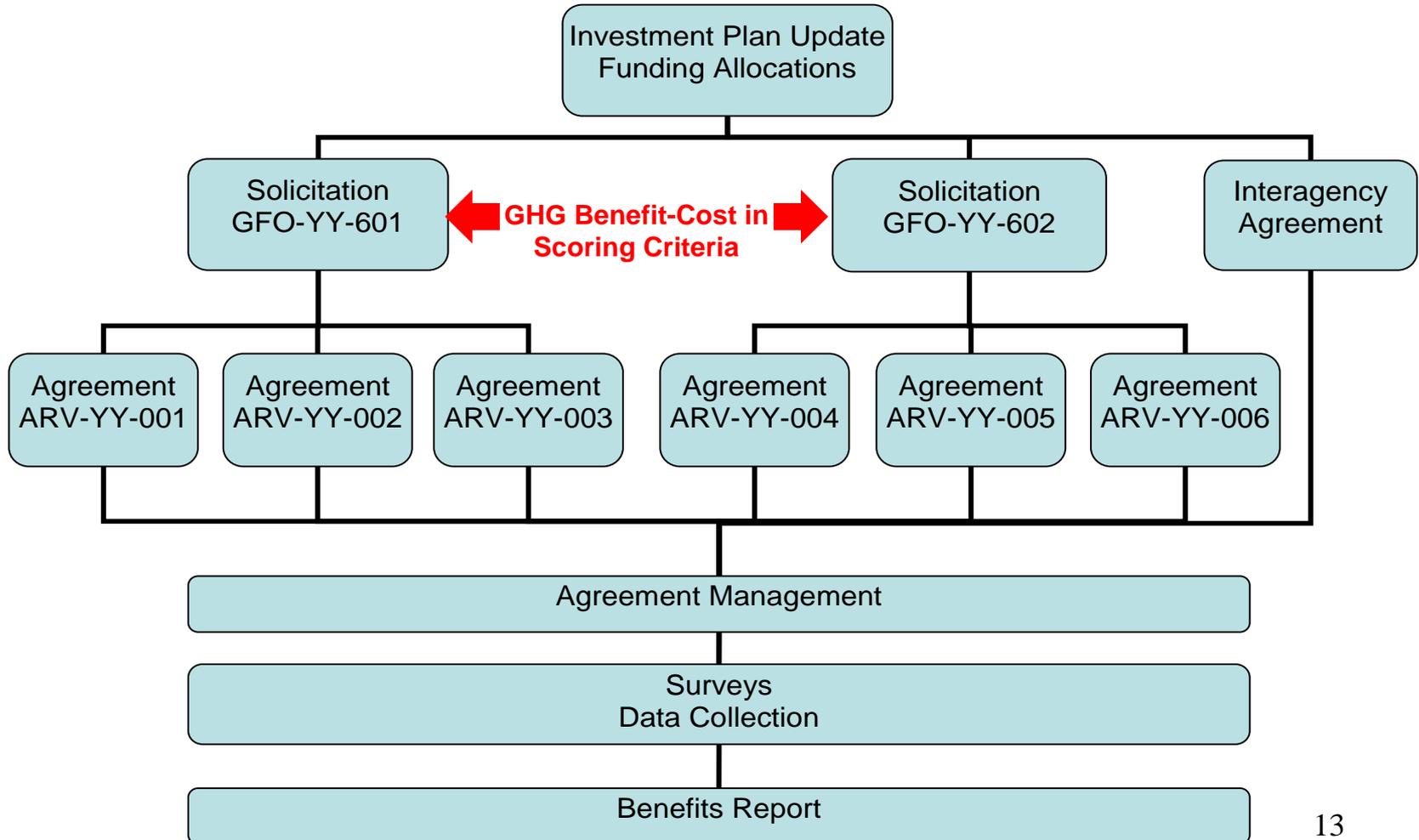
Hydrogen Fueling Station	Low Case	High Case	Heavy-Duty CNG Truck Incentive	Low Case	High Case
ARFVTP share:	\$2,000,000	\$1,500,000	ARFVTP share:	\$20,000	\$20,000
Daily station capacity (kg):	180	300	Displaced vehicle's annual VMT:	15,000	50,000
Annual station capacity (kg):	64,800	108,000	Displaced vehicle's miles per DGE:	7.0	4.0
Miles per kg of average FCV:	65	65	Annual DGE displaced:	2,143	12,500
MPG of displaced conventional vehicle:	25	25	EER of NG Vehicles:	0.95	0.95
Annual GGE displaced:	168,480	280,800	gCO2e/MJ of alternative fuel (inc. EER):	71.58	71.58
gCO2e/MJ of alternative fuel (inc. EER):	40.9	29.2	GHG emission reduction <sup>a</sup> /year (tonnes):	7.6	44.6
GHG emission reduction <sup>a</sup> /year (tonnes):	1,175	2,353			
GHG emissions (tonnes)	11,752	9,399			

See June 2014 workshop presentation for full examples

[http://www.energy.ca.gov/2014\\_energypolicy/documents/#06122014](http://www.energy.ca.gov/2014_energypolicy/documents/#06122014)



# Program Implementation



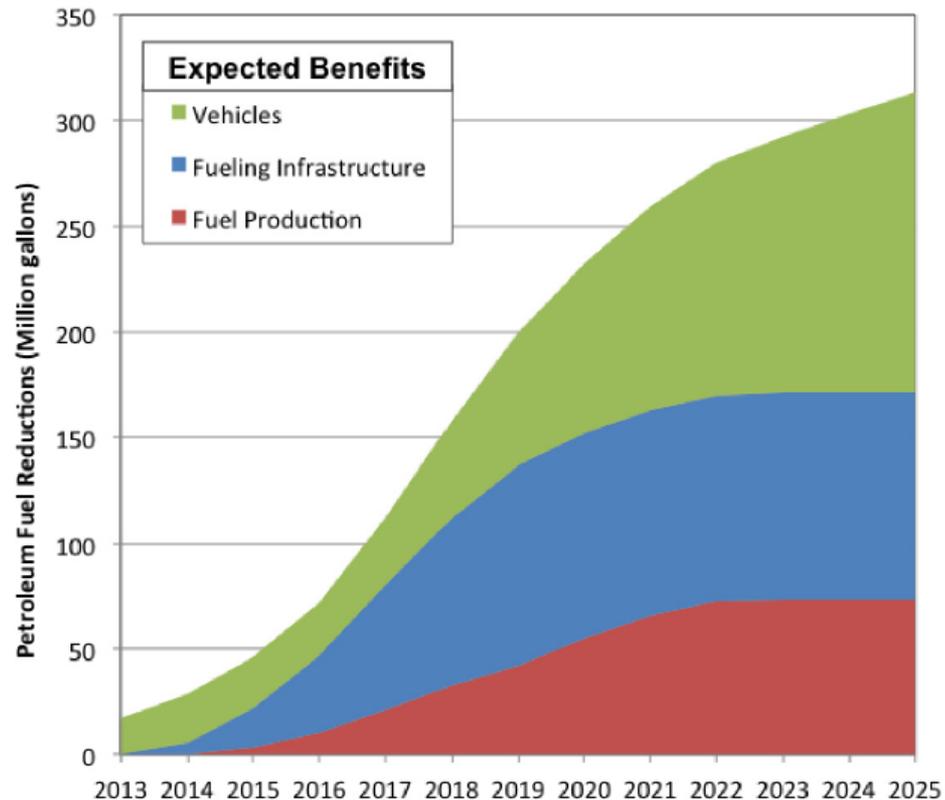


# Recent GHG Benefit-Cost Scoring

GFO	Subject Area	Relevant Scoring Element(s)	Part of...	Criterion Weight
GFO-15-604	Freight Transportation Projects at California Seaports	“The proposed project results in higher benefit/cost score as defined as the amount of lifecycle GHG emissions reduced over the project duration per dollar of Energy Commission funding.”	Budget	15 out of 100 possible points
GFO-15-605	Light-Duty Vehicle Hydrogen Refueling Infrastructure	“The proposed project is likely to result in a high benefit-cost score (GHG reductions per public dollar provided to the project).”	Project Budget	25 out of 500 possible points
GFO-15-606	Community-, Commercial-Scale Biofuel Production	“The proposed project minimizes Energy Commission funding per metric ton of GHG emissions reduced on an annual and 5-year project life basis.”	Project Budget and Cost Effectiveness	50 out of 300 possible points



## 2015 NREL Benefit Analysis (Petroleum Displacement)



Source: 2015 Integrated Energy Policy Report



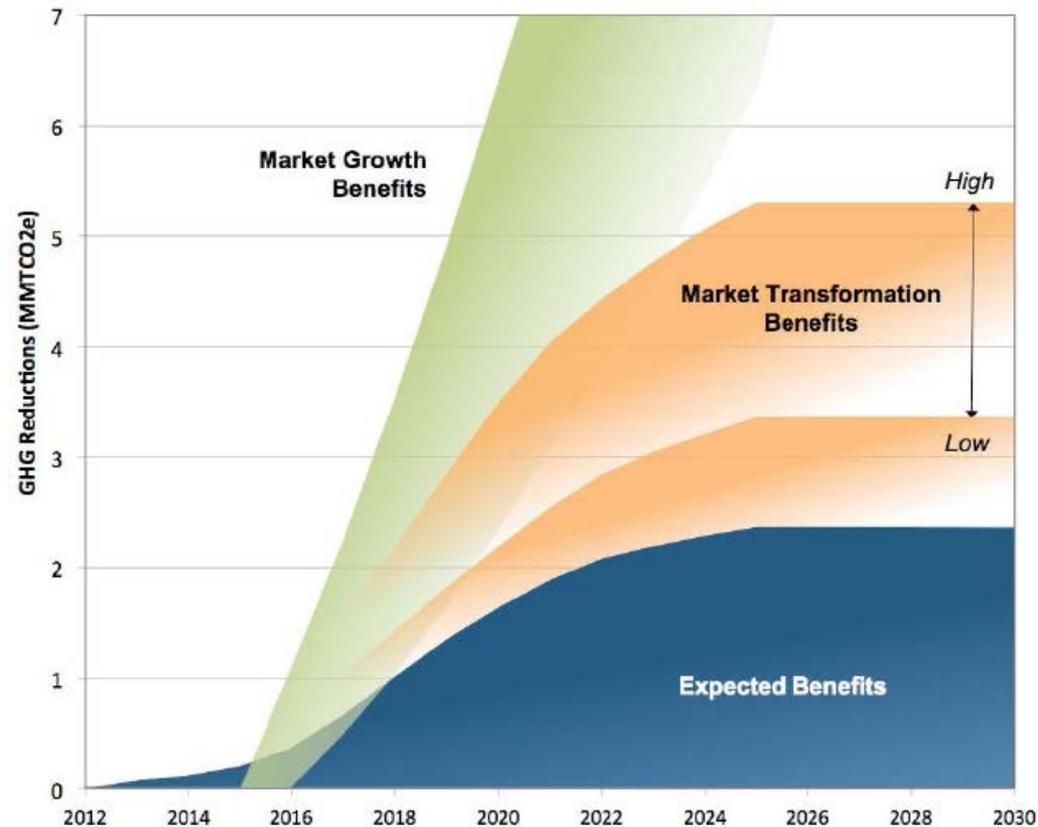
## 2015 NREL Benefit Analysis (Criteria Emission Reduction)

- By 2025: 2-5 tons of PM<sub>2.5</sub> emissions reduced per year from ARFVTP ZEV investments
- Monetized benefit: \$4 million to \$8 million per year
- \$M/ton varies significantly by county

Source: *2015 Integrated Energy Policy Report*



## 2015 NREL Benefit Analysis (GHG Emissions)



Source: 2015 Integrated Energy Policy Report



## Expanding ARFVTP Data Gathering

- New project proposals and awards
- Final Project Reports
- Hydrogen refueling station data from O&M grants
- RAND project evaluations
- Real-time data on charging infrastructure and hydrogen refueling stations from NREL



## Refining Methods of Measurement

Measurements	Divisible by...
GHG / criteria / toxic emission reductions	<ul style="list-style-type: none"><li>• ARFVTP funding of...<ul style="list-style-type: none"><li>- ...a project</li><li>- ...a funding category</li><li>- ...the total program</li></ul></li></ul>
Alternative fuel used / produced	
Petroleum displaced	
Units deployed	
Matching investment	
Short- / long-term jobs	
Total monetized benefits	
<b><i>Other fuel-specific metrics</i></b>	



# Questions?

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