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California Energy Commission

Clean Transportation Program Benefits Report for 2021 IEPR

Susan Ejlalmaneshan

July 30, 2021

Structure of Today's Workshop

- Overview of Clean Transportation Program and Benefits Report goals.
- Staff presentations on Clean Transportation Program funding activities and success stories
- NREL presentation on quantifying benefits of Clean Transportation Program investments

About the Clean Transportation Program

- Transportation sector is the largest source of GHG emissions in California (>50%)

- State requires a rapid transformation to zero and near-zero emission vehicles

Source: Dept. of Energy

Key Policy Milestones

Policy Origin	Objective	Goals and Milestones
Assembly Bill 32 Senate Bill 32 Executive Order B-55-18	GHG Emission Reduction	2020: 1990 levels 2030: 40% below 1990 levels 2045: Achieve carbon neutrality
Clean Air Act State Implementation Plans	Air Quality	2031: 80 percent reduction in NOx
Executive Order B-16-2012 Executive Order B-48-18	Increase Zero-Emission Vehicles	Vehicles 2025: 1.5 million zero-emission vehicles deployed 2030: 5 million zero-emission vehicles deployed Infrastructure 2020: Support 1.5 million zero-emission vehicles 2025: 250,000 electric vehicle chargers (inc.10,000 DC fast chargers) and 200 H2 stations
Executive Order N-79-20	Carbon Neutrality	2035: 100% of in-state sales of new passenger cars and trucks to be zero emission; 100% of drayage trucks, off-road vehicles, and off-road equipment operations to be zero emission 2045: 100% of in-state sales of medium- and heavy-duty trucks and buses to be zero emission

About the Clean Transportation Program


Assembly Bill No. 8

CHAPTER 401

- Established in 2007, and extended in 2013 through 2023
- $100 million per fiscal year from vehicle registration and smog abatement fees
- **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…"*
  - Additional preference for projects that *"reduce criteria air pollutants and air toxics"* and *"provide economic benefits for California"*

Context of the Clean Transportation Program

- Supports and complements statewide efforts to decarbonize the transportation sector

- Coordinated with other major programs and regulations, including:
  - Zero Emission Vehicle Reg.
  - Low Carbon Fuel Standard
  - Cap-and-Trade / GHG Reduction Fund
  - Utility Investments
  - Settlement Agreements (VW; NRG)
  - Air Quality Improvement Program
  - Carl Moyer Program

Program Status Update

- Now in thirteenth fiscal year (2021-2022)
- Through March 2021, nearly $1 billion awarded to more than 600 projects

Clean Transportation Program Investments as of March 1, 2021
13,014 EV Chargers
83 Hydrogen Refueling Stations
14,500+ ZEV and Low Carbon Vehicles
75 Advanced Technology Truck Demonstrations
27 Manufacturing Projects
20,000 Workforce Trainees
55 Regional Readiness Grants
68 Biofuel Production Projects
70 Natural Gas Fueling Stations

About the Benefits Report

- Required with biennial Integrated Energy Policy Report (IEPR)

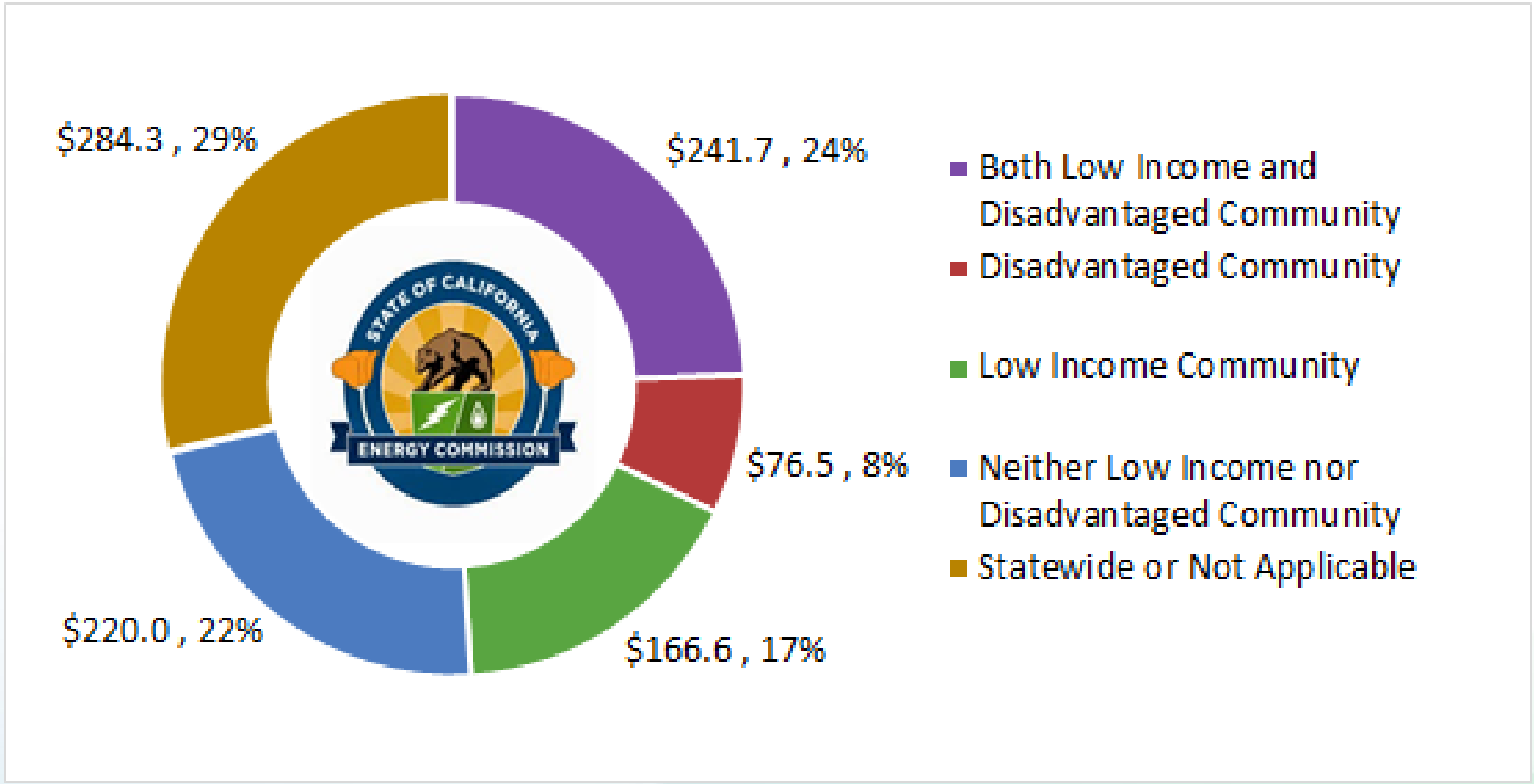
- *"The evaluation shall include all of the following:"*
  - List of projects funded
  - Expected benefits
  - Overall contribution toward transition to clean, alternative transportation fuels
  - Key obstacles and challenges
  - Recommendations

Building Inclusivity within the Clean Transportation Program

- Diversifying the Clean Transportation Program Advisory Committee
- Consulting with the Disadvantaged Communities Advisory Group
- Consulting with the CEC's Tribal Program and the Tribal Lead Commissioner
- Assessing whether electric vehicle charging station infrastructure is disproportionately distributed (SB 1000 report)

Investment in Disadvantaged or Low-Income Communities

as of April 2021 (in Millions)



Capturing Benefits to Communities

+ Equity
+ Access
+ Environmental and Public Health Benefits
+ Economic Opportunities
+ Mobility
+ Investment in Community

EV charger ribbon cutting event in Fresno, CA.

Thank You!

Light-Duty Electric Vehicle Charging Infrastructure

IEPR Commissioner Workshop on Benefits From the Clean Transportation Program

Thanh Lopez, Staff EV Charging Infrastructure Unit
Fuels and Transportation Division
July 30, 2021

History of Electric Vehicle Charger Investments (2010 – 2016)

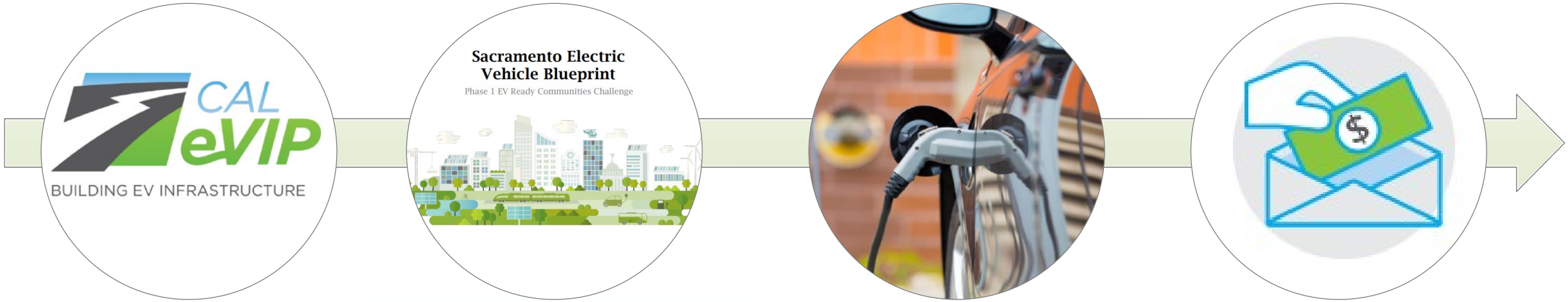
2010
Partnered with Federal Government to install chargers.

2012
Upgrade legacy chargers and fund regional planning for widespread charger deployment.

2014
Increase the number of public, workplace, and fleet charging.

2015
Build out network of DC Fast Charging on highway corridors.

History of Electric Vehicle Charger Investments (2017 – Present)



2017
Launched California Electric Vehicle Infrastructure Project

2018
EV Ready Communities Blueprint: Phase I Development; Phase II Implementation

2020
Innovative charging solutions for light-, medium-, and heavy-duty vehicles

2021
Second Block Grant; vehicle-grid innovation lab services within California; and solicitations targeting light-duty transportation services, multi-family housing, and rural areas

Electric Vehicle Charger Investments to Date

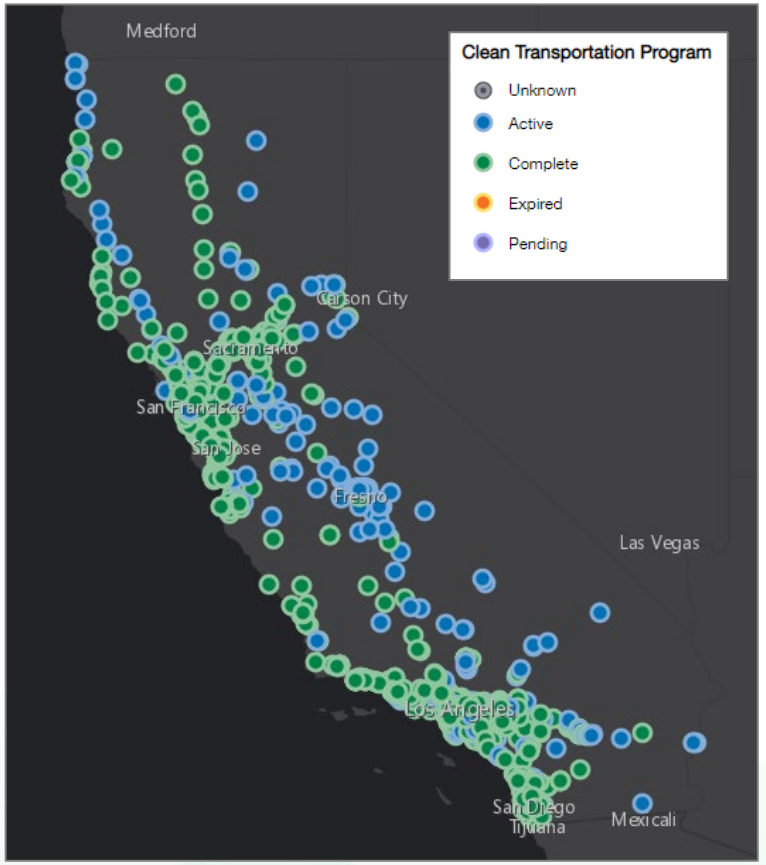
$188.12 Million for over 13,000 planned and installed chargers

	Private Access	Shared Private Access	Shared Private Access	Shared Private Access	Public Access	Public Access	Mixed Access	Total
Charger Type / Setting	Level 2 - Residential (Single & Multifamily)	Level 2 - Fleet	Level 1 and Level 2 - Workplace	Level 2 - Residential (Multifamily)	Level 1 and Level 2 - Public	Level 2 and DCFC - Corridor/ Urban Metro	Level 2 and DCFC - CALeVIP*	-
Installed	3,936	155	419	341	3,090	482	728	**9,151**
Planned	0	0	0	0	18	56	3,789	**3,863**
Total	**3,936**	**155**	**419**	**341**	**3,108**	**538**	**4,517**	**13,014**

Source: 2021-2023 Investment Plan Update. As of January 31, 2021. Does not include chargers that have yet to be approved at a CEC business meeting or connectors that have yet to be funded under CALeVIP. *Planned CALeVIP chargers = number of chargers with rebate funding reserved. Mixed Access includes shared private and public access chargers.

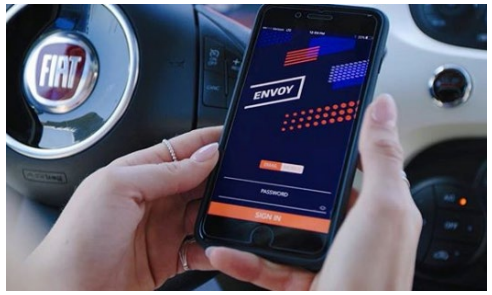
Program Successes

- Contribute to California's network of public and shared private chargers
- Network of DC fast chargers along highway corridors in California
- Replicable EV-Ready Communities Blueprints
- Streamlined Block Grants through CALeVIP



Map Source: Clean Transportation Program Investment Map

Projects Benefiting Disadvantaged, and Low-Income Communities



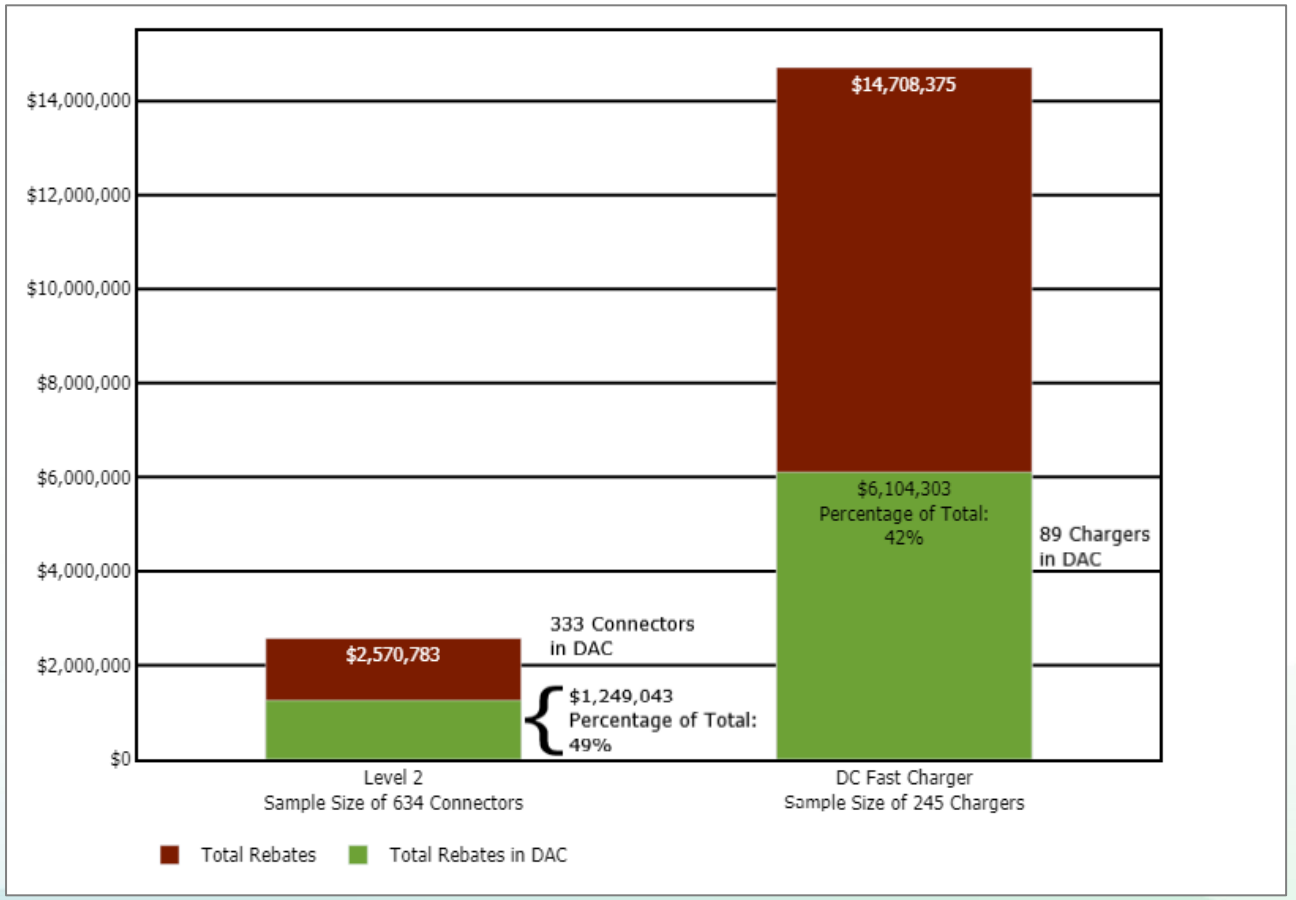
BOLT TO COLLEGE
CATCH A RIDE TO SCHOOL & SAVE

Innovative e-Mobility Projects

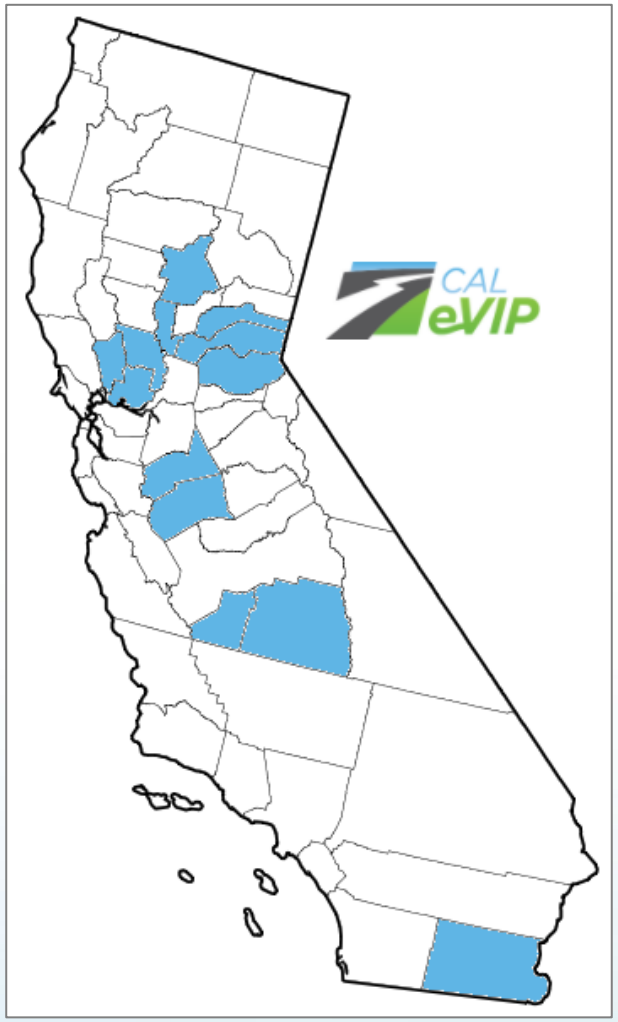
Clean Mobility Options

Partnering with California Air Resources Board to expand Clean Mobility Options program eligibility and funding.

CALeVIP Rebate Funding Issued to Projects in Disadvantaged Communities



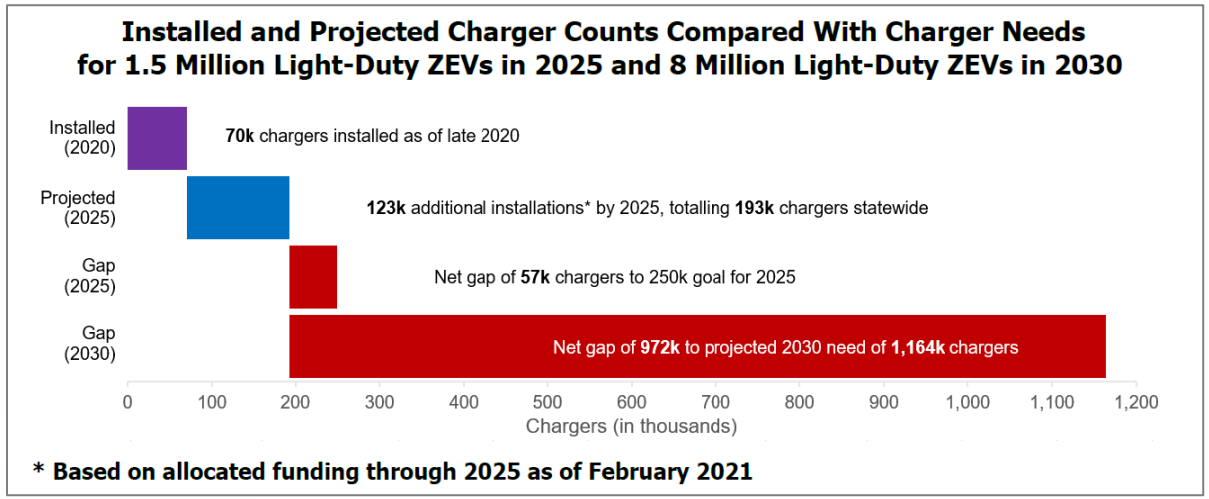
CALeVIP Inland Counties Incentive Project



- Minimum of 35% funding in each county for low-income and/or disadvantaged communities.
- Minimum of 25% of funding is required to be invested in unincorporated communities in certain counties.

Near-Term Future Funding Plans

- Continue to fill charger gap to meet state infrastructure goals.
- Focus on providing benefits for low-income, disadvantaged, and rural communities.
- Future solicitations for electric vehicle charging targeting:
  - Multi-family housing residents
  - Increased charging access in rural communities



Source: Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment available at https://efiling.energy.ca.gov/getdocument.aspx?tn=238853

California Energy Commission

Hydrogen Refueling Infrastructure

Jane Berner

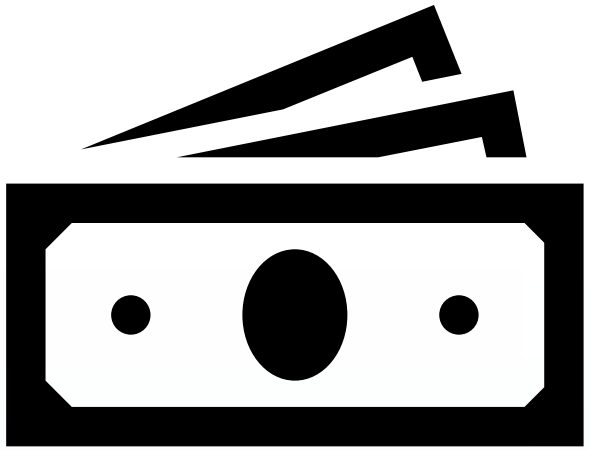
July 30, 2021

California Goals

- Assembly Bill 8 (Perea, 2013):
  - 100 publicly available stations
  - $20 million from Clean Transportation Program annually
- Governor Edmund G. Brown Jr.'s Executive Order B-48-18
  - 200 hydrogen stations by 2025
  - 5 million zero-emission vehicles by 2030

Picture of a station from FirstElement Fuel

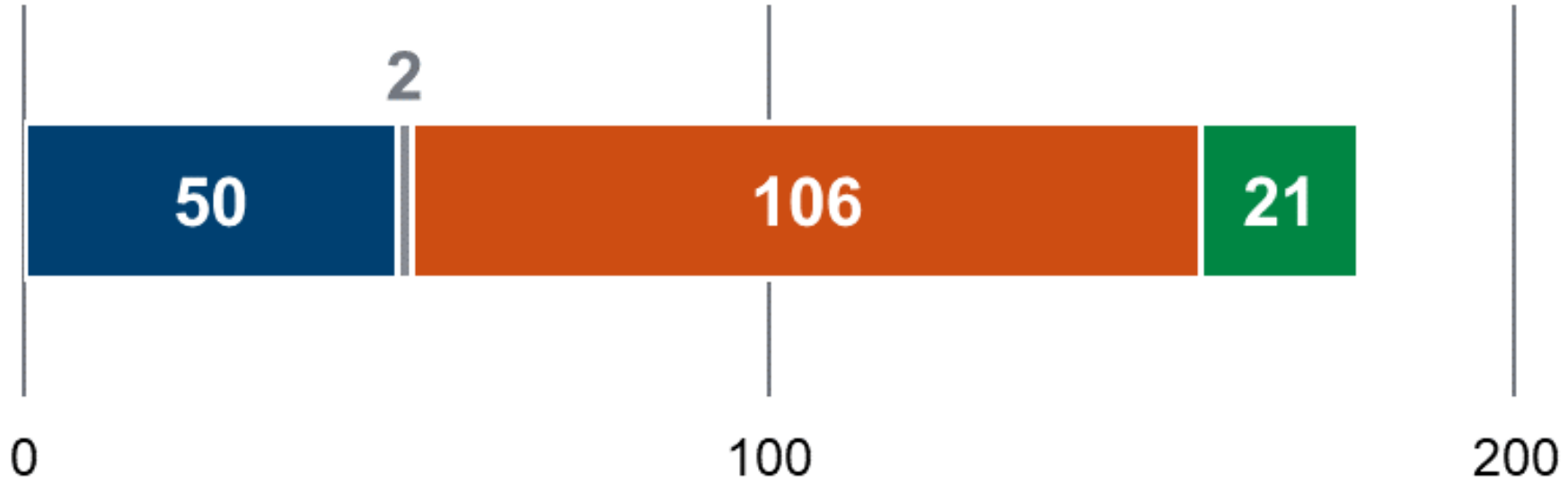
Public Hydrogen Refueling Station Investment



Clean Transportation Program	Investment Amount	Grant Recipient Match Amount
Cumulative Investment	$166 million	$92 million
Future Investment	$86 million	$99 million
Total	**$252 million**	**$191 million**

Note: The future investment amount is subject to future Clean Transportation Program appropriations and Investment Plan allocations.

H2 Retail Station Development



- Open Retail with Public Co-Funding
- Open Retail with Private Funding
- Planned with Public Co-Funding
- Planned with Private Funding

Total Stations: 179
Executive Order Goal: 200
Gap from Goal: 21

Equity of Station Locations

Metric	Disadvantaged Communities	All California
Population within a 6-Minute Drive of a Planned Station*	34%	34%
Population within a 15-Minute Drive of a Planned Station*	67%	62%

*110 of the 179 planned stations have known locations for inclusion in this analysis.
Source: California Air Resources Board

Trends

- Reduced station cost
- More fueling capacity

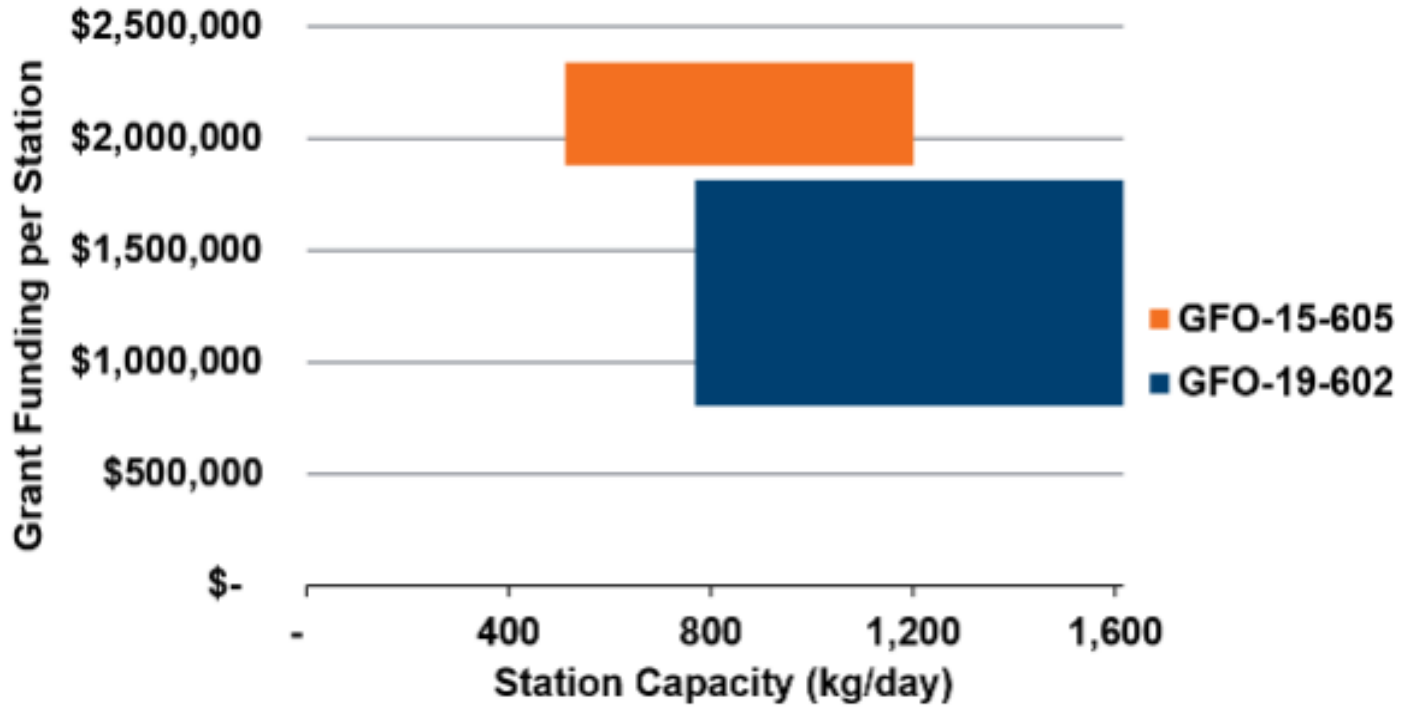
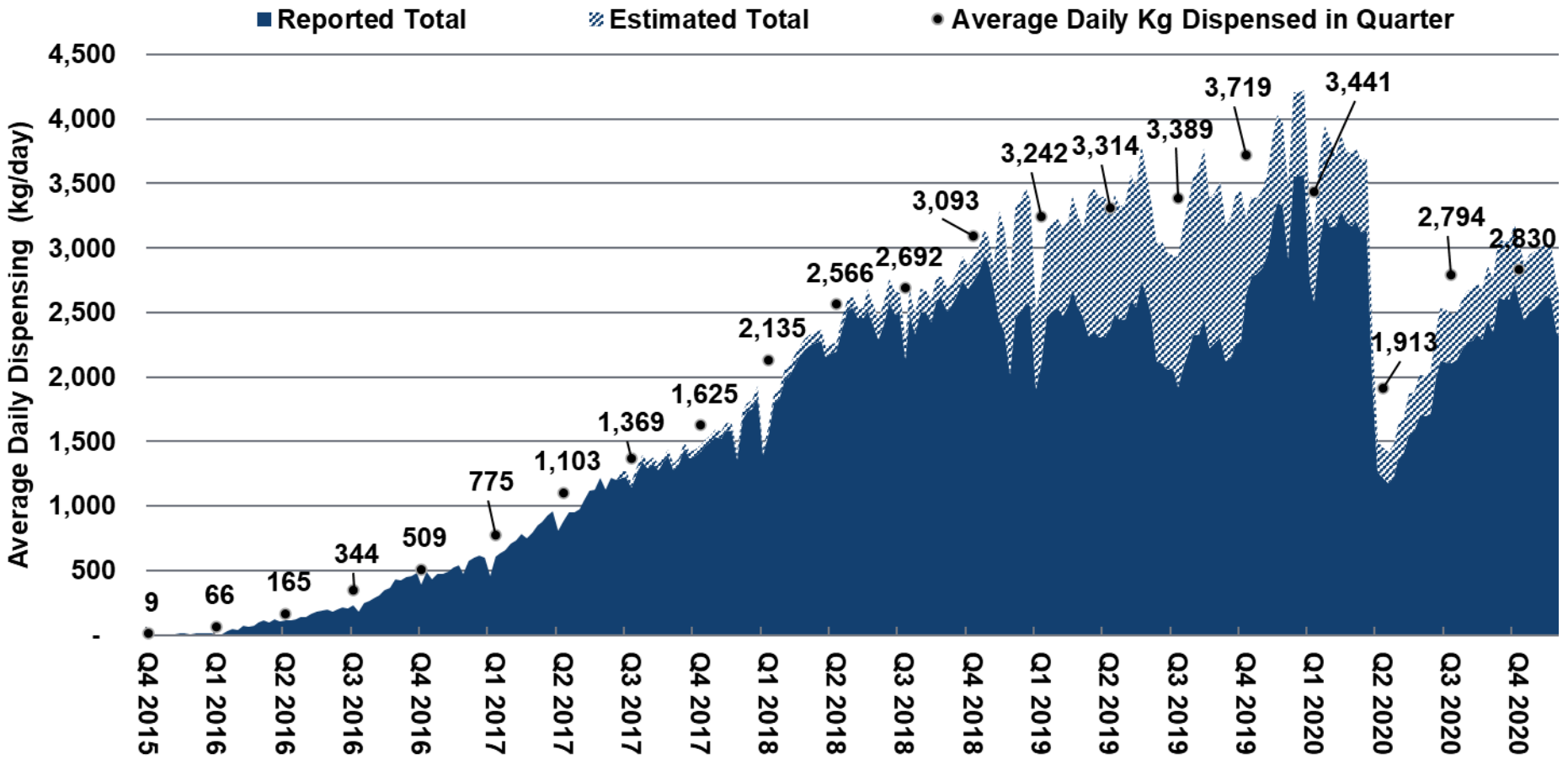


Image Credit: Air Products and Chemicals, Inc.

Image Credit: Iwatani Corporation of America

Hydrogen Fuel Dispensed 2015-2020



Renewable Hydrogen Requirements:

33.3%
Senate Bill 1505 (Lowenthal, 2006)

40%
Low Carbon Fuel Standard Hydrogen Refueling Infrastructure Program

Future Station Network

Today

52 Stations:

~23,000 kg/day Capacity

~10,000 Light-Duty FCEVs

~2026

179 Stations:

~160,000 kg/day Capacity

Potential:

~230,000 Light-Duty FCEVs

Contact: Jane Berner

jane.berner@energy.ca.gov

Thank You!

California Energy Commission

Freight and Transit Unit

Marc Perry

July 30, 2021

Freight Transportation Sector

Freight Transportation Sector

- 26% of GHG Emissions
- 80% NOx emissions
- 90% Diesel Particulate Matter

Pollution Health Hazards

- Asthma
- Cancer
- Emergency Room Visits
- Hospitalization

California Goals

Regulations that advance zero-emission medium and heavy-duty vehicles and fuels.

Laws/Regulation	Content Summary
Innovative Clean Transit Regulation	• 2029: 100 percent of new buses will be zero-emission • 2040: 100 percent of operating buses will be zero-emission
Advanced Clean Trucks Regulation	• 2024-2045: Increasing percentage of zero-emission truck sales • 2045: 100 percent zero-emission truck sales
Executive Order N-79-20	• 100 percent of new drayage truck sales be zero-emission by 2035 • 100 percent of medium- and heavy-duty trucks and buses be zero-emission by 2045, where feasible

Historical Clean Transportation Program Investments

Funded Activity	FY 2014-17 Vehicles and Infrastructure	FY 2017-2020 Infrastructure
On-Road (Not Port)	• Natural Gas Fueling Infrastructure • Plug-In Hybrid Electric Drayage Trucks • Battery Electric Drayage Trucks and Buses • Fuel Cell Drayage Trucks and Buses	• Conductive AC and DC Charging • Inductive Charging • Hydrogen Fueling Stations (including renewable hydrogen) • Battery Energy Storage Systems
Off-Road (Port)	• Electric Rubber Tire Gantries • Battery Electric Container Handlers • Battery Electric Lift Trucks	• Conductive AC and DC Charging • Inductive Charging • Hydrogen Fueling Stations (including renewable hydrogen) • Battery Energy Storage Systems

Evolution of Freight & Transit

Alternative Fuel Vehicles and Infrastructure	• Zero-Emission Vehicles
Zero-Emission Vehicles	• Zero-Emission Infrastructure
Demonstration Projects	• Pilot and Deployment Projects

Highlighted Successes

TransPower's "Heavy-Duty Electric Yard Tractor" (ARV-14-054)

Highlighted Successes

Port of Long Beach's "Zero-Emissions Terminal Equipment Transitions Project" (ARV-16-024)

Highlighted Successes

City of Gardena's "Zero-Emission Bus Repower" (ARV-15-006)

Recently Awarded Projects

Award Totals for Blueprints for MD/HD ZEV Infrastructure (GFO-20-601)

Public Agencies	Private Enterprise	Non-Profit Corporation
$3,799,722	**$1,000,000**	**$799,054**

Recently Awarded Projects

Award Totals for Blueprints for MD/HD ZEV Infrastructure (GFO-20-601)

Anaheim Transportation Network	ElectrifyAnaheim: ATN Microgrid Project	$5,000,000
Los Angeles Department of Transportation	Washington Yard Microgrid Project	$6,000,000
SunLine Transit	Develop and Deploy Liquid Hydrogen Refueling Infrastructure	$4,986,250
North County Transit District	Next Generation Hydrogen Fueling Infrastructure Project	$4,013,750

Recently Awarded Projects

Block Grant for MD/HD Zero-Emission Refueling Incentive Projects (GFO-20-603)

CALSTART, Inc.	EnergIIZE Commercial Vehicles, the nation's first incentive project for zero-emission truck and bus charging/fueling infrastructure.	$17,000,000

Recently Awarded Projects

Hydrogen Fuel Cell Demonstrations in Rail and Marine Applications at Ports (H2RAM) (GFO-20-604)

Equilon Enterprises, LLC dba Shell Oil Products US	First multi-modal hydrogen refueling station in California; will serve locomotives and on-road heavy-duty vehicles	$4,000,000

Recently Awarded Projects

BESTFIT Innovative Charging Solutions (GFO-20-605)

Momentum Dynamics Corporation	Innovative Wireless Charging for Public Transit Project	$1,700,000
WattEV, Inc.	21st Century Truck Stop - 1st Public MD/HD Charging Station in California	$1,000,000

Recently Awarded Projects

Zero-Emission Drayage Truck and Infrastructure Pilot Project (GFO-20-606)

South Coast Air Quality Management District	California Joint Electric Truck Scaling Initiative	$10,964,955
The Center for Transportation and the Environment	NorCAL ZERO	$9,185,045

Contact: Marc Perry

marc.perry@energy.ca.gov

Thank You!

California Energy Commission

Alternative Fuel Production & Supply Category (Biofuels Production)

Hieu Nguyen, Energy Commission Specialist, Fuels and Transportation Division

July 30, 2021

Fuel Production Projects

Crimson Renewable Energy LP

CR&R, Inc.

Altex Technologies Corporation

Advanced Fuel Production Awards

Fuel Type	Awards Made	Funds Awarded (in millions)
Gasoline Substitutes	15	$32
Diesel Substitutes	25	$75
Biomethane	30	$87
Renewable Hydrogen	2	$8
Total	72	$202

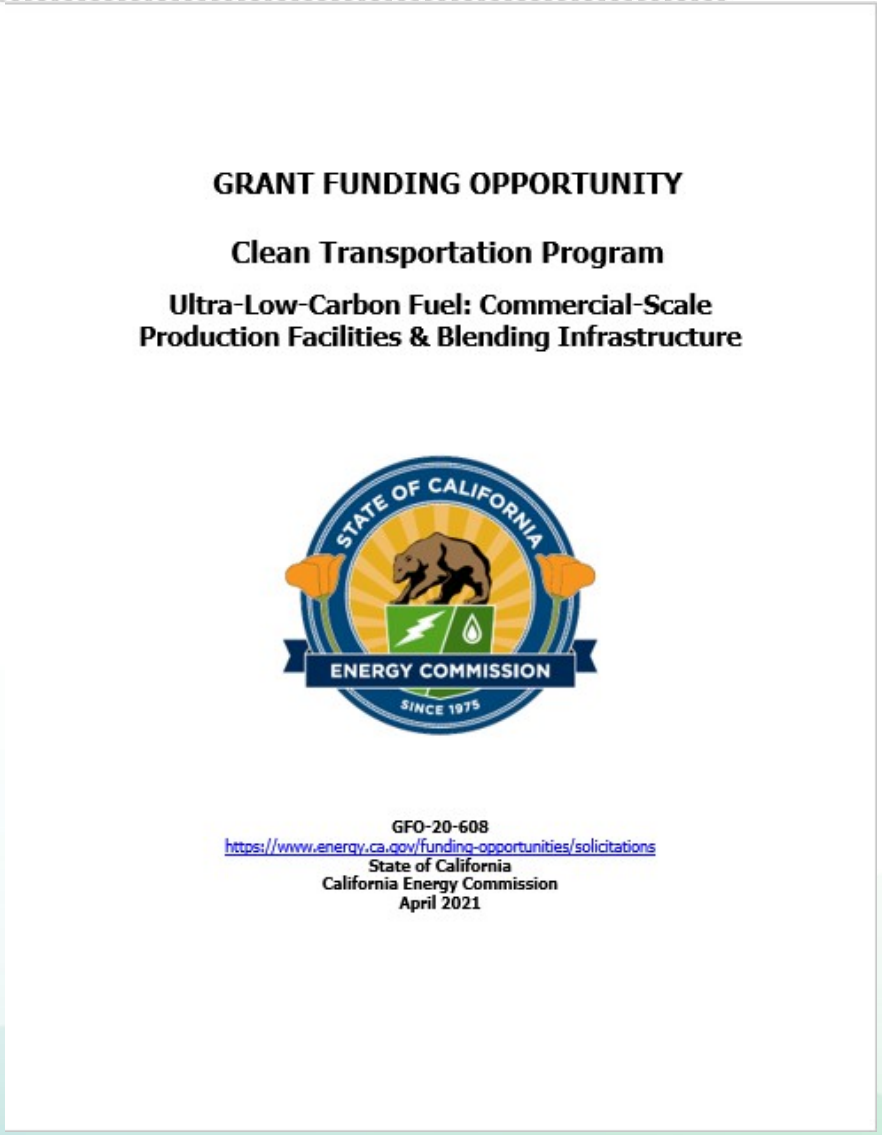
Program Evolution

- Transformative technologies (Lab-Scale or Early Stage)
  - Advancements to increase yield, productivity, or cost effectiveness
- Demonstration / Pilot-Scale
- Community scale facilities
  - Matching production with locally available feedstock supply
  - Addressing complimentary state goals (dairy management through methane reduction, waste diversion and short-lived climate pollutants)
- Sustainability
  - Preserve / enhance natural resources (water, energy, land, etc.)
  - Forest biomass as feedstock
- Ultra-Low-Carbon Fuels: =< 30g CO2e/MJ
- Renewable hydrogen
- Ultra-Low-Carbon Fuel Blending

Current Biofuels Funding

GFO-20-609: Renewable Hydrogen Transportation Fuel Production

- $7 million available in funding.
  - Released April 2021
- Focus on fuel production: renewable hydrogen.
  - 1,000 kg/day
  - 100% renewable
- NOPA
  - November 2021


GRANT FUNDING OPPORTUNITY

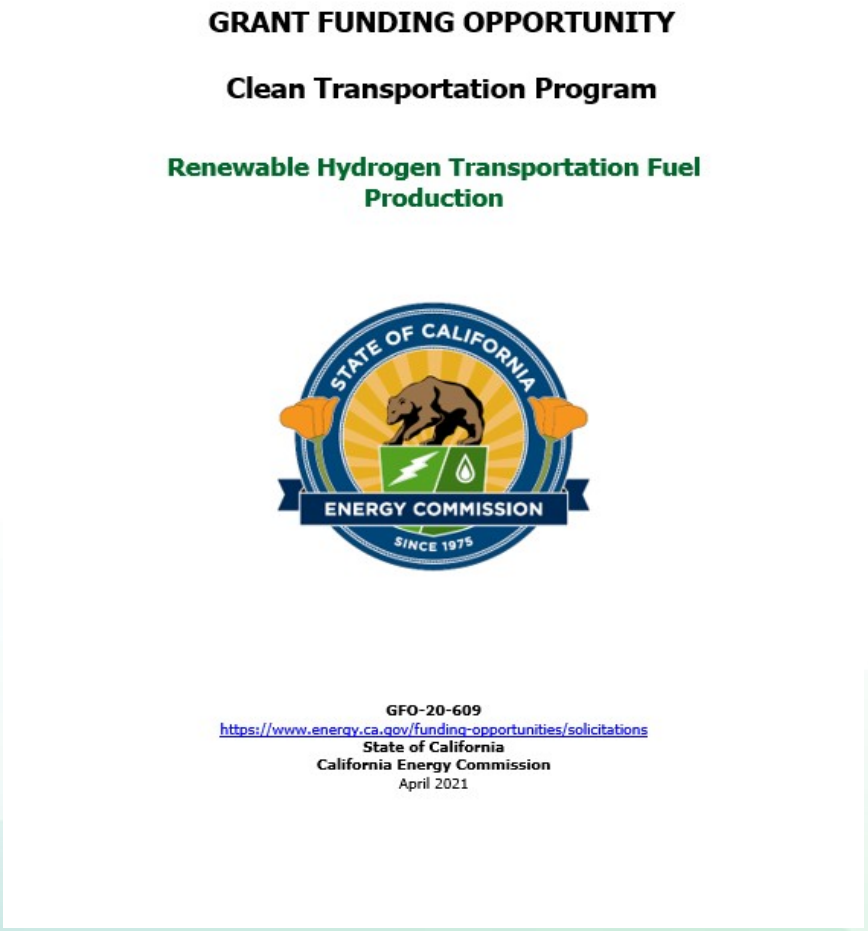
Clean Transportation Program

Ultra-Low-Carbon Fuel: Commercial-Scale Production Facilities & Blending Infrastructure

GFO-20-608
https://www.energy.ca.gov/funding-opportunities/solicitations
State of California
California Energy Commission
April 2021

GFO-20-608: Ultra-Low-Carbon Fuel: Commercial-Scale Production Facilities & Blending Infrastructure

- $8 million available in funding.
  - Released April 2021
- Focus on fuel production: ultra-low-carbon fuels production.
  - $6 million
- Focus on blending infrastructure for biodiesel and renewable diesel.
  - $2 million
- 30g CO2e/MJ
- NOPA
  - November 2021



Project Highlights

CR&R, Incorporated.

Project Title: CR&R MSW to Biomethane Project

GHG Reductions: 46,295 MTCO2e

Facility Type: Bioenergy Facility

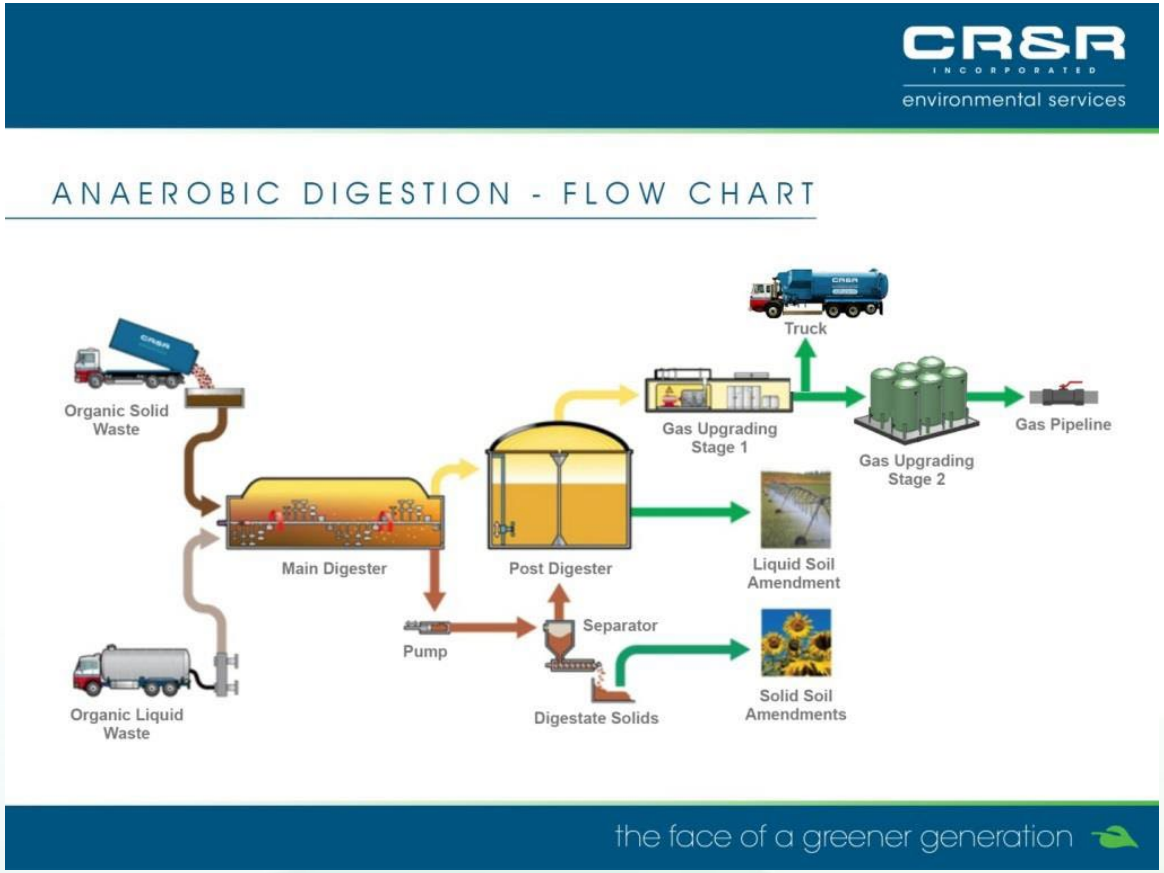
Facility Location: Perris, CA

Facility Info:

- *Feedstock*: MSW Organics
- *Carbon Intensity*: -25.5 gCO2e/MJ.

Project Description:

- CR&R is a large waste and recycling firm serving the greater Southern California region, managing approximately 1.5 million tons of solid waste per year.
- Separated biodegradable materials of the waste stream are pumped into a two-stage anaerobic digestion system to produce biogas.
- Upgraded natural gas is injected in the natural gas pipeline (the 1st in California)



Rialto Bioenergy Facility

Project Title: Rialto Bioenergy Facility: Expanded Renewable Natural Gas Refueling

GHG Reductions: 186,543 MTCO2e

Facility Type: Bioenergy Facility

Facility Location: Bloomington, CA

Facility Info:

- *Feedstock*: MSW Organics
- *Carbon Intensity*: -187 gCO2e/MJ.

Phase 3 (current) will effectively double the RNG production capacity of the Phase 1+2 RBF
Rialto Bioenergy Facility

Project Description:

- Three-phase construction of a new biogas upgrading facility, which will process an additional 300 tons per day of organic waste, resulting in a total of 4.8 million DGE per year of new renewable natural gas for transportation fuel for Waste Management refuse vehicles

Five Points Pipeline Project

Project Title: Five Points Pipeline Cluster Project

GHG Reductions: 94,145 MTCO2e

Facility Type: Biogas to RNG Conditioning Facility

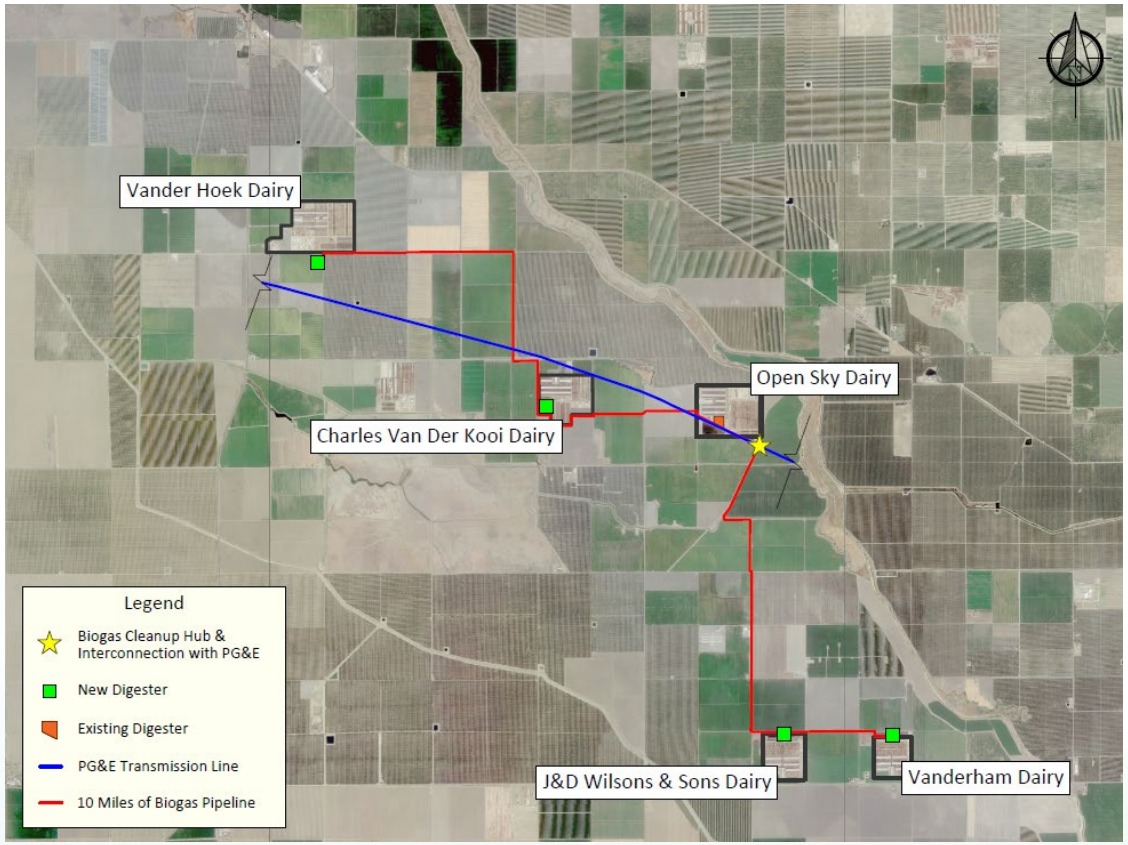
Location: Central Valley

Facility Info:

- *Feedstock*: Dairy Manure
- Dairy Cluster Project
- *Carbon Intensity*: -174.04 gCO2e/MJ.

Project Description:

- Construction of a new facility for the cleanup and upgrade of dairy biogas from participating dairies in the surrounding areas. The resulting project will produce over 2.5 million diesel gallon equivalents (DGE) per year of renewable natural gas transportation fuel.



Five Points Pipeline Cluster Project - Map of Participating Dairies and Pipeline Route

Thank You!

Biofuels@energy.ca.gov
Hieu.Nguyen@energy.ca.gov

Manufacturing
July 30 IEPR Presentation

Presenters: Jonathan Bobadilla, ECS

Date: 07/30/2021

Manufacturing Investments

- Five Manufacturing Solicitations
- 27 Clean Transportation Program Funded Projects
- $55.4 Million Awards
- Products include:
  - transit buses
  - electric vehicle supply equipment
  - electric motorcycles
  - powertrains, battery/control systems
  - More

Clean Transportation Program Manufacturing Awards

Solicitation#	Awards ($ in millions)	Project Partners
PON-08-010	$ 0.9	Envia
PON-09-605	$21.3	Quallion, Electric Vehicles International, Wrightspeed
PON-11-604	$14.3	Zero Motorcycles, Motiv Power Systems, Wrightspeed
PON-14-604	$ 9.9	Proterra, Efficient Drivetrains (Cummins)
GFO-18-605	$ 8.9	ChargePoint, TransPower, FreeWire
Total	**$55.4**	

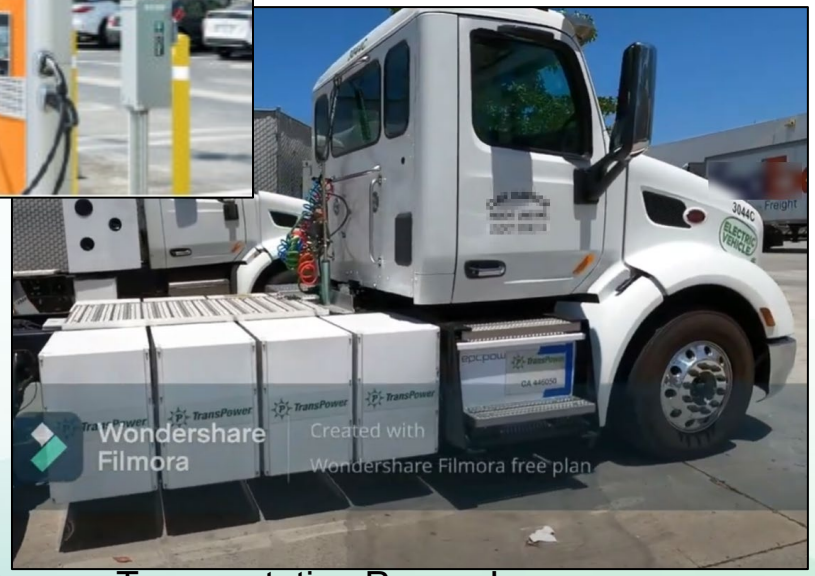
Source: CEC staff

ZEV Supply Chain Resilience

- Essential & Safe Businesses
  - No manufacturing floor shut-downs reported
- Continuous Improvement
- Capacity Growth
- Continuity of Supply

Source: Proterra, Inc.

Source: ChargePoint, Inc.



Source: Transportation Power, Inc.

Manufacturing Jobs

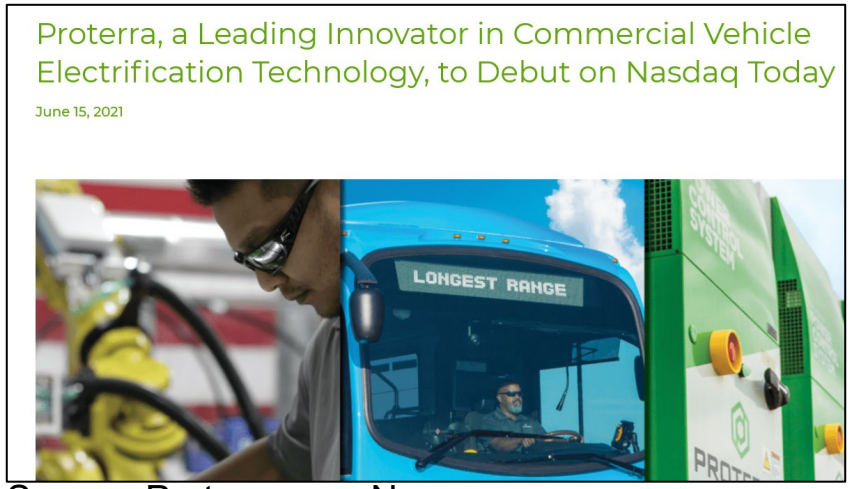
- Minimizing Unemployment
  - ChargePoint preserved >40 California based jobs
- Jobs Growth
  - TransPower & Proterra in-state workforce growth
- Workforce Partnerships

Source: ChargePoint, Inc.

Source: Proterra, Inc.

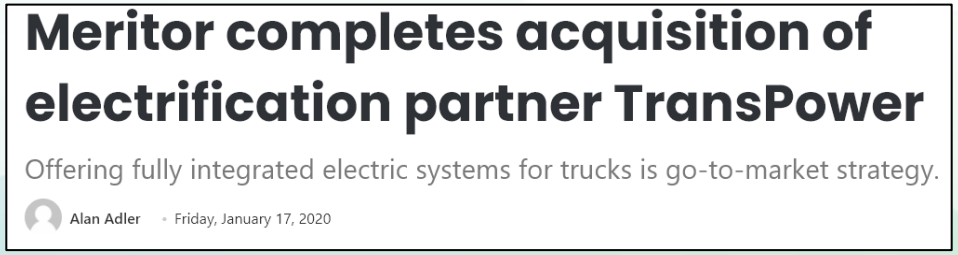
Economic Growth Engine

- Going Public & Market Cap growth
  - ChargePoint
  - Proterra
- Acquisitions
  - TransPower – Meritor
  - EDI – Cummins Electrified
- Partnerships
  - Transit
  - Interagency Coordination



Source: Proterra.com Newsroom

Source: ChargePoint.com News and Updates



Source: Alan Adler, Freightwaves.com

Thank You!

Contact: Jonathan.Bobadilla@energy.ca.gov

California Energy Commission

Larry Rillera

Fuels and Transportation Division

July 30, 2021

Workforce Portfolio: Foundation

Early Policies, Trends, and Investments

- Green Collar Jobs Initiative
- Alternative Fuels and Technologies
- Capacity Building
- Few Deployments

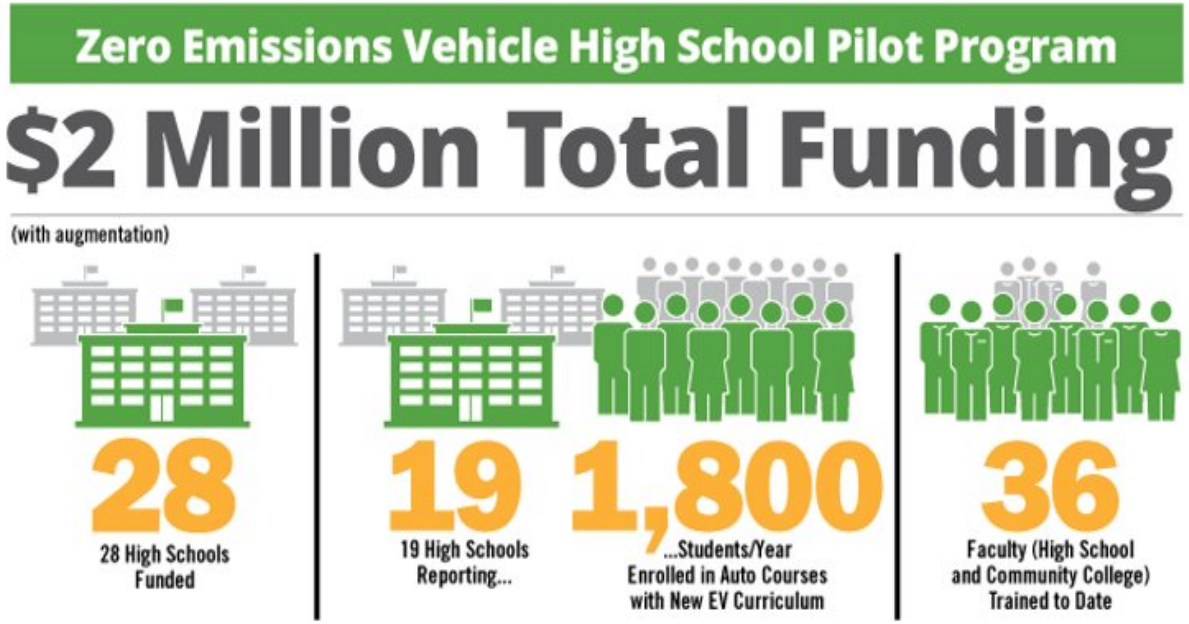
Partnerships and Projects

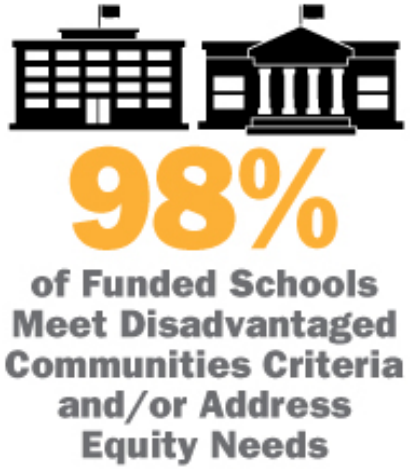
- Employment Training Panel
- Employment Development Department
- Community Colleges
- Workforce Development Board
- Transit Training Apprenticeship

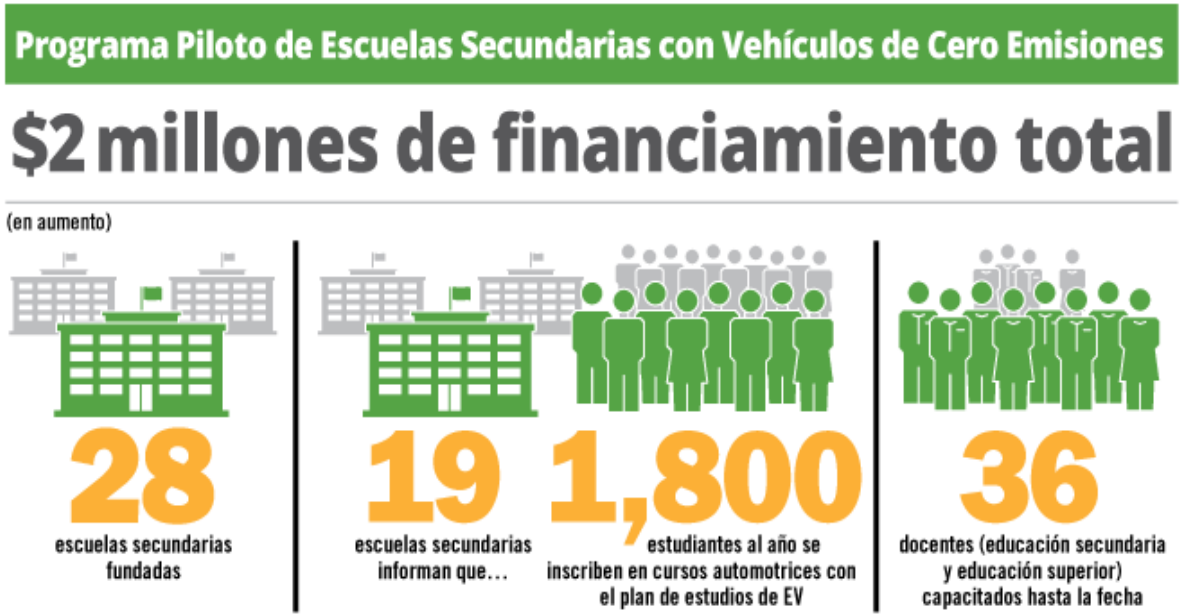
Workforce Portfolio: Current

- Electric School Bus Training Project ($1M)
- ZEV College Training Project ($4.2M)
- ZEV High School Pilot Project ($3.5M)
- Sustainable Freight Workforce Pilot Project ($0.2M)
- ZEV Drayage Truck and Infrastructure Pilot ($0.2M)

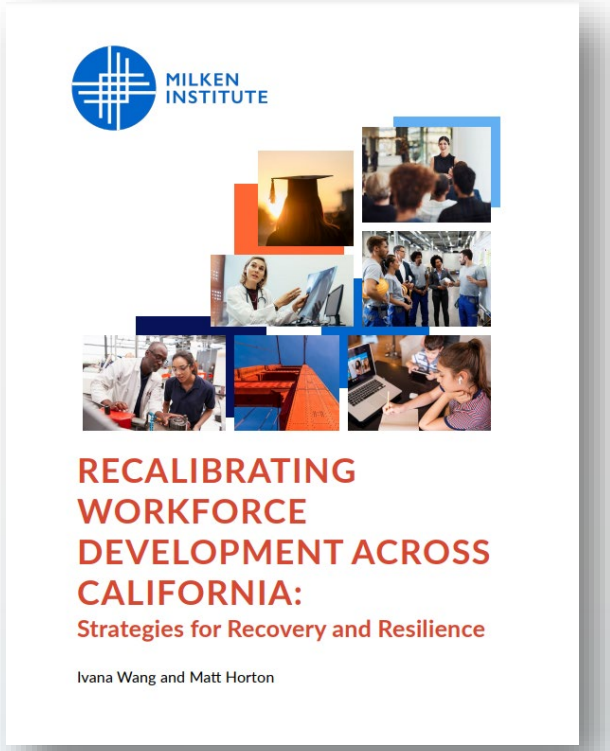
Success!

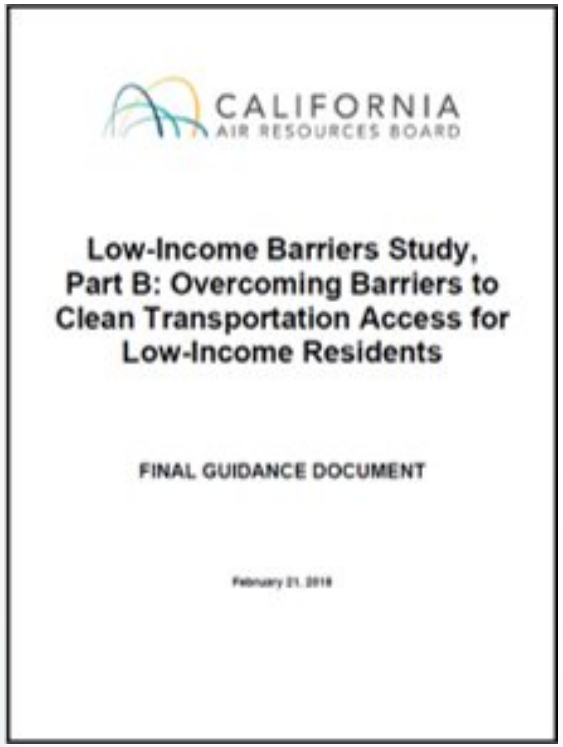

Zero Emissions Vehicle High School Pilot Program
$2 Million Total Funding
(with augmentation)
28
28 High Schools Funded
19
19 High Schools Reporting...
1,800
...Students/Year Enrolled in Auto Courses with New EV Curriculum
36
Faculty (High School and Community College) Trained to Date

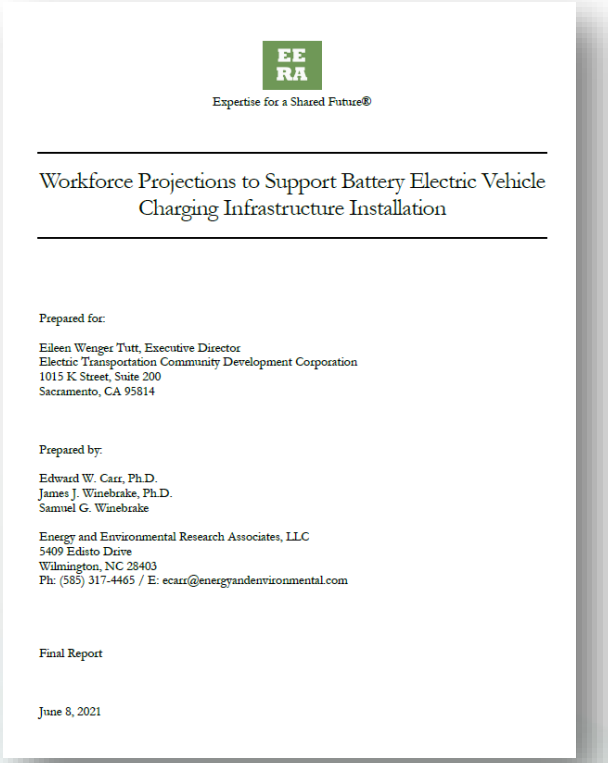

98%
of Funded Schools Meet Disadvantaged Communities Criteria and/or Address Equity Needs


Programa Piloto de Escuelas Secundarias con Vehículos de Cero Emisiones
$2 millones de financiamiento total
(en aumento)
28
escuelas secundarias fundadas
19
escuelas secundarias informan que...
1,800
estudiantes al año se inscriben en cursos automotrices con el plan de estudios de EV
36
docentes (educación secundaria y educación superior) capacitados hasta la fecha

Drivers: Policies, Market, Funding



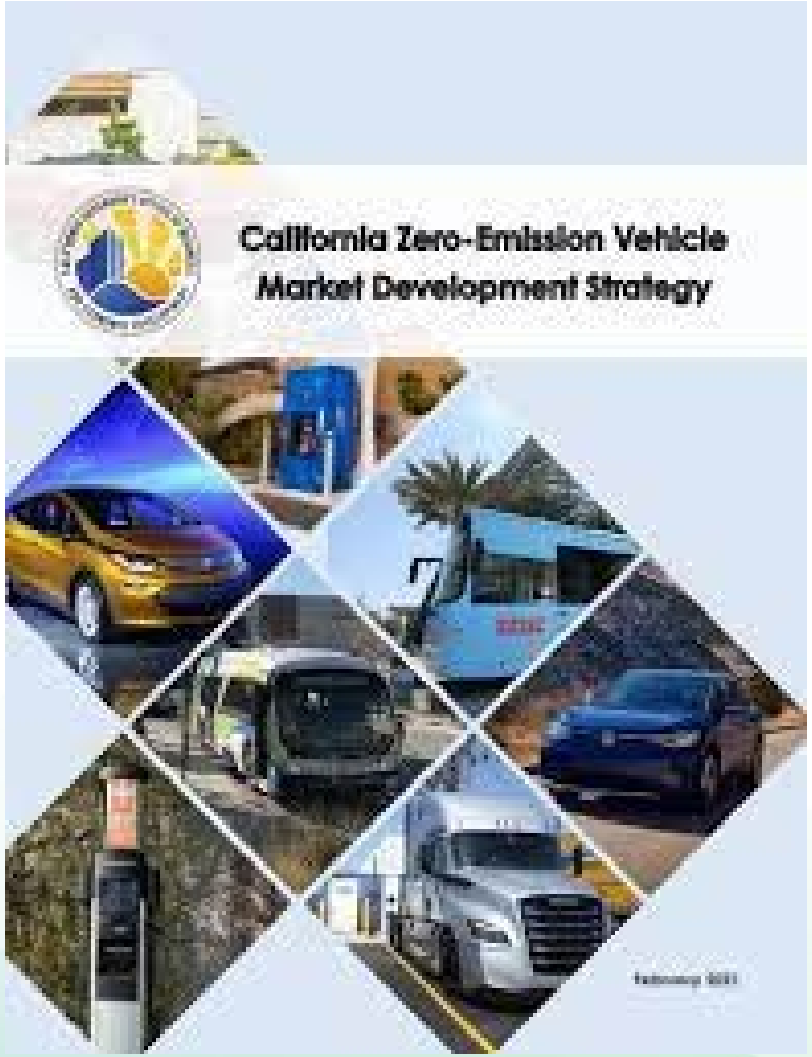




The Workforce Road Ahead

IDEAL ZEV Workforce Pilot

- $6.8 M Project
- CARB Partnership
- Training and workforce development for ZEV markets/deployments
- Focus on community-based and frontline communities
- Employment
- Solicitation release anticipated in August



Thank You!

Larry Rillera

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