

CONTRACT REQUESTS FORM (CRF)

CEC-94 (Revised 5/11)

CALIFORNIA ENERGY COMMISSION


 New Contract 500-12-012 Amendment to Existing Contract: _____ Amendment Number: _____

Division	Contract Manager:	MS-	Phone	CM Training Date
ERDD - Transportation	Pilar Magana	43	916-327-2216	6/26/2008

Contractor's Legal Name	Federal ID Number
South Coast Air Quality Management District	95-3099419

Title of Project
Low NOx Natural Gas Engine Development for Heavy-Duty Vehicles

Term	Start Date	End Date	Amount
New/Original Contract	6/30/2013	6/30/2016	\$ 2,000,000

Line up the Amendment information as best as possible in the following boxes.

Amendment #	End Date (mm/dd/yy)	Amount

Business Meeting Information

Proposed Business Meeting Date	6/12/2013	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Pilar Magana	Time Needed:	5 minutes

Agenda Item Subject and Description

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT. Possible approval of Agreement 500-12-012 with the South Coast Air Quality Management District for a \$2,000,000 contract to collaborate with the Energy Commission and additional funding partners to develop and implement a solicitation for the development and demonstration of advanced natural gas engine(s) for heavy-duty vehicles with near zero nitrogen oxide emissions. (PIER natural gas funding) Contact: Pilar Magana (5 minutes)

Business Meeting approval is not required for the following types of contracts: *Executive Director's signature is required in all cases.*

- Contracts less than \$10k (*Policy Committee's signature is also required*)
- Amendment for a no-cost time extension. Must be first extension, less than one year and original contract less than \$100k.
- Contracts less than \$25k for Expert Witness in Energy Facility licensing cases and amendments.

Purpose of Contract or Purpose of Amendment, if applicable

The purpose of this agreement is to partner with the South Coast Air Quality Management District (SCAQMD) to develop and implement a solicitation for the development and demonstration of advanced natural gas engines with near zero nitrogen oxide emissions. The SCAQMD will issue a solicitation that will target natural gas engine development for heavy-duty vehicle applications with 9 liter displacement or greater. The research conducted under this contract will aim to optimize after-treatment technology designs, after-treatment configurations, engine tuning, and engine management practices for heavy-duty natural gas engines to obtain the maximum nitrogen oxide reductions possible while continuing to meet or exceed all applicable standards for hydrocarbons, non-methane hydrocarbons, carbon monoxide, and particulate matter, and without incurring a fuel economy penalty.

CONTRACT REQUESTS FORM (CRF)



California Environmental Quality Act (CEQA) Compliance

1. Is Contract considered a "Project" under CEQA?
 Yes: skip to question 2 No: complete the following (PRC 21065 and 14 CCR 15378):
 Explain why contract is not considered a "Project":
 Contract will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because the contracted work is for the management of a solicitation which will not have an environmental impact.

2. If contract is considered a "Project" under CEQA:
 a) Contract **IS** exempt. (Draft NOE required)
 Statutory Exemption. List PRC and/or CCR section number: _____
 Categorical Exemption. List CCR section number: _____
 Common Sense Exemption. 14 CCR 15061 (b) (3)
 Explain reason why contract is exempt under the above section:
 The activity is covered by the general rule that CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA. The work being conducted under this project primarily consists of the research, testing and data collection of engine technology(ies) being developed in an existing facility(ies), and therefore will have no environmental impact. On-road vehicle demonstrations through this project will not result in major disturbances to environmental resources.

b) Contract **IS NOT** exempt. The Contract Manager needs to consult with the Energy Commission attorney assigned to their division and the Siting Office regarding a possible Initial Study.

Budgets Information

Contract Amount Funded		Breakdown by FY			Funding Sources			
Funding Source	Amount	FY	Amount	Approved?	Funding Source	FY	Budget List No.	Amount
ARFVTF	\$	12-13	\$2,000,000	Yes	NG Subaccount, PIERDD	12-13	501.001G	\$2,000,000
ECAA	\$		\$					\$
State- ERPA	\$		\$					\$
Federal	\$		\$					\$
PIER - E	\$		\$					\$
PIER - NG	\$2,000,000		\$					\$
Reimbursement	\$		\$					\$
Other	\$		\$					\$
TOTAL:	\$2,000,000	TOTAL:	\$2,000,000				TOTAL:	\$2,000,000
Reimbursement Contract #:					Federal Agreement			

Contractor's Administrator/ Officer		Contractor's Project Manager	
Name:	Jeff Cox	Name:	Jeff Cox
Address:	21865 Copley Dr	Address:	21865 Copley Dr
City, State, Zip:	Diamond Bar, CA 91765-4178	City, State, Zip:	Diamond Bar, CA 91765-4178
Phone/ Fax:	909-396-3092 / 909-396-3252	Phone/ Fax:	909-396-3092 / 909-396-3252
E-Mail:	jcox@aqmd.gov	E-Mail:	jcox@aqmd.gov

Contractor Is

Private Company (including non-profits)
 CA State Agency (including UC and CSU)
 Government Entity (i.e. city, county, federal government, air/water/school district, joint power authorities, university from another state)

Selection Process Used

Solicitation Select Type Solicitation #: _____ # of Bids: _____ Low Bid? No Yes
 Non Competitive Bid (Attach CEC 96)
 Exempt Other Government Entity



Civil Service Considerations	
<input type="checkbox"/> Not Applicable (Contract is with a CA State Entity or a membership/co-sponsorship) <input checked="" type="checkbox"/> Public Resources Code 25620, et seq., authorizes the Commission to contract for the subject work. (PIER)	
<input type="checkbox"/> The Services Contracted: <input type="checkbox"/> are not available within civil service <input type="checkbox"/> cannot be performed satisfactorily by civil service employees <input type="checkbox"/> are of such a highly specialized or technical nature that the expert knowledge, expertise, and ability are not available through the civil service system.	
<input type="checkbox"/> The Services are of such an: <input type="checkbox"/> urgent <input type="checkbox"/> temporary, or <input type="checkbox"/> occasional nature that the delay to implement under civil service would frustrate their very purpose.	
Justification: Public Resources Code 25620, et seq., authorizes the Commission to contract for the subject work. (PIER)	

Payment Method	
<input checked="" type="checkbox"/> A. Reimbursement in arrears based on: <input type="checkbox"/> Itemized Monthly <input checked="" type="checkbox"/> Itemized Quarterly <input type="checkbox"/> Flat Rate <input type="checkbox"/> One-time	
<input type="checkbox"/> B. Advanced Payment	
<input type="checkbox"/> C. Other, explain:	

Retention	
1. Is contract subject to retention?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
If Yes, Do you plan to release retention prior to contract termination?	<input type="checkbox"/> No <input type="checkbox"/> Yes

Justification of Rates	
The rates are consistent with other state agencies doing similar research.	

Disabled Veteran Business Enterprise Program (DVBE)	
1. <input checked="" type="checkbox"/> Not Applicable	
2. <input type="checkbox"/> Meets DVBE Requirements	DVBE Amount:\$ _____ DVBE %: _____
<input type="checkbox"/> Contractor is Certified DVBE <input type="checkbox"/> Contractor is Subcontracting with a DVBE: _____	
3. <input type="checkbox"/> Requesting DVBE Exemption (attach CEC 95)	

Is Contractor a certified Small Business (SB), Micro Business (MB) or DVBE?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
If yes, check appropriate box:	<input type="checkbox"/> SB <input type="checkbox"/> MB <input type="checkbox"/> DVBE

Is Contractor subcontracting any services?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
If yes, give company name and identify if they are a Small Business (SB), Micro Business (MB) and/or DVBE:	

Miscellaneous Contract Information	
1. Will there be Work Authorizations?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
2. Is the Contractor providing confidential information?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
3. Is the contractor going to purchase equipment?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
4. Check frequency of progress reports	<input type="checkbox"/> Monthly <input checked="" type="checkbox"/> Quarterly <input type="checkbox"/> _____
5. Will a final report be required?	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes
6. Is the contract, with amendments, longer than a year? If yes, why?	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes
The Department of General Services has agreed to give the Commission blanket authority to execute multi-year contracts to support the Commission's RD&D Programs.	

CONTRACT REQUESTS FORM (CRF)



The following items should be attached to this CRF			
1. Scope of Work, Attach as Exhibit A.	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached	
2. Budget Detail, Attach as Exhibit B.	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached	
3. CEC 96, NCB Request	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached	
4. CEC 30, Survey of Prior Work	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached	
5. CEC 95, DVBE Exemption Request	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached	
6. Draft CEQA Notice of Exemption (NOE)	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached	
7. Resumes	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached	
8. CEC 105, Questionnaire for Identifying Conflicts		<input checked="" type="checkbox"/> Attached	

 Contract Manager Date Office Manager Date Deputy Director Date

The following signatures are only required when contract approval is delegated to the Executive Office and not approved at a Business Meeting. See Business Meeting Information Section.

 Presiding Policy Committee Date Associate Policy Committee Date Executive Director Date

**Exhibit A
SCOPE OF WORK**

TECHNICAL TASK LIST

Task #	CPR	Task Name
1	n/a	Administration
2		Solicitation Management and Subcontractor(s) Selection
3	X	Engine Development
4		Vehicle Integration
5	X	Vehicle Demonstration
6		Data Collection Plan
7		Technology Transfer Activities

KEY NAME LIST

Task #	Key Personnel	Key Sub-contractor	Key Partner(s)
1	Jeff Cox (SCAQMD)		Southern California Gas Company
2			
3			
4			
5			
6			
7			

GLOSSARY

Specific terms and acronyms used throughout this scope of work are defined as follows:

Term/ Acronym	Definition
CARB	California Air Resources Board
CCM	Commission Contract Manager
CO	Carbon Monoxide
CPR	Critical Project Review
Energy Commission	California Energy Commission
U.S. EPA	U.S. Environmental Protection Agency
FTP	Federal Test Procedure
g/bhp-hr	Grams per brake horsepower hour
HC	Hydrocarbon
NH3	Ammonia
NOx	Nitrogen Oxides
PM	Particulate Matter
RFP	Request for Proposals
RD&D	Research Development and Demonstration
SCAQMD	South Coast Air Quality Management District

Exhibit A SCOPE OF WORK

Problem Statement:

The California Air Resources Board (CARB) 2010 emission standards for heavy-duty engines establish a limit for Nitrogen Oxides (NO_x) emissions of 0.2 grams per brake horsepower hour (g/bhp-hr), and constitute a 90 percent reduction of emissions compared to the previous standard (CARB 2007) of 2.0 g/bhp-hr. Nevertheless, it is projected that even with the entire on-road fleet of heavy-duty vehicles compliant with the 2010 standards, upcoming National Ambient Air Quality Standards requirements for ozone attainment cannot be achieved in California's worst air basins without further significant reductions in NO_x emissions from heavy-duty fleets.

Analysis of natural gas vehicle technology shows a high potential for greenhouse gas reductions on a well-to-wheels basis in heavy-duty vehicles (11-23 percent) using conventional natural gas, as well as an opportunity to substantially offset petroleum consumption. Original equipment manufacturers indicate that the near-zero emission target of 0.05 g/bhp-hr could be met or exceeded through R&D efforts. Even higher potential may exist, depending in large part on the removal of current obstacles through Research Development and Demonstration (RD&D) and deployment. Collaborative research efforts between federal, state, and local funding agencies and private technology developers are expected to produce key strategic breakthroughs in a broad range of natural gas vehicle technologies.

The development and deployment of low NO_x, advanced and efficient natural gas vehicle technologies will lower greenhouse gas emissions and benefit natural gas ratepayers by improving air quality and reducing health and environmental risks associated with emissions from heavy-duty vehicles. Research is needed to develop and demonstrate innovative technologies for various applications or vocations.

Goals of the Agreement:

The goals of this agreement are to develop natural gas engines suitable for use in various heavy-duty vehicle applications. The engines and associated exhaust after-treatment technologies should be capable of:

- Achieving emissions targets of 0.02 g/bhp-hr NO_x, 0.01 g/bhp-hr particulate matter (PM), 0.14 g/bhp-hr Hydrocarbon (HC), and 15.5 g/bhp-hr Carbon Monoxide (CO) or lower as determined by the heavy-duty engine federal test procedure (FTP);
- Keeping exhaust Ammonia (NH₃) emissions as low as achievable. Projects that address methods to maintain NH₃ emission at 10 parts per million or lower are preferable.
- Being thermally and fuel efficient. Developed engines that achieve 20% or lower engine thermal efficiency penalty or fuel economy penalty when compared to 2010 U.S. Environmental Protection Agency (U.S. EPA) and CARB certified diesel engines in similar duty cycle are preferred

Exhibit A SCOPE OF WORK

The solicitation will also show preference to engines and after-treatment technologies that are commercially viable and will be certified by the U.S. EPA and CARB.

Objectives of the Agreement:

The objective of this agreement is to promote the development of advanced natural gas engines and after-treatment technologies with near zero NO_x emissions that can be used in heavy-duty vehicle applications. The Energy Commission will work with the South Coast Air Quality Management District (SCAQMD) and other funding partners to develop a solicitation then issue a request for proposals through the SCAQMD. Through a competitive bid process the Energy Commission, SCAQMD, and other funding partners will select qualified candidates to conduct research and achieve the goals identified in this agreement. Following the selection of the subcontractors, the SCAQMD will be responsible for the management of the project(s) and providing project updates and results to the Energy Commission. SCAQMD will work closely with the Energy Commission and other funding partners to ensure that projects selected through the SCAQMD solicitation are successfully implemented.

The proposed research aims to optimize after treatment technology designs, after-treatment configurations, engine tuning, and engine management practices for heavy-duty natural gas engines. The objective is to obtain the maximum NO_x reductions possible while continuing to meet or exceed all applicable standards for hydrocarbons, non-methane hydrocarbons, carbon monoxide, and PM, and without incurring a fuel economy penalty. A NO_x emission rate between 0.02 (a 90% reduction from the 2010 standard) and 0.05 g/bhp-hr is considered achievable through the proposed research.

Electronic File Format

The Contractor shall deliver an electronic copy (CD ROM or memory stick or as otherwise specified by the CCM) of the full text in a compatible version of Microsoft Word (.doc).

The following describes the accepted formats of electronic data and documents provided to the Energy Commission as contract deliverables and establishes the computer platforms, operating systems and software versions that will be required to review and approve all software deliverables.

- Data sets shall be in Microsoft (MS) Access or MS Excel file format.
- PC-based text documents shall be in MS Word file format.
- Documents intended for public distribution shall be in PDF file format, with the native file format provided as well.
- Project management documents shall be in MS Project file format.

Software Application Development

If this scope of work includes any software application development, including but not limited to databases, websites, models, or modeling tools, contractor shall utilize the following standard Application Architecture components in compatible versions:

Exhibit A SCOPE OF WORK

- Microsoft ASP.NET framework (version 3.5 and up) Recommend 4.0
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5
- Visual Studio.NET (version 2008 and up) Recommend 2010
- C# Programming Language with Presentation (UI), Business Object and Data Layers
- SQL (Structured Query Language)
- Microsoft SQL Server 2008, Stored Procedures Recommend 2008 R2
- Microsoft SQL Reporting Services Recommend 2008 R2
- XML (external interfaces)

Any exceptions to the Electronic File Format requirements above must be approved in writing by the Energy Commission Information Technology Services Branch.

TASK 1.0 ADMINISTRATION

MEETINGS

Task 1.1 Attend Kick-off Meeting

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement.

The Contractor shall:

- Attend a “kick-off” meeting with the Commission Contract Manager, the Contracts Officer, and a representative of the Accounting Office. The Contractor shall bring their Project Manager, Contracts Administrator, Accounting Officer, and others designated by the Commission Contract Manager to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the Commission Contract Manager will provide an agenda to all potential meeting participants.

The administrative portion of the meeting shall include, but not be limited to, the following:

- Terms and conditions of the Agreement
- CPRs (Task 1.2)
- Match fund documentation (Task 1.7)(if applicable)
- Permit documentation (Task 1.8) (if applicable)

The technical portion of the meeting shall include, but not be limited to, the following:

- The Commission Contract Manager’s expectations for accomplishing tasks described in the Scope of Work;
- An updated Schedule of Deliverables
- Progress Reports (Task 1.4)
- Technical Deliverables (Task 1.5)
- Final Report (Task 1.6)
- Establish the TAC (Task 1.9)
- TAC Meetings (Task 1.10)

Exhibit A SCOPE OF WORK

The Commission Contract Manager shall designate the date and location of this meeting.

Contractor Deliverables:

- An Updated Schedule of Deliverables
- An Updated List of Match Funds
- An Updated List of Permits
- Schedule for Recruiting TAC Members

Commission Contract Manager Deliverables:

- Final Report Instructions

Task 1.2 Critical Project Review Meetings

The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and if it should, are there any modifications that need to be made to the tasks, deliverables, schedule or budget.

CPRs provide the opportunity for frank discussions between the Energy Commission and the Contractor. CPRs generally take place at key, predetermined points in the Agreement, as determined by the Commission Contract Manager and as shown in the Technical Task List above and in the Schedule of Deliverables. However, the Commission Contract Manager may schedule additional CPRs as necessary, and any additional costs will be borne by the Contractor.

Participants include the Commission Contract Manager and the Contractor, and may include the Commission Contracts Officer, the PIER Program Team Lead, other Energy Commission staff and Management as well as other individuals selected by the Commission Contract Manager to provide support to the Energy Commission.

The Commission Contract Manager shall:

- Determine the location, date and time of each CPR meeting with the Contractor. These meetings generally take place at the Energy Commission, but they may take place at another location.
- Send the Contractor the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.
- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.
- Determine whether to continue the project, and if continuing, whether or not to modify the tasks, schedule, deliverables and budget for the remainder of the Agreement, including not proceeding with one or more tasks.
- Provide the Contractor with a written determination in accordance with the schedule. The written response may include a requirement for the Contractor to revise one or more deliverable(s) that were included in the CPR.

The Contractor shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include

Exhibit A SCOPE OF WORK

recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other deliverables identified in this Scope of Work. Submit these documents to the Commission Contract Manager and any other designated reviewers at least 15 working days in advance of each CPR meeting.

- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

Contractor Deliverables:

- CPR Report(s)
- CPR deliverables identified in the Scope of Work

Commission Contract Manager Deliverables:

- Agenda and a List of Expected Participants
- Schedule for Written Determination
- Written Determination

Task 1.3 Final Meeting

The goal of this task is to closeout this Agreement.

The Contractor shall:

- Meet with the Energy Commission to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Contractor, the Commission Contracts Officer, and the Commission Contract Manager. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the Commission Contract Manager.

The technical portion of the meeting shall present findings, conclusions, and recommended next steps (if any) for the Agreement. The Commission Contract Manager will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the Commission Contract Manager and the Contracts Officer about the following Agreement closeout items:

- What to do with any state-owned equipment (Options)
- Need to file UCC.1 form re: Energy Commission's interest in patented technology
- Energy Commission's request for specific "generated" data (not already provided in Agreement deliverables)
- Need to document Contractor's disclosure of "subject inventions" developed under the Agreement
- "Surviving" Agreement provisions, such as repayment provisions and confidential deliverables
- Final invoicing and release of retention

Exhibit A SCOPE OF WORK

- Prepare a schedule for completing the closeout activities for this Agreement.

Deliverables:

- Written documentation of meeting agreements and all pertinent information
- Schedule for completing closeout activities

REPORTING

See Exhibit D, Reports/Deliverables/Records.

Task 1.4 Quarterly Progress Reports

The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the research objectives of this Agreement.

The Contractor shall:

- Prepare progress reports which summarize all Agreement activities conducted by the Contractor for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the Commission Contract Manager within 10 working days after the end of the reporting period. Attachment A-2, Progress Report Format, provides the recommended specifications.

Deliverables:

- Quarterly Progress Reports

Task 1.5 Test Plans, Technical Reports and Interim Deliverables

The goal of this task is to set forth the general requirements for submitting test plans, technical reports and other interim deliverables, unless described differently in the Technical Tasks. When creating these deliverables, the Contractor shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager, the latest version of the PIER Style Manual published on the Energy Commission's web site:

<http://www.energy.ca.gov/contracts/pier/contractors/>

The Contractor shall:

- Unless otherwise directed in this Scope of Work, submit a draft of each deliverable listed in the Technical Tasks to the Commission Contract Manager for review and comment in accordance with the approved Schedule of Deliverables. The Commission Contract Manager will provide written comments back to the Contractor on the draft deliverable within 10 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final deliverable to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final deliverable within 5 working days of receipt. Key elements from this deliverable shall be included in the Final Report for this project.

Exhibit A SCOPE OF WORK

Task 1.6 Final Report

The goal of this task is to prepare a comprehensive written Final Report that describes the original purpose, approach, results and conclusions of the work done under this Agreement. The Commission Contract Manager will review and approve the Final Report. The Final Report must be completed on or before the termination date of the Agreement. When creating these deliverables, the Contractor shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager, the latest version of the PIER Style Manual published on the Energy Commission's web site:

<http://www.energy.ca.gov/contracts/pier/contractors/>

The Final Report shall be a public document. If the Contractor has obtained confidential status from the Energy Commission and will be preparing a confidential version of the Final Report as well, the Contractor shall perform the following subtasks for both the public and confidential versions of the Final Report.

Task 1.6.1 Final Report Outline

The Contractor shall:

- Prepare a draft outline of the Final Report.
- Submit the draft outline of Final Report to the Commission Contract Manager for review and approval. The Commission Contract Manager will provide written comments back to the Contractor on the draft outline within 10 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final outline to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final outline within 5 working days of receipt.

Deliverables:

- Draft Outline of the Final Report
- Final Outline of the Final Report

Task 1.6.2 Final Report

The Contractor shall:

- Prepare the draft Final Report for this Agreement in accordance with the approved outline.
- Submit the draft Final Report to the Commission Contract Manager for review and comment. The Commission Contract Manager will provide written comments within 10 working days of receipt.

Once agreement on the draft Final Report has been reached, the Commission Contract Manager shall forward the electronic version of this report for Energy Commission internal approval. Once the approval is given, the Commission Contract Manager shall provide written approval to the Contractor within 5 working days.

- Submit one bound copy of the Final Report with the final invoice.

Exhibit A SCOPE OF WORK

Deliverables:

- Draft Final Report
- Final Report

MATCH FUNDS, PERMITS, AND ELECTRONIC FILE FORMAT

Task 1.7 Identify and Obtain Matching Funds

The goal of this task is to ensure that the match funds planned for this Agreement are obtained for and applied to this Agreement during the term of this Agreement.

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. While the PIER budget for this task will be zero dollars, the Contractor may utilize match funds for this task. Match funds shall be spent concurrently or in advance of PIER funds during the term of this Agreement. Match funds must be identified in writing, and the associated commitments obtained before the Contractor can incur any costs for which the Contractor will request reimbursement.

The Contractor shall:

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting:
 1. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state such in the letter.
 2. If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:
 - A list of the match funds that identifies the:
 - Amount of each cash match fund, its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied.
 - Amount of each in-kind contribution, a description, documented market or book value, and its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Contractor shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located.
 - A copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured.

Exhibit A SCOPE OF WORK

- Discuss match funds and the implications to the Agreement if they are significantly reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide the appropriate information to the Commission Contract Manager if during the course of the Agreement additional match funds are received.
- Notify the Commission Contract Manager within 10 working days if during the course of the Agreement existing match funds are reduced. Reduction in match funds may trigger an additional CPR.

Deliverables:

- A letter regarding Match Funds or stating that no Match Funds are provided
- Letter(s) for New Match Funds
- A copy of each Match Fund commitment letter
- Letter that Match Funds were Reduced (if applicable)

Task 1.8 Identify and Obtain Required Permits

The goal of this task is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track.

Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement. While the PIER budget for this task will be zero dollars, the Contractor shall show match funds for this task. Permits must be identified in writing and obtained before the Contractor can incur any costs related to the use of the permits for which the Contractor will request reimbursement.

The Contractor shall:

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting:
 1. If there are no permits required at the start of this Agreement, then state such in the letter.
 2. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
 - A list of the permits that identifies the:
 - Type of permit
 - Name, address and telephone number of the permitting jurisdictions or lead agencies
 - Schedule the Contractor will follow in applying for and obtaining these permits.

Exhibit A SCOPE OF WORK

- The list of permits and the schedule for obtaining them will be discussed at the kick-off meeting, and a timetable for submitting the updated list, schedule and the copies of the permits will be developed. The implications to the Agreement if the permits are not obtained in a timely fashion or are denied will also be discussed.
If applicable, permits will be included as a line item in the progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the appropriate information on each permit and an updated schedule to the Commission Contract Manager.
- As permits are obtained, send a copy of each approved permit to the Commission Contract Manager.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Contract Manager within 5 working days. Either of these events may trigger an additional CPR.

Deliverables:

- A letter documenting the Permits or stating that no Permits are required
- Updated list of Permits as they change during the Term of the Agreement
- Updated schedule for acquiring Permits as it changes during the Term of the Agreement
- A copy of each approved Permit

Technical Advisory Committee (TAC)

Task 1.9 Establish the TAC

The goal of this task is to create an advisory committee for this Agreement.

The TAC should be composed of diverse professionals. The number can vary depending on potential interest and time availability. The exact composition of the TAC may change as the need warrants. TAC members serve at the discretion of the Commission Contract Manager.

The TAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter
- Members of the trades who will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives)
- Public Interest Market Transformation Implementers
- Product Developers relevant to project subject matter
- U.S. Department of Energy Research Manager
- Public Interest Environmental Groups
- Utility Representatives
- Members of the relevant technical society committees

Exhibit A SCOPE OF WORK

The purpose of the TAC is to:

- Provide guidance in research direction. The guidance may include scope of research; research methodologies; timing; coordination with other research. The guidance may be based on:
 - technical area expertise
 - knowledge of market applications
 - linkages between the agreement work and other past, present or future research (both public and private sectors) they are aware of in a particular area.
- Review deliverables. Provide specific suggestions and recommendations for needed adjustments, refinements, or enhancement of the deliverables.
- Evaluate tangible benefits to California of this research and provide recommendations, as needed, to enhance tangible benefits.
- Provide recommendations regarding information dissemination, market pathways or commercialization strategies relevant to the research products.

The Contractor shall:

- Prepare a draft list of potential TAC members that includes name, company, physical and electronic address, and phone number and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting. This list will be discussed at the kick-off meeting and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members and ensure that each individual understands the member obligations described above, as well as the meeting schedule outlined in Task 1.11.
- Prepare the final list of TAC members.
- Submit letters of acceptance or other comparable documentation of commitment for each TAC member.

Deliverables:

- Draft List of TAC Members
- Final List of TAC Members
- Letters of acceptance, or other comparable documentation of commitment for each TAC Member

Task 1.10 Conduct TAC Meetings

The goal of this task is for the TAC to provide strategic guidance to this project by participating in regular meetings or teleconferences.

Exhibit A SCOPE OF WORK

The Contractor shall:

- Discuss the TAC meeting schedule at the kick-off meeting. The number of face-to-face meetings and teleconferences and the location of TAC meetings shall be determined in consultation with the Commission Contract Manager. This draft schedule shall be presented to the TAC members during recruiting and finalized at the first TAC meeting.
- Organize and lead TAC meetings in accordance with the schedule. Changes to the schedule must be pre-approved in writing by the Commission Contract Manager.
- Prepare TAC meeting agenda(s) with back-up materials for agenda items.
- Prepare TAC meeting summaries, including recommended resolution of major TAC issues.

Deliverables:

- Draft TAC Meeting Schedule
- Final TAC Meeting Schedule
- TAC Meeting Agenda(s) with Back-up Materials for Agenda Items
- Written TAC meeting summaries, including recommended resolution of major TAC issues

TECHNICAL TASKS

TASK 2 SOLICITATION MANAGEMENT AND SUBCONTRACTOR(S) SELECTION

The goal of this task is to manage a solicitation in order to select technical experts that will be capable of developing a natural gas engine suitable for heavy duty vehicles according to the goals of this Agreement.

The Contractor Shall:

- Prepare the Program Management Manual, which will include but not be limited to the following:
 - The Project Selection Process:
 - Project selection must integrate Energy Commission staff into the process, given the Energy Commission's role as selection team participant and final conveyor of subcontractor awards to the Energy Commission business meeting. The Contractor must clearly delineate the process by which proposals are received, screened, evaluated and brought before the Energy Commission for funding recommendation. The Contractor and Energy Commission staff will integrate the project evaluation and selection process.
 - Contract Project Management and Support:
 - The Manual will describe the roles and responsibilities of the Contractor, the award methods and applicability, and the appropriate resource levels (including anticipated travel) to be allocated to project and contract management to ensure the highest quality project work.

Exhibit A SCOPE OF WORK

- Program Eligibility. The Contractor will provide an analysis of eligibilities, based on business type, such as national research laboratories, small and large private businesses, educational institutions, and non-profit organizations, and provide written recommendations. Final eligibility will be determined at the time the solicitation is prepared.
- Financial and Credit Screening Criteria. The Contractor will use generally acceptable accounting and financial guidelines to produce screening criteria necessary to maintain the state's fiduciary responsibilities concerning the funds used for the grant program. Such criteria may include, but are not limited to:
 - Past bankruptcies (any in the previous seven years)
 - Adverse credit history
 - Known criminal activity
 - Known rejection or dismissal from any other funding program due to malfeasance
- Project Selection Criteria. The Contractor will establish project selection criteria using, at a minimum, the following:
 - The concept must be energy-related and must propose RD&D activities that will advance science or technology not adequately provided by competitive and regulated markets,
 - The concept must be intended to provide clearly identifiable benefits to California's ratepayers
 - The concept must primarily address the PIER natural gas transportation subject area or otherwise as identified by the organization of the Energy Research and Development Division within the Energy Commission,
 - The concept must have a reasonable market-connected goal,
 - The conceptual basis for the project must require a feasibility analysis or performance determination (in the context of its application and within the award amount.)

As part of the project selection process, the Contractor will establish a relative weighting system for scoring proposals using the selection criteria. In addition, the Contractor will identify personnel responsible for scoring proposals and making final recommendations for funding. The Contractor will ensure that Energy Commission staff are integrated into the project selection and scoring process.

- Intellectual Property Procedures
The Contractor will establish procedures to protect the intellectual property of the applicants and any intellectual property generated by or on behalf of the grant applicant during the project. The procedures will include optional assistance in filing for Provisional Patent Protection with the US Patent Office at the expense of the subcontractor, and may include non-disclosure agreements and other appropriate means to cover applicable Contractor staff, faculty and subcontractors.

Exhibit A SCOPE OF WORK

- Subcontractor Terms and Conditions
The Contractor will establish terms and conditions for Subcontractors that are acceptable to the Energy Commission.
 - Both the Intellectual Property Procedures and the Subcontractor Terms and Conditions listed above are subject to review and comment of the Commission Contract Manager and the Commission Legal Office.
- Issue a Request for Proposals (RFP) developed with input from the Energy Commission and other funding partners, and include project requirements, scoring criteria, and any additional information that should be provided to prospective applicants.
- Using the scoring criteria developed by SCAQMD in conjunction with the Energy Commission, score and rank the submitted projects based on input and scores provided by the Energy Commission and other funding partners.
- After receiving written direction from the Commission Contract Manager, the Contractor will release and advertise the RFP.
- Designated staff from the Energy Commission will be part of the Contractor's selection team for all solicitations. The Energy Commission's role in project selection will encompass both the technical and cost elements of the subcontractor (s) award. The participating Energy Commission staff must be satisfied that the technical cost elements of the subcontract are reasonable and justifiable before recommending the subcontractor award for Energy Commission approval.
- The Contractor will prepare a "Subcontractor Project Recommendation" for each selected project award and provide the package to the Commission Contract Manager. Each project recommendation shall, at minimum, contain the following:
 - A sequential identification number,
 - A funding justification,
 - A project scope of work, and schedule,
 - A project budget showing all proposed expenditures of funds and uses and costs of all facilities and expertise.
- The Contractor shall be available to present facts pertaining to these proposed projects to Energy Research and Development Division (ERDD) Management, the appropriate Lead Commissioner and/or to the full Energy Commission at its business meeting.
- The Energy Commission in conjunction with the other funding partners decides which projects to fund. Develop a List of Ranked Subcontractors and Funding Amounts based on approval of the Energy Commission. This list is used to inform awardee(s) that they have been approved for an award.
- Prepare subcontract(s).

Contractor Deliverables:

- Copy of Final RFP
- Program Management Manual
- Subcontractor Project Recommendation
- List of Ranked Subcontractors and Funding Amounts

Exhibit A SCOPE OF WORK

TASK 3 ENGINE DEVELOPMENT

The goal of this task is to develop a commercially viable natural gas engine(s) and after-treatment technologies suitable for various heavy-duty vehicle applications that meet or exceeds CARB and Environmental Protection Agency (U.S. EPA) 2010 on-road emissions regulations. Information will also be collected on the specifications of the natural gas that will be used for the engine testing and on-road vehicle demonstration described in Task 4 and Task 5.

Task 3.1 Fuel Specification

The Contractor shall:

- Work with the subcontractors to collect natural gas fuel specification information indicating that the fuel being used for testing meets specifications for natural gas engine certification.
- Work with the subcontractors to prepare Natural Gas Fuel Specification Report that includes fuel specification information including but not limited to:
 - Methane, ethane, propane, I-butane, nitrogen gas (N₂), and carbon dioxide (CO₂) levels
 - Methane number (MN) determined via CARB calculations
 - Wobbe Number/Index
 - Higher Heating Value
 - H/C (hydrogen to carbon) ratio

Contractor Deliverables:

- Natural Gas Fuel Specification Report

Task 3.2 Engine Development

The Contractor shall:

- Obtain a detailed Work Plan from each subcontractor for the design, analysis, and development of the proposed natural gas engine and after-treatment technologies. The Work Plan, at a minimum, should include:
 - Specifications and conceptual design strategy of the proposed heavy-duty natural gas engine and associated exhaust after-treatment technologies suitable for heavy-duty vehicle chassis and powertrain strategies in refuse, goods movement, drayage, and transit and school buses' market fleets.
 - A detailed feasibility and risk analysis of the design strategy addressing, at a minimum, the development strategies for:
 - Engine mechanical components including base engine components, power cylinder components (pistons, rings, bores, liners, etc), intake/exhaust manifolds, cylinder heads, turbo

Exhibit A SCOPE OF WORK

machinery, fuel system components, exhaust gas recirculation subsystem, etc.

- Engine control system including electronic, hardware, and software controls, sensors, valves, actuators, ignition system, on-board diagnostics and the interface with various mechanical engine systems, after-treatment technology, vehicle electronics and any application specific interface requirements or control system performance features.
 - Exhaust after-treatment technology and associated subsystems components.
 - Engine mechanical components and vehicle interface and packaging requirements.
 - Emissions certification to ensure that the proposed heavy-duty natural gas engine and associated exhaust after-treatment technology are thermally and fuel efficient, and certified by the U.S. EPA and CARB to meet the emissions targets of 0.02 g/bhp-hr NO_x, 0.01 g/bhp-hr PM, 0.14 g/bhp-hr HC, and 15.5 g/bhp-hr CO or lower as determined by the heavy-duty engine FTP while keeping exhaust NH₃ emissions as low as achievable.
-
- Have each of the subcontractors build a minimum of one (1) prototype engine and exhaust after-treatment technology for initial laboratory testing and evaluation.
 - Work with each of the subcontractors to implement modifications and refinements to the engine, engine subsystem and exhaust after-treatment technology to meet the product specifications as needed. In cases where product specifications must be updated during the development process, the subcontractors shall identify the changes, evaluate the impact of the change, and review them with Contractor for approval before proceeding.
 - Upon completion of the detailed design and the initial prototype engine and associated exhaust after-treatment system evaluation, the Contractor shall have each of the subcontractors:
 - Build a minimum of one (1) production-intent or production engine and exhaust after-treatment technology for final performance and emissions validation.
 - Perform transient dynamometer tests per the U.S. EPA heavy-duty on-highway FTP to determine BSFC and HC, NO_x, CO, PM, NH₃, N₂O, NO₂, CO₂, and ultrafine emissions from the production-intent or production engine with and without the exhaust after-treatment technology. The testing shall be conducted using natural gas that is laboratory tested to comply with CCR Title 13 Section 2292.5.
 - Utilize their internal product development and validation procedures to establishing minimum quantities and specific validation requirements, but at a minimum, the subcontractor must perform a full validation of the product specifications and document the results. The subcontractor should conduct an initial engine durability testing program for a minimum of 250 hours, or as defined by the subcontractor and approved by the Contractor.

Exhibit A SCOPE OF WORK

- Obtain from the subcontractors production or production-intent engines available for independent dynamometer emissions and performance testing during this project, as directed by the Contractor. In addition, the subcontractor shall provide a complete engines system and any required appurtenance necessary to conduct the testing and arrange for on-site engineering support to facilitate the testing.
- Obtain from the subcontractors Prototype Engine Performance Specifications and Photos for each of the completed engine prototypes. Engine specifications should include, but are not limited to: brake horsepower and torque ratings, engine displacement, compression ratio and bore and stroke.
- Have each of the subcontractors submit a draft and final Certification Pathway report identifying proposed path towards eventual emissions certification of the engine and exhaust after-treatment technology and commercialization of the product. This report shall include specific high-level activities and proposed timeline for the commercialization of the engine.

Contractor Deliverables:

- Final Engine Work Plan
- Prototype Engine Performance Specifications and Photos
- Draft Certification Pathway Report
- Final Certification Pathway Report

TASK 4 VEHICLE INTEGRATION

The goal of this task is to integrate the developed natural gas engine into multiple heavy-duty vehicle applications.

The Contractor shall:

- Obtain a detailed Integration Work Plan from each subcontractor for the design, feasibility and risk analysis, assemblage, and validation of prototype and production vehicle for heavy-duty vehicle applications. Specifically, the work-plan shall include, at a minimum:
 - Vehicle specifications and a conceptual design strategy suitable for heavy-duty vehicle chassis and powertrain strategies in refuse, goods movement, drayage, and transit and school buses' market fleets.
 - A detailed feasibility and risk analysis of the design strategy in Task 3 addressing, at a minimum, the integration strategies for:
 - Mechanical components including engine mounting requirement, transmission interface, driveline requirements, cooling and air interface, cooling system requirements, fan drive requirements, air conditioning compressor interface, axle ratio, transmission ratios, and other mechanical systems.
 - Fuel system including fuel storage strategy (CNG/LNG), storage capacity requirements, storage tank installation

Exhibit A SCOPE OF WORK

- Electrical systems including vehicle communication protocols, on-board diagnostics requirements, diagnostic connector locations, engine and control system power/grounding, Electromagnetic Interference/Electromagnetic Compatibility, wiring interface requirements and design, electrical component installation, fuel level display, electronic foot pedal, remote throttle, Anti-lock Braking System or traction control interface, charging system, exhaust after-treatment system control and diagnostics.
 - Exhaust after-treatment and associated sub-system requirements, diesel exhaust fluid freeze protection if required, heat protection, piping material requirements, packaging and mounting, etc
- Work with each of the subcontractors to conduct detailed design of the vehicle to integrate the production-intent or production engines and exhaust after-treatment systems built in Task 3, update product specifications, as required and as design details are solidified, and build a minimum of one (1) prototype vehicle for initial testing and evaluation.
- As needed, work with each of the subcontractors to implement modifications and refinements to the vehicle integration to meet the product specifications and comply with engine and exhaust after-treatment technology manufacturers' requirements and other design requirements including codes and standards. In cases where product specifications must be updated during the integration process, the subcontractor shall identify the changes, evaluate the impact of the change, and review them with Contractor for approval before proceeding.
- Upon completion of the detailed design and the initial prototype vehicle evaluation, have each of the subcontractors:
 - Build a minimum of one (1) production-intent or production vehicle for final performance and emissions validation (total quantity shall be defined by the Contractor based upon the Contractor's internal product validation requirements).
 - Utilize their internal product development and validation procedures to establishing minimum quantities and specific validation requirements. At a minimum, the subcontractor must perform a full validation of the product specifications and document the results in the compliance matrix. The subcontractor is encouraged to conduct an initial vehicle emissions tests to confirm performance and emissions expectations.
- Obtain a production or production-intent vehicle from each of the subcontractors available for independent chassis dynamometer emissions and performance testing during this project, as directed by the Contractor. In addition, each subcontractor shall provide a complete vehicle system

Exhibit A SCOPE OF WORK

- Obtain a Commercialization Pathway Report identifying proposed path towards commercialization of the product from each of the subcontractors. This report shall include specific high-level activities and proposed timeline for the commercialization of the vehicle.

Contractor Deliverables:

- Draft Integration Work Plan
- Final Integration Work Plan
- Draft Commercialization Pathway Report
- Final Commercialization Pathway Report

TASK 5 VEHICLE DEMONSTRATION

The goal of this task is to deploy the developed engines in multiple vehicle applications for on-road demonstration and testing. At least one vehicle should be deployed in both the San Joaquin Valley and South Coast Air Districts.

The Contractor shall:

- Deploy to the field, a minimum of three (3) vehicles per subcontractor, preferably in multiple applications, in both the South Coast and San Joaquin Valley Air Basins.
- Conduct at least six (6) months of field demonstration for each vehicle, including monitoring and support.
- Identify, characterize, and resolve operational and/or performance issues prior to commercial product launch.
- Document the in-service performance of the demonstration fleet, including mileage accumulation, vehicle downtime, maintenance and repair frequency, and operating costs.
- Validate vehicle fuel efficiency for each vehicle to within 20% or lower of comparable diesel vehicles over comparable duty cycles.
- Prepare an On-Road Demonstration Vehicle Report discussing the following for each vehicle:
 - Duty cycle selection, estimated mileage accumulation, range and geographic location of vehicles selected for on-road demonstration, including photographs of vehicles.
 - Performance specifications of the engine for each of the vehicles used in the demonstration. Performance specifications should include the torque and brake horsepower rating of the engine used in each vehicle.
 - Operational and/or performance issues with on-road demonstration, including downtime, actual mileage accumulation, and operating costs over the full demonstration period.Chassis dynamometer testing of vehicle level tailpipe emissions and

Exhibit A SCOPE OF WORK

- fuel economy for a representative vehicle.
- Compatibility results of the on-board fuel storage and delivery system with a variety of operating and ambient conditions, including lessons learned and recommendations for future designs.

Contractor Deliverables:

- Draft On-Road Demonstration Vehicle Report
- Final On-Road Demonstration Vehicle Report

TASK 6 DATA COLLECTION AND ANALYSIS

The goals of this task are to collect operational data, analyze the data for economic and environmental impacts, and include the data and analysis in the Final Report. Data will be collected and included in the analysis report for each project completed by the subcontractor(s).

The Contractor shall:

- Provide data on potential job creation, market potential, economic development, and increased state revenue as a result of expected future expansion for each project.
- Provide an estimate for each of the project's energy savings and other benefits and potential statewide energy savings once market potential has been realized.
- Compare project performance and expectations provided in each of the proposals with actual project performance and accomplishments.
- Prepare a Data Analysis Report. The Data analysis report should include data collected for each of the individual projects completed by the subcontractors, as well as aggregate data that provides an overall analysis of the overall project performance.
 - Develop a Data Collection Test Plan based on input from the Energy Commission Project Manager. The plan should be used to collect information from each of the projects completed by the subcontractors. The plan will include but not be limited to a discussion of the following:
 - Energy savings and estimated cost savings
 - Greenhouse gas reductions
 - Petroleum usage displacement
 - Air quality criteria pollutant reductions
 - Other non-energy benefits

Contractor Deliverables:

- Draft Data Analysis Report
- Final Data Analysis Report

TASK 7 TECHNOLOGY TRANSFER ACTIVITIES

Exhibit A SCOPE OF WORK

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to key decision-makers.

The Contractor shall:

- Prepare a Technology Transfer Plan that explains how the knowledge gained in this project will be made available to the public. The level of detail expected is least for research-related projects and highest for demonstration projects. Key elements from this report will be included in the Final Report.
- Conduct technology transfer activities in accordance with the Technology Transfer Plan. These activities will be reported in the Monthly Progress Reports.
- Indicate the intended use(s) for and users of the project results.

Contractor Deliverables:

- Draft Technology Transfer Plan
- Final Technology Transfer Plan