# DOCKETED

<table>
<thead>
<tr>
<th><strong>Docket Number:</strong></th>
<th>17-ALT-01</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Title:</strong></td>
<td>2018-2019 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program</td>
</tr>
<tr>
<td><strong>TN #:</strong></td>
<td>221698</td>
</tr>
<tr>
<td><strong>Document Title:</strong></td>
<td>Staff Presentations on ARFVTP Activities</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Staff presentations on funding categories from the November 7, 2017 ARFVTP Advisory Committee meeting and public workshop.</td>
</tr>
<tr>
<td><strong>Filer:</strong></td>
<td>Jacob Orenberg</td>
</tr>
<tr>
<td><strong>Organization:</strong></td>
<td>California Energy Commission</td>
</tr>
<tr>
<td><strong>Submitter Role:</strong></td>
<td>Commission Staff</td>
</tr>
<tr>
<td><strong>Submission Date:</strong></td>
<td>11/8/2017 10:08:27 AM</td>
</tr>
<tr>
<td><strong>Docketed Date:</strong></td>
<td>11/8/2017</td>
</tr>
</tbody>
</table>
Low-Carbon Fuel Production and Supply

Bill Kinney
Biofuels Unit
Fuels and Transportation Division
California Energy Commission

November 7, 2017
Biofuels Project Funding

(As of 10/31/2017)

**ARFVTP Biofuels Production Awards**

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Awards Made</th>
<th>Funds Awarded (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline Substitutes</td>
<td>15</td>
<td>$32</td>
</tr>
<tr>
<td>Diesel Substitutes</td>
<td>25</td>
<td>$75</td>
</tr>
<tr>
<td>Biomethane</td>
<td>20</td>
<td>$61</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>$168</strong></td>
</tr>
</tbody>
</table>

Crimson Renewable Energy LP

CR&Rs, Inc.

Altex Technologies Corporation
Biofuels Project Benefits
(as of 10/31/2017)

Production Capacity
- 135.7 million gallons per year funded capacity (diesel gallon equivalents)

GHG Displaced
- 1,300,000 Metric Tons CO2e/year
- 24.1 gCO2e/MJ volume weighted average carbon intensity

Economic Benefits
- 572 long-term / 1,589 short-term jobs
- $105.8 million in annual tax benefits
- $84.4 million (80%) in DACs

Disadvantaged Communities
- Over $500 million public and private investment statewide
- $390 million (78%) in disadvantaged communities
Opportunities for Meeting California’s Climate Change Goals

Large commercial facilities
- High volumes of low-carbon fuels

Community scale facilities
- Matching production with locally available feedstock supply
- Addressing complementary state goals (such as short lived climate pollutant reduction of SB 1383)

Transformative technologies
- Advancements to increase yield, productivity, or cost effectiveness, and hurdle blend wall
- Sustainability and new feedstock utilization, such as woody biomass
AltAir Fuels, LLC

40+ million gallons/year

Supports 200 direct and indirect jobs

Renewable diesel and jet fuel
Community Scale Facilities

California Bioenergy LLC
Transformative Technologies and New Feedstocks

Tracy Renewable Energy

G4 Insights
Emerging Opportunities for Advancement of Biofuels

- Renewable (drop-in) diesel & gasoline, woody biomass conversion, other renewable fuel pathways, and biocrude
- Approximately $17 million in FY 17-18 funding available
- Demonstration facilities – early 2018
  Commercial facilities – late 2018
Low-Carbon Fuel Production and Supply

$25 million allocation (proposed)
FY 2018-2019
Electric Vehicle Charging Infrastructure

Brian Fauble
Electric Vehicles Unit
Fuels and Transportation Division
California Energy Commission

November 7, 2017
History of Energy Commission
Electric Vehicle Charging Infrastructure Deployment

- Partnering with the American Recovery and Reinvestment Act
- Planning, Deploying EV Charging Infrastructure and Upgrades to Legacy Chargers
- Increasing the Numbers and Meeting Specific Needs for Charging
- Allowing Border-to-Border Travel on California’s Major Highway Corridors
- Block Grant for Targeted EV Charging Incentive Projects

2010 2012 2014 2015-2016 2017
Electric Vehicle Charging Infrastructure

ARFVTP Funding to Date: $80.1 million

<table>
<thead>
<tr>
<th>Public Sites</th>
<th>Private Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,297</td>
<td>4,088</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Public Connectors</th>
<th>Private Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,280</td>
<td>4,403</td>
</tr>
</tbody>
</table>

**AFDC Electric Station Locator**

<table>
<thead>
<tr>
<th>Charging Sites/ Electric Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,053</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Charging Connectors/ Outlets</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,251</td>
</tr>
</tbody>
</table>

CHARGING STATION
A device that provides electrical power to charge an EV battery.

CHARGING CONNECTOR (charging outlet)
A part that connects the charging station to the vehicle.

CHARGING SITE (electric station)
A physical address with EV charging infrastructure.
Cumulative Electric Vehicle Sales

Compared to national sales of over 700,000 vehicles, California accounts for about 46% of the nationwide total.
DC Fast Charging Corridors

- 2015-2016
- 120 Sites
- 187 DC Fast Chargers
- 129 Level 2 Chargers

Source: Energy Commission Staff Analysis, PlugShare.com, US Department of Energy Alternative Fuels Data Center
California EV Infrastructure Project (CALeVIP)

- Implemented by the Center for Sustainable Energy
- Geographically targeted incentive projects to install EV infrastructure for future charging needs
- $15.25 million currently funded, up to $200 million
- Fresno County Incentive Project expected to launch in December 2017
  - $4 million total funding available
  - Rebates for Level 2 charging stations
  - Public, private and MUD sites
Innovative Mobility Services With Zero-Emission Vehicles

• Purpose of the solicitation: Demonstrating innovative mobility services among disadvantaged communities using zero-emission vehicles.

• Total funding: $3 million

• Four projects awarded funding:
  – Envoy: Two electric car sharing awards for affordable housing, Bay Area and North Central Valley (Yuba City to Los Banos)
  – CALSTART: Electric ride-hailing for college students in Kerman to commute to Fresno City College
  – StratosFuel: Car sharing using FCEVs in Riverside and Ontario areas
Data Collection and Analysis

- Strategically plan for additional stations and funding opportunities that will support the goal of 1.5 million vehicles on California roadways by 2025
- Track impact of electric vehicle charging station investments
- Electric Vehicle Infrastructure Projections or EVI-PRO

EVI-PRO Conceptual Diagram

- California Household Travel Survey (2012)
- Regional Housing Stock (ACS, 2014)
- PEV Battery Limitation
- Regional PEV Adoption Projections: 2016-2025 (NREL's ADOPT Model)
- PEV Travel & Charging Simulations
- Electricity Pricing Feed (by Destination Type and Time of Day)
- Regional EVSE Needs (by Power Level and by Location Type)
- Hourly PEV Charging Sessions and Electrical Load Profiles

Input Datasets

Output Datasets
Continued Infrastructure Support for PEVs

- Monitor vehicle markets and consumer response
- Evaluate electric charging requirements and support infrastructure demands through focused funding efforts
- Work with community based programs in underserved areas
- Work cooperatively with utilities, regional readiness planning coalitions, air districts, and OEMs on strategic placement of charging infrastructure, deployment of adequate service to support chargers, and support zero-emission vehicle deployment.
Electric Charging Infrastructure

$20 million allocation (proposed)
FY 2018-2019
Hydrogen Refueling Infrastructure

Jane Berner
Hydrogen Unit
Fuels and Transportation Division
California Energy Commission

November 7, 2017
Hydrogen Refueling Infrastructure Overview

• Establishing a hydrogen refueling network for the fuel cell electric vehicle (FCEV) market in California
• 60 hydrogen refueling stations funded so far, towards milestone of 100
• 12 are in disadvantaged communities
• The funded stations will support nearly 19,000 FCEVs
• 31 stations open today can support 8,500 FCEVs
• 2,699 FCEVs in California through September 2017
FCEV Makes and Models

No tailpipe emissions, 300+ mile EPA-rated range, refills in 5 minutes

Available Now:
- Honda Clarity Fuel Cell
- Toyota Mirai

Coming Soon:
- Mercedes GLC F-Cell
- Hyundai FE Fuel Cell
Hydrogen Refueling Network
Hydrogen Refueling Station in Fremont

- Open as of September 7, 2017
- Hydrogen dispenser is integrated under the station canopy
- 18th station to open from FirstElement Fuel
- 31st station to open in the state
Hydrogen Refueling Station in Torrance

On October 9, 2017, Commissioner Janea Scott attended a celebration of the upgraded Torrance station, which was the 30th station to open in California and is Shell’s first retail hydrogen station in the U.S. This event was scheduled to follow National Hydrogen and Fuel Cell Day (October 8 or 10/08, reflecting hydrogen’s atomic weight of 1.008).
Hydrogen Refueling Infrastructure

$20 million allocation (proposed)
FY 2018-2019
Natural Gas Vehicles and Infrastructure

Sarah Williams
Medium- & Heavy-Duty Vehicles Unit
Fuels and Transportation Division
California Energy Commission

November 7, 2017
Natural Gas Fueling Infrastructure 2016-2017

GFO-16-602 released September 2016

Awarded $1.5 million for 3 projects

Awardees were Public K-12 school districts

Mix of private and public access stations

Provides fueling for over 61 vehicles (currently operating)

Allows for the expansion of additional CNG vehicles for fleets

Kings Canyon Unified School District
### GFO-16-602 Natural Gas Infrastructure Projects

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lemoore Union High School District</td>
<td>$500,000</td>
</tr>
<tr>
<td>Kings Canyon Unified School District</td>
<td>$500,000</td>
</tr>
<tr>
<td>Exeter Unified School District</td>
<td>$500,000</td>
</tr>
</tbody>
</table>
Natural Gas Fueling Infrastructure

Huntington Beach Union High School District

Kings Canyon Unified School District

Beaumont Unified School District
## Natural Gas Vehicle Deployment Portfolio

<table>
<thead>
<tr>
<th>Funding Agreement or Solicitation</th>
<th>Vehicle Type</th>
<th># of Vehicles</th>
<th>Funding (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Bernardino Associated Governments (ARV-09-001)</td>
<td>Heavy-duty trucks</td>
<td>202</td>
<td>$9.3</td>
</tr>
<tr>
<td>South Coast AQMD (ARV-09-002)</td>
<td>Heavy-duty drayage trucks</td>
<td>132</td>
<td>$5.1</td>
</tr>
<tr>
<td>Buydown Incentives (PON-10-604, PON-11-603, and PON-13-610)</td>
<td>Class 1 – 8</td>
<td>1,734</td>
<td>$29.6</td>
</tr>
<tr>
<td>Natural Gas Vehicle Incentive Project</td>
<td>Class 1 – 8</td>
<td>984 (est.)</td>
<td>$21.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>3,052</strong></td>
<td><strong>$65.8</strong></td>
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</tbody>
</table>
Natural Gas Vehicle Incentive Project (NGVIP)

Administered by the University of California, Irvine

Initiated in October of 2015

Offered incentives for the purchase of light-, medium-, and heavy-duty vehicles

Majority of incentives being utilized for class 8 waste disposal vehicle purchases

$21.8 million of ARFVTP funding has been added the NGVIP since its inception:

- $9.8 million has been utilized by applicants for completed vehicle purchases
- $10.6 million reserved for applicants to make future vehicle purchases with
- $1.4 million available for new reservations
Natural Gas Vehicle Incentives
Natural Gas Vehicles and Infrastructure

Merged with Advanced Freight and Fleet Technologies
FY 2018-2019
Advanced Freight and Fleet Technologies

Sam Lerman
Medium- & Heavy-Duty Vehicles Unit
Fuels and Transportation Division
California Energy Commission

November 7, 2017
## Summary of MD-HD Vehicle Demonstrations

<table>
<thead>
<tr>
<th>Vehicle/Technology Type</th>
<th># of Vehicles</th>
<th>ARFVTP Funding (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium-Duty Hybrids, PHEVs and BEVs</td>
<td>166</td>
<td>$16.4</td>
</tr>
<tr>
<td>Heavy-Duty Hybrids, PHEVs and BEVs</td>
<td>78</td>
<td>$48.6</td>
</tr>
<tr>
<td>Electric Buses</td>
<td>35</td>
<td>$14.6</td>
</tr>
<tr>
<td>Natural Gas Trucks</td>
<td>51</td>
<td>$19.1</td>
</tr>
<tr>
<td>Fuel Cell Trucks and Buses</td>
<td>13</td>
<td>$14.5</td>
</tr>
<tr>
<td>Vehicle-to-Grid</td>
<td>6</td>
<td>$7.7</td>
</tr>
<tr>
<td>Off-Road Hybrids</td>
<td>2</td>
<td>$4.5</td>
</tr>
<tr>
<td>E85 Hybrids</td>
<td>1</td>
<td>$2.7</td>
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<tr>
<td>Intelligent Transportation Systems</td>
<td>110</td>
<td>$2.0</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>462</strong></td>
<td><strong>$130.1</strong></td>
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Port Energy Collaborative

Focus Areas

- MD-HD Vehicle Demonstrations
- Electric Truck Charging Standardization
- Grid Resiliency
- Clean Energy and Efficiency Measures
- Lighting Enhancements

Container Terminal at Port of Oakland

Port of Los Angeles
Advanced Freight and Fleet Projects 2016-2017

GFO-16-604 released November 2016
Awarded $24.3 million for 3 projects
Focused on demonstrating technologies at California Seaports

28 drayage trucks (20 Low NOx, 7 PHEV, 1 BEV)
15 BEV yard trucks, 3 BEV top handlers, and
9 electric RTGs

Direct reduction of 3,900 MT CO2e, 22 tons NOx,
0.4 tons PM10 over term of projects.

Next GFO expected to be released later this year

$22 million with focus on freight infrastructure

Port of Long Beach
# GFO-16-604 Project Summaries

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Advanced Vehicles</th>
<th>Technology Vendors</th>
<th>Fleet Demonstrators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port of Los Angeles</td>
<td>• 2 BEV Top Handlers&lt;br&gt;• 3 BEV Yard Tractors</td>
<td>• Taylor Machine Works&lt;br&gt;• BYD</td>
<td>• Everport Terminal</td>
</tr>
<tr>
<td>Port of Long Beach</td>
<td>• 9 electric RTGs&lt;br&gt;• 12 BEV Yard Trucks&lt;br&gt;• 4 PHEV-LNG Drayage Trucks</td>
<td>• BYD&lt;br&gt;• Cavotec&lt;br&gt;• US Hybrid</td>
<td>• SSA Marine&lt;br&gt;• Long Beach Container Terminal&lt;br&gt;• Total Transportation Services</td>
</tr>
<tr>
<td>SCAQMD</td>
<td>• 20 Low Nox Drayage Trucks&lt;br&gt;• 3 PHEV-CNG Drayage Trucks&lt;br&gt;• 1 BEV Drayage Truck&lt;br&gt;• 1 BEV Top Handler</td>
<td>• Cummins Westport&lt;br&gt;• Efficient Drivetrains&lt;br&gt;• Hyster-Yale&lt;br&gt;• Wave</td>
<td>• APM Terminals&lt;br&gt;• Total Transportation Services&lt;br&gt;• Mayor Logistics&lt;br&gt;• Southern Counties Express&lt;br&gt;• Heavy Load Transfer&lt;br&gt;• Three Rivers Trucking</td>
</tr>
</tbody>
</table>
Advanced Freight and Fleet Demonstrations

- **Low NOx Natural Gas Engine**
- **Battery-Electric Drayage Truck**
- **Battery-Electric Yard Tractor**
- **Battery-Electric Reach Stacker**
- **Rubber-Tired Gantry Crane**
Advanced Freight and Fleet Technologies

$17.5 million allocation
(proposed)
FY 2018-2019
Manufacturing

Larry Rillera
Program Implementation Unit
Fuels and Transportation Division
California Energy Commission

November 7, 2017
Manufacturing Advanced Transportation Vehicle Technologies to Meet California’s Climate Change and Economic Development Goals

- Vertically Integrated Vehicles
- Powertrains
- Batteries
- Control Systems
- Refueling Infrastructure
- On-/Off-Road Technologies
## Manufacturing Investments

### Summary of Manufacturing Projects

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Projects</th>
<th>ARFVTP Funding (Millions)</th>
<th>Match Funding (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery Systems</td>
<td>4</td>
<td>$11.6</td>
<td>$16.6</td>
</tr>
<tr>
<td>Charging Equipment</td>
<td>1</td>
<td>$1.1</td>
<td>$1.1</td>
</tr>
<tr>
<td>Electric Cars</td>
<td>1</td>
<td>$0.2</td>
<td>$2.9</td>
</tr>
<tr>
<td>Electric Motorcycles</td>
<td>3</td>
<td>$3.7</td>
<td>$3.2</td>
</tr>
<tr>
<td>Electric Powertrains &amp; Platforms</td>
<td>4</td>
<td>$7.5</td>
<td>$12.0</td>
</tr>
<tr>
<td>Electric Trucks &amp; Buses</td>
<td>8</td>
<td>$22.4</td>
<td>$43.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>$46.5</strong></td>
<td><strong>$79.5</strong></td>
</tr>
</tbody>
</table>
Manufacturing Projects

$3.0 million to design and build a new manufacturing line in the City of Industry for battery-electric transit buses. Catalyst battery-electric bus has a nominal range of up to 350 miles.

$1.1 million to develop hardware, software, and improve manufacturing to communications processor for EV charging stations in the city of Campbell. Provides smart grid and peak load management functions to reduce GHG emissions by regulating the electricity demand load of the charger and to reduce the cost of charging at most economical time.
### ARFVTP Manufacturing in Context

#### Support from Other Incentives/Programs

<table>
<thead>
<tr>
<th>Support from Other Incentives/Programs</th>
<th>Percentage of ARFVTP Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales and Use Tax Exclusion for Manufacturers</td>
<td>24%</td>
</tr>
<tr>
<td>California Competes Tax Credit</td>
<td>5%</td>
</tr>
<tr>
<td>Workforce Development</td>
<td>20%</td>
</tr>
<tr>
<td>No Other Incentives Received</td>
<td>51%</td>
</tr>
</tbody>
</table>

#### Supporting for Deployment Incentives

<table>
<thead>
<tr>
<th>Supporting for Deployment Incentives</th>
<th>Percentage of ARFVTP Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project</td>
<td>20%</td>
</tr>
<tr>
<td>Clean Vehicle Rebate Project</td>
<td>5%</td>
</tr>
</tbody>
</table>
BYD Motors Inc. employees fabricating an all-electric transit bus shell in Lancaster.

Governor Brown and employees at an open house for all-electric transit bus manufacturer Proterra Inc. in the City of Industry.
$5 million allocation
(proposed)
FY 2018-2019
Workforce Training and Development

Tami Haas

Fuels and Transportation Division
California Energy Commission

November 7, 2017
Workforce Training to Meet California’s Climate Change and Economic Development Goals

- Sustainable Transportation
- Jobs and Wages
- Service Delivery
- Partnerships and Leverage
- Growth
## Workforce Investments

(as of 9/1/2017)

<table>
<thead>
<tr>
<th>Partner</th>
<th>Funding (millions)</th>
<th>Match Funding (millions)</th>
<th>Trainees</th>
<th>Businesses Assisted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment Training Panel</td>
<td>$13.5</td>
<td>$11.3</td>
<td>16,441</td>
<td>173+</td>
</tr>
<tr>
<td>Employment Development Department</td>
<td>$8.2</td>
<td>$7.5</td>
<td>1,000</td>
<td>36+</td>
</tr>
<tr>
<td>California Community Colleges Chancellor’s Office</td>
<td>$5.75</td>
<td>$0.5</td>
<td>-</td>
<td>68+</td>
</tr>
<tr>
<td>California Workforce Development Board</td>
<td>$0.25</td>
<td>$0.5</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Clean Energy and Transportation Initiative</td>
<td>$4.0</td>
<td>-</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$31.7</strong></td>
<td><strong>$19.8</strong></td>
<td><strong>17,441</strong></td>
<td><strong>277+</strong></td>
</tr>
</tbody>
</table>
Community Colleges: Automotive Technology

Automotive Mechanical Repair:
- Alternative Fuels Service Technician
- Manufacture Specialty
- Electrical/Diagnosis
- Machining Technology
- Automotive Management

Partnerships:
- LA New Car Dealership
- CETI
- Northwood University
- Southeast ROP
- La Mirada/Norwalk USD

Alternative Fuel Program & Advanced Transportation Technology:
- Electric Vehicle Technology
- Hybrid Technology
- Fuel Cell Technology
- CNG/LNG
- Light & Heavy Duty Vehicles
Workforce Training: Policy and Investment Drivers

- Clean Energy and Pollution Reduction Act (SB 350)
  - Disadvantaged Communities
  - Barriers Studies
- ZEV Action Plan
- Clean Energy Job Creation Fund (SB 110)
Freight Workforce

- Freight Workforce Development and Pilot Project (GO-Biz and CSULB)

- Zero-Emission Port Equipment Workforce Development Group (POLB)
Workforce Training and Development

$3.5 million allocation
(proposed)
FY 2018-2019
Emerging Opportunities

$4.2 million allocation
(proposed)
FY 2018-2019
Public Comment

Docket No. 17-ALT-01

Alternative and Renewable Fuel and Vehicle Technology Program

AB118@energy.ca.gov

http://energy.ca.gov/transportation