

Survey of Project Concepts for the Alternative and Renewable Fuel and Vehicle Technology Program

The California Energy Commission (Energy Commission) is in the early planning stage developing an Investment Plan and other program aspects for this new program. Energy Commission staff seek suggestions of concepts as we develop this new transportation funding program which, among other goals, seeks to reduce greenhouse gas emissions from mobile sources.

Significantly more staff work is still necessary before the program is ready to release an official solicitation, expected in the spring of 2009. This survey is intended to be used as an early reconnaissance tool to help Energy Commission staff gauge the interest and magnitude of funding that could be allocated for the Alternative and Renewable Fuel and Vehicle Technology Program.

This survey allows you to share concepts that you think would advance Alternative and Renewable Fuel and Vehicle Technologies. It is important that you include the funding level recommended for each concept. For the first year we anticipate \$75 million. For survey purposes please assume that this program will annually administer \$100 million over seven years. Please submit a separate survey for each concept.

THIS IS NOT A SOLICITATION. YOUR RESPONSE TO THIS SURVEY CREATES NO OBLIGATION ON YOUR PART OR ON THE PART OF THE ENERGY COMMISSION.

Survey Questions: (Responses should not exceed four pages, no graphics except simple schematic diagrams.)

- Describe the concept; identify specific goals, technology and the plan to bring the project to completion.
- Describe the funding needs, term of the funding, amount of state and other sources needed. Describe the funding needed per-widget (if appropriate).
- Describe the expected results, in terms of gasoline or diesel fuel displaced, and greenhouse gas emission reductions, or other appropriate metric.
- Describe how this project idea would be compatible with sustainability goals and standards. Summarize the environmental data you have (and or provide links to any related references) assembled to meet the sustainability goal standards.

Please check the below boxes that best characterizes the concept:

Project Type

- ☐ Fuel Production
- ☐ Fuel Transport/Storage/Blending Facility
- ☐ Fuel Infrastructure (Station, Pump, Electric Charging Facility, Fueling System)
- ☐ Vehicle Deployment (Fleet, Consumer)
 - ☐ Light-Duty
 - ☐ Medium-Duty
 - ☐ Heavy-Duty
- ☒ Vehicle/Engine Technology or Components
 - ☐ Performance Test/ Protocol Development
 - ☐ Workforce Training, Public Outreach, Education
 - ☐ California Manufacturing Plant
 - ☐ Other_____

Fuel/Technology

- ☐ Electric Drive ☐ Plug-in Hybrid EV
- ☐ Batter Electric Vehicle
- ☐ MD/HD Hybrid or Hydraulic Hybrid
- ☐ Non Road Electric
- ☐ Other_____
- ☐ Natural Gas (CNG, LNG)
- ☐ Renewable Diesel/Biodiesel
- ☐ Hydrogen
- ☐ Ethanol
- ☒ Propane
- ☐ Vehicle Efficiency
- ☐ Other_____

Development Stage

- ☐ Widespread commercial Availability-Consumer Acceptance
- ☒ Early Market Deployment/Development
 - ☐ Fleets
 - ☐ Consumers
 - ☐ Fuel Producers
 - ☐ Infrastructure owners
 - ☐ Manufacturing Plants
- ☐ Market Niche Demonstration and Feasibility
- ☒ Application Research and Development (Validation Test, Prototype Development)
- ☐ Other_____

A. AB 118 Project Concept -- Propane-Fueled, Low-Emission Generator Set (Genset)

The California Energy Commission (CEC) and the California Air Resources Board (CARB) increasingly seek to support and fund projects in California that meet alternative energy and reduced global warming objectives required under relatively recent legislation (AB 32, AB 118, etc.) The California Environmental Quality Act (CEQA) environmental review process applied to all substantial new proposed developments increasingly requires the use of low-emission, alternatively-fueled “mobile sources” and construction equipment that both build and then serve the development over its lifetime. Emissions from the transportation sector in California represent the largest share of total “criteria” pollutants regulated under the California and federal Clean Air Acts, and diesel engines are now regulated

for their toxic diesel particulate matter emissions. While California has among the worst air quality in the country (Sacramento, San Joaquin, and South Coast), diesel use, particularly in offroad construction and emergency standby power gensets, is largely exclusive and ubiquitous.

Propane-fueled emergency gensets represent substantial benefits for use in public emergencies, often capable of operating with their inherently-secure fuel storage where diesel or gasoline units are compromised by water intrusion, spillage, etc. Experiences gained in the Hurricane Katrina disaster show that propane engines routinely operated where diesels could not obtain fuel, and propane fuel—used for heating purposes as the most popular fuel for generations-- is available in virtually all rural areas of California with any significant population base. This project proposal will provide one or two (of the project's total of three gensets) fully portable demonstration "emergency gensets" on loan to emergency services agencies (including the state Office of Emergency Services, CalFire, and local or regional fire departments) for the one-year term of the project. Those agencies may use the genset(s) in response to earthquake, fire, flooding or other disasters that strike CA each year.

Mitigating diesel emission impacts with lower-emitting, alternatively-fueled (propane) internal combustion engine-powered (ICE) equipment of the types usually found on construction sites and for emergency power generation will provide immediate green house gas (GHG) and "breather" benefits. Thousands of diesel ICE's operate each year across California in portable or mobile equipment, with greatest activity and fuel consumption during high-ozone, high-petroleum-use summer months. This project will also fulfill AB 118's sustainability goals, since domestically produced propane is coupled with natural gas exploration and production.

California's climate change legislation and the Governor's Executive Order S-03-05 require specified, scheduled reductions of GHG emissions across California in the coming years at the same time the CEC continues to promote the development and use of environmentally sustainable, energy-secure alternative-fuels. Propane is considered an alternative fuel with lower GHG-producing potential than diesel or gasoline and results as a by-product of natural gas production and petroleum production; nearly all propane used in CA is produced in North America with obvious energy-security benefits.

California air quality is among the worst in the country for summer ozone air pollution; strategies to achieve healthy air depend heavily on reducing diesel NOx emissions from the use of internal combustion engines. Diesel emissions produce about 70% of the cancer risk to California citizens (See SCAQMD MATES II Study), often generating one-half or more of the harmful mobile source-related air pollutants in California's nonattainment areas at rates six to ten times those of their spark-ignited counterparts. Because diesel vehicles and engines operate frequently in disparately affected, socio-economically challenged neighborhoods adjacent to industrial operations, distribution centers, etc., alternatively-fueled and lower-emitting equipment and engines will provide options not currently available to these breathers. Even with tightening emission standards, offroad diesel engines produce substantial "criteria" pollutants (governed under the Clean Air Acts) and toxics.

Presently, portable ICE gensets used in California are nearly all diesel powered. Many construction companies either own or rent trailer-mounted units, and certain types of construction (e.g. road building) routinely use portable units due to the unavailability of grid power. The great majority of emergency standby gensets are diesel powered. Offroad diesels emit at a Tier III level, for less than 100 hp, at roughly 4.7 g/bhp-hr NOx; propane-fueled engines developed for onroad applications by Clean Fuels USA and available for sale in onroad-certified versions only emit at far less than one-tenth that NOx level and avoid the issue of toxic diesel particulate matter altogether. Because of the established nature of diesel infrastructure and equipment, development of the project is unlikely to occur without CEC support.

B. Proposal to Develop Low-Emission Genset For Public Demonstration and Education Purposes

This “survey” concept submitted to CEC targets the research, development, construction, and statewide demonstration of a first-of-its-kind CARB-certified low-emission, propane-fueled genset of nominally 80 kW size. If successful, the low-emission propane fueling technology for an engine appropriate for the generator size (likely the newer 6L GM industrial spark-ignited engine) will be developed and CARB-certified with financial support from the Propane Education and Research Council (PERC, the national-level R&D project-funding arm of the US propane industry based in Washington, DC), Clean Fuels USA or other appropriate propane engine and vehicle technology provider(s), and supportive air agencies (SJVUAPCD, SMAQMD, PCAPCD, etc.). Requested funding support from the CEC will, in keeping with AB 118 objectives, be used to cover the project’s hard equipment and operations costs for three demonstration engines, controls, trailers, storage tanks and administrative costs to manage the development and execution of the project. Resulting trailer-mounted 80 kW propane gensets would be loaned at reduced or no cost (not including those for fuel, insurance, and basic transportation) to qualifying businesses and agencies to demonstrate the project’s air, environmental, emergency response, and energy attributes. Public outreach and educational materials will be prepared and distributed with the machine to construction companies, developers, planning, air quality and emergency services agencies, and other interested parties in selected locations in northern, central, and southern CA. The expected term of the project is one year.

The LPG engine and genset will be installed on a double-axle trailer of similar size and strength to those commonly used for diesel units in equipment rental yards, and fitted with an appropriately sized LPG tank. The trailer, to contain the engine, generator, tank, and operational controls, will be designed, built, and licensed for on-highway use in accordance with all applicable highway and safety standards. The genset will be constructed with input from representatives of the construction industry and emergency services. During construction, public education and outreach materials will be prepared with input from CEC staff, CARB staff, planning and emergency services agency staffs. Project management by Autumn Wind Associates (as the provider of this “survey” paper) on behalf of the propane industry, or other appropriate entity to be determined at a later date but prior to full application to CEC for AB 118 financial support) will occur with oversight and cost-share from the Propane Education and Research Council and representatives of the propane industry in California (including the Western Propane Gas Association, based in Sacramento).

Specifically, the envisioned LPG Gensets Demonstration project will:

- Secure funding from non-CEC sources to develop and CARB-certify a propane-fueled engine appropriately-sized for the targeted ~80kW portable gensets.
- Secure bids from qualifying LPG engine suppliers, generator equipment suppliers, trailer suppliers, and fabrication companies in order to build a fully operational ~80kW continuous-rated standard genset on a suitably sized low-emission, CARB certified LPG engine with necessary hardware (catalyst, radiator, etc.). The low-emission engine will be developed and certified to maximize energy and emission benefits. Selection of the generator portion and a heavy-duty trailer consistent of the type used by rental yards will be undertaken after research and input from targeted users. A firm will be chosen to integrate and mount the generator and controls, the low-emission LPG engine and controls, and the LPG tank and controls, following applicable regulations and generally recognized trade standards. The trailer will be provided with all necessary brakes, wiring, lights, and all other safety equipment necessary for its application

under California vehicle, fire, pressure vessel safety regulations, and any other applicable codes or regulations, and will comply with CARB requirements.

- The project will ensure that the three demonstration gensets are given the widest possible promotion to air, energy, planning, and emergency services agencies, construction firms, rental businesses, and any other businesses or agencies interested in genset applications that will produce energy-, GHG-, and emission-benefits.
- Upon completion of the one-year demonstration and promotion period, a summary of the project's "lessons learned" and quantified emission and energy benefits will be prepared and submitted to CEC by the project manager. This summary will include hours of genset operation, reduced NOx emissions, comments of project participants, basic cost-benefit analysis of the project, and valuable lessons learned. In addition, the project manager will supply summaries of important meetings or discussions with regulators and agency personnel, of promotional uses and demonstrations of the genset to regulatory agencies, contractors, rental operations, and LPG retailers, and of discussions with LPG engine and genset fabrication firms designed to lead to routine manufacturing of a low-emission genset.

C. Project Timeline

Commencement: The project will commence within two weeks of project and contract approval by CEC.

Completion: ~12 months, following funding and availability of CARB-certified LPG engine.

D. Identified Project Tasks

I.	Secure Access to ~6L CARB-certified LPG engine	Undetermined
II.	Initiate Fabrication Processes	2 - 4 weeks
	Write bid spec, distribute, select winning genset fabrication firm	
	Write bid spec, distribute, and select winning low-emission LPG engine manufacturer	
	Fabricator begins genset fabrication	
III.	3 Gensets Fabrication	8 - 10 weeks
	Supervise fabrication of the low-emission gensets	
	Develop all insurance and operational requirements for gensets	
IV.	Promotional Materials and Communications	4 – 6 weeks
	Prepare and Distribute Promotional Materials for Construction Firms, Rental Firms, Etc.	
	Prepare and Provide Emission Information on Gensets	
V.	Schedule and Implement Promotional Genset Demonstrations	36 - 40 weeks
	Schedule Promotions of Gensets to Qualifying Firms	
	Assure Transportation Between Qualifying Firms Promotional Use of Gensets	
	Assure Genset Maintenance	

Provide Demonstrations of Gensets to Targeted Agencies and Users

IV. **Summary of Program Accomplishments**

2 weeks

Prepare Summary of Project Accomplishments

Solicit Comments of Project Participants

Prepare Summary of Participants Comments Regarding this Project

Produce Final Written Deliverable for SMAQMD

Total Elapsed Time

~50 – 52 Weeks Following Engine Emissions Certification

E. Preliminary Estimated Budget and Statement of Costs

<i>Budget Items</i>	<i>Estimated Cost</i>
PERC-funded development of ~new 6L LPG offroad engine	\$1,100,000
CEC-funded 3 engines, generators, trailers, onboard LPG tanks, installation-integration	\$114,000
CEC-funded administrative costs, overhead, project mgmt misc. (25% FTE, 12 months)	\$65,000
<u>Total</u>	\$1,279,000

F. Contact Information

This “AB 118 Survey” proposal is submitted by Autumn Wind Associates, Inc. to the California Energy Commission on behalf of the California and national propane industry, and is intended to signal to CEC staff the interest and intent of the propane industry to continue efforts with CEC to develop and deploy environmentally-beneficial propane-fueled vehicles and equipment across California. Inquiries regarding this survey should be directed to Greg Gilbert of Autumn Wind Associates, Inc. at 916.663.2222 or ggilbert@autumnwind.us