Fueling tomorrow’s transport
How the new RED can drive the best alternative fuels

Presentation to the European Union Parliament

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California Energy Commission
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California: Nation-State Statistics

- Population: 39 million
- GDP: $2.6 trillion – 6th largest global economy
  - Transportation accounts for 37% of all GHG emissions
- Vehicles: 28.8 million cars + 1 million trucks
- Petroleum Consumption:
  - 13.9 billion gallons of gasoline
  - 3.3 billion gallons of diesel
Air Quality Nonattainment Areas
PM-2.5 and Ozone

Source: Environmental Protection Agency
California's GHG Emissions by Sector

- **Transportation**: 39%
- **Industrial**: 23%
- **Electricity Generation (In State)**: 11%
- **Electricity Generation (Imports)**: 8%
- **Agriculture**: 8%
- **Residential**: 6%
- **Commercial**: 5%
- **Not Specified**: <1%

**2015 Total CA Emissions: 440.4 MMTCO2e**
“…climate change is unlike any other threat we humans face…It is subject to irreversible tipping points and vast unknowns. Combatting climate change, the existential threat of our time, will take heroic effort on the part of many people and many nations.”

Governor Jerry Brown, 2016
## California Policy Goals and Objectives

<table>
<thead>
<tr>
<th>Policy Objectives</th>
<th>Policy Origin</th>
<th>Goals and Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse Gas Reduction</td>
<td>California State Senate Bill 32 (2016)</td>
<td>Reduce greenhouse gas emissions to 1990 levels by 2020, 40% below 1990 levels by 2030 and 80% below 1990 levels by 2050 in California</td>
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<tr>
<td>Air Quality</td>
<td>Clean Air Act</td>
<td>80% reduction in NOx from current levels by 2023</td>
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<tr>
<td>Zero Emission Vehicle Mandate</td>
<td>Executive Order B-16-2012</td>
<td>Infrastructure to accommodate 1 million ZEVs by 2020 and 1.5 million ZEVs on California roadways by 2025</td>
</tr>
<tr>
<td>Increase Transportation Electrification (TE)</td>
<td>California State Senate Bill 350 (2015)</td>
<td>Encourages the state to take actions to accelerate widespread adoption of TE including increased access in disadvantaged communities and requiring utilities to address TE in Integrated Resource Plans.</td>
</tr>
<tr>
<td>Short-Lived Climate Pollutant Reductions</td>
<td>California Senate Bill 605 (2014), California Senate Bill 1383 (2016)</td>
<td>Develop a strategy for reducing short-lived climate pollutants including black carbon (50%), methane (40%), and hydrofluorocarbons (40%) by 2030.</td>
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</tbody>
</table>
Senate Bill 350 Drives Transportation Electrification

Encourages the State to take actions that will accelerate the widespread adoption of transportation electrification including:

• Increasing access to low-income and disadvantaged communities

• Requiring investor owned utilities to submit applications for programs and investments that will accelerate transportation electrification

• Requiring utilities to address transportation electrification in their integrated resources plans (IRPs)
The California Energy Commission is the state's primary energy policy and planning agency. Established by the Legislature in 1974, seven core responsibilities guide the Energy Commission:

- Forecasting future energy needs
- Promoting energy efficiency and conservation by setting the state's appliance and building energy efficiency standards
- Supporting energy research that advances energy science and technology through research, development and demo projects
- Developing renewable energy resources
- Advancing alternative and renewable transportation fuels and technologies
- Certifying thermal power plants 50 megawatts and larger
- Planning for and directing state response to energy emergencies.
History of California’s Renewable Portfolio Standard

• 2002: Original RPS (California Senate Bill 1078) signed into law
  • Required California Public Utilities Commission-regulated investor-owned utilities (IOUs) to procure 20% renewable energy by 2017
• 2006 Legislation accelerated the RPS to 20% by 2010
  • Public Owned Utilities required to set their own RPS goals recognizing the intent of the Legislature
• 2011: Governor Brown signed California Senate Bill x1-2, which set a new target of 33% renewables by 2020 for all utilities
• 2015: California Senate Bill 350, increases the state’s RPS target to 50% by 2030
Current Renewable Generation

- 1983: First California RPS established (20% by 2017)
- 2002: RPS increased to 20% by 2010
- 2011: RPS increased to 33% by 2020
- 2015: RPS increased to 50% by 2030
Alternative and Renewable Fuel and Vehicle Technology Program

“…to 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 44272(a)

Complementary state goals

- Improve air quality
- Increase alternative fuel use
- Reduce petroleum dependence
- Promote economic development
Alternative and Renewable Fuel and Vehicle Technology Program

A Portfolio Approach

**Alternative Fuel Production**
- Biofuel Production and Supply

**Alternative Fuel Infrastructure**
- Electric Charging Infrastructure
- Hydrogen Refueling Infrastructure
- Natural Gas Fueling Infrastructure

**Alternative Fuel and Advanced Technology Vehicles**
- Natural Gas Vehicle Incentives
- Med and Heavy-Duty Advanced Vehicle Technology Demo and Scale-Up

**Related Needs and Opportunities**
- Emerging Opportunities
- Workforce Training and Development
- Regional Readiness
## Alternative and Renewable Fuel and Vehicle Technology Program Funding

<table>
<thead>
<tr>
<th>Category</th>
<th>Funded Activity</th>
<th>Cumulative Awards to Date (in millions)*</th>
<th># of Projects or Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alternative Fuel Production</strong></td>
<td>Biomethane Production</td>
<td>$59.5</td>
<td>20 Projects</td>
</tr>
<tr>
<td></td>
<td>Gasoline Substitutes Production</td>
<td>$32.4</td>
<td>14 Projects</td>
</tr>
<tr>
<td></td>
<td>Diesel Substitutes Production</td>
<td>$75.1</td>
<td>25 Projects</td>
</tr>
<tr>
<td><strong>Alternative Fuel Infrastructure</strong></td>
<td>Electric Vehicle Charging Infrastructure**</td>
<td>$80.1</td>
<td>7,796 Charging Stations</td>
</tr>
<tr>
<td></td>
<td>Hydrogen Refueling Infrastructure</td>
<td>$128.2</td>
<td>64 Fueling Stations</td>
</tr>
<tr>
<td></td>
<td>E85 Fueling Infrastructure</td>
<td>$13.7</td>
<td>158 Fueling Stations</td>
</tr>
<tr>
<td></td>
<td>Upstream Biodiesel Infrastructure</td>
<td>$4.0</td>
<td>4 Infrastructure Sites</td>
</tr>
<tr>
<td></td>
<td>Natural Gas Fueling Infrastructure</td>
<td>$21.9</td>
<td>64 Fueling Stations</td>
</tr>
<tr>
<td><strong>Alternative Fuel and Advanced Technology Vehicles</strong></td>
<td>Natural Gas Vehicle Deployment***</td>
<td>$65.8</td>
<td>3,148 Vehicles</td>
</tr>
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<td></td>
<td>Propane Vehicle Deployment</td>
<td>$6.0</td>
<td>514 Trucks</td>
</tr>
<tr>
<td></td>
<td>Light-Duty Electric Vehicle Deployment</td>
<td>$25.1</td>
<td>10,700 Cars</td>
</tr>
<tr>
<td></td>
<td>Medium- and Heavy-Duty Electric Vehicle Deployment</td>
<td>$4.0</td>
<td>150 Trucks</td>
</tr>
<tr>
<td></td>
<td>Medium- and Heavy-Duty Vehicle Technology Demonstration and Scale-Up</td>
<td>$129.4</td>
<td>49 Demonstrations</td>
</tr>
<tr>
<td><strong>Related Needs and Opportunities</strong></td>
<td>Manufacturing</td>
<td>$46.5</td>
<td>21 Manufacturing Projects</td>
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<tr>
<td></td>
<td>Workforce Training and Development</td>
<td>$30.7</td>
<td>96 Recipients</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>$26.3</td>
<td>1 Project</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>$748.7</td>
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Examples of ARFVTP Funded Projects
ARFVTP Project Benefits (anticipated by 2025)

**Petroleum Displacement**
- Displace 243 million gallons of petroleum annually

**Environmental Benefits**
- Reduce GHG emissions by 2 M metric tons of CO2e annually
- Reduce 25 tonnes of NOx and 7.5 tonnes of PM2.5 annually

**Economic Benefits**
- Over 4,600 long-term jobs
- Over 5,100 short-term jobs

**Workforce Training**
- 17,000 individuals have received training
- Over 255 businesses have received assistance
Other Transportation Incentive Programs in California

- **Greenhouse Gas Reduction Fund** – supports programs that reduce GHG emissions

- **Air Quality Improvement Program and Low Carbon Transportation Investments**
  - *Advanced Emission Reduction Technology* - $240 M to support low carbon vehicle demonstration and deployment
  - *Clean Vehicle Rebate Program (CVRP)* - $133 M in incentives for purchase of zero-emission vehicles
  - *Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program (HVIP)* - $18 M in incentives for purchase of advanced bus and trucks

- **Volkswagen Diesel Emissions Settlement** - $800 M for zero-emission vehicle projects over 10 years

- **Organics Grant Program** - $12 million for anaerobic digester projects
Thank You!

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