Natural Gas Transportation Research and Development

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California Energy Commission
October 18, 2016
Energy Commission Natural Gas Research Process

Policy Drivers → Workshops, Agencies, Roadmap → Research Initiatives

Research Projects ← Competitive Solicitations ← Annual Budget Plan
# Policy Drivers for Energy Commission Transportation Research

<table>
<thead>
<tr>
<th><strong>Executive Order B-32-15</strong></th>
<th>Directs the development of the Sustainable Freight Action Plan to improve freight efficiency, transition to ZEV technologies, and increase California freight system competitiveness.</th>
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</thead>
<tbody>
<tr>
<td><strong>Low Carbon Fuel Standard</strong></td>
<td>Encourages the use and production of cleaner low-carbon fuels in California to reduce GHG emissions.</td>
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<tr>
<td><strong>Assembly Bill 118 / 8 (ARFVTP)</strong></td>
<td>Authorizes the Energy Commission to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state’s climate change goals.</td>
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<td><strong>Assembly Bill 32</strong></td>
<td>Calls for approximately 36 percent of the state’s 2020 GHG reduction targets to come from the transportation sector.</td>
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<tr>
<td><strong>Executive Order B-30-15</strong></td>
<td>Sets statewide GHG emission reduction goals to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.</td>
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Transportation Research Goals

The goals of transportation-related projects are to:

• Reduce carbon emissions
• Improve infrastructure capacity, reliability, and sustainability
• Improve air quality
• Increase the use of transportation renewable fuels
Energy Commission Transportation R&D Funding

- Vehicle Technologies (EPIC)
- Vehicle Technologies (PIER Electric)
- Transportation Systems (PIER Electric)
- Alternative Fuels (NG)
- Vehicle Technologies (NG)
## Current Portfolio Highlights & Major R&D Initiatives

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
<th>Status</th>
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| **Ultra Low Emissions, High Performance, Spark Ignited Natural Gas Engine** | Developing and demonstrate a low NOx, spark-ignited, natural gas 6.7L engine for applications such as shuttle buses, delivery trucks, and yard spotters. | - Alpha Engine Completed 2015  
- Beta Engine Demo In Progress, Started 2016 |
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| **Natural Gas Vehicle On-Board Storage**        | Develop and demonstrate a safe, low-pressure, high-density, conformable adsorbed natural gas storage system that enables cost-effective home refilling of NGVs.                                                  | ▪ In Progress  
▪ Expected Completion 2017                                                                  |
| **Natural Gas Fueling Infrastructure Improvements** | Develop technology that improves the fueling method in natural gas vehicles to achieve a better “full fill” of compressed natural gas.                                                                           | ▪ In Progress  
▪ Expected Completion 2017                                                                  |
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| **Natural Gas Vehicle Hybridization** | Develop and demonstrate hybridization designs that use battery power to minimize emissions, idle, and low-load engine operation.                                                                        | ▪ In Progress  
▪ Three projects awarded:  
  1. Efficient Drivetrains, Inc.  
  2. TransPower  
  3. Gas Technology Institute  
▪ Expected Completion 2017 |
| **Advanced Ignition Engine Research** | Develop advanced ignition methods to improve engine efficiency while reducing emissions.                                                                                                                   | ▪ In Progress  
▪ Three projects awarded:  
  1. Gas Technology Institute  
  2. North American Repower  
  3. Olson Ecologic  
▪ Expected completion 2017/18 |
Project Success

**Purpose:** Development, integration, and demonstration of an advanced low NOx 8.9L stoichiometric spark-ignited natural gas engine for vocational applications.

**Contractor:** South Coast Air Quality Management District

**Partners:** Cummins Westport, Inc., SoCalGas

**PIER Funds:** $2M with $2M in match share

**Results:** CWI’s 8.9L engine (ISL G NZ) was certified at CARB’s lowest optional NOx emissions standard of 0.02 g/bhp-hr NOx on October 2015.

**Rate Payer Benefits:** Near zero NOx and PM emissions improve urban community air quality. Additional GHG reduction benefits can be realized when combined with renewable natural gas.
Current Natural Gas Solicitation

**Title:** Off-Road Heavy-Duty Natural Gas Engine Research and Development (GFO-16-XXX)

**Research:** Incorporate advanced natural gas vehicle technologies in off-road applications to reduce petroleum dependency and improve air quality.

<table>
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<tr>
<th>Group</th>
<th>Minimum Award per Project</th>
<th>Maximum Award per Project</th>
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<tbody>
<tr>
<td>South Coast Air Basin</td>
<td>$750,000</td>
<td>$1,500,000</td>
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<tr>
<td>San Joaquin Valley Air Basin</td>
<td>$750,000</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>CA Ports/Military Bases</td>
<td></td>
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**Proposed Timeline:**
- Solicitation Release: October 17, 2016
- **Deadline to Submit Applications:** November 18, 2016, 5:00 pm
- NOPA: December 2016
- Business Meeting: March 2017
Upcoming Natural Gas Solicitation

**Title:** Natural Gas Engine Improved Efficiency Research and Development

**Research:** Advanced natural gas engine technologies that assist in reducing the efficiency gap between spark-ignited stoichiometric natural gas engines and diesel engines.

**Funding Amount:** $2,700,000 ($900,000 max/project)

**Proposed Timeline:**
- Solicitation Release: December 2017
- Deadline to Submit Applications: February 2017
- Business Meeting: July 2017
2015 Natural Gas Vehicle Research Roadmap (NGVRR)

November 2015: NGVRR Draft published.

March 2016: Public workshop held.

May 2016: Updated graphics and made edits responding to public comments.

October 2016: Publication process for final report to begin after 2016 NGVTF.