



COORDINATING RESEARCH COUNCIL, INC.

5755 NORTH POINT PARKWAY, SUITE 265
ALPHARETTA, GA 30022
TEL: 678/795-0506 FAX: 678/795-0509
WWW.CRCAO.ORG

February 21, 2017

In reply, refer to:

CRC Project No. A-110

Dear Prospective Bidder:

The Coordinating Research Council (CRC) invites you to submit a written proposal to provide services for “Scoping Study for Rewrite of MOVES for Efficiency,” (CRC Project No. A-110). A description of the project is presented in Exhibit A, “Statement of Work.”

Please indicate by letter, fax, or email by **March 3, 2017** if you or your organization intends to submit a written proposal for this research program. CRC will answer technical questions regarding the Request for Proposal if they are submitted in writing. CRC will then return written answers to all of the bidders, along with a copy of the original questions.

A CRC technical group composed of industry representatives will evaluate your proposal. CRC reserves the right to accept or reject any or all proposals.

The reporting requirements will be monthly progress reports and a summary technical report at the end of the contractual period. The reporting requirements are described in more detail in the attachment entitled “Reports” (Exhibit B).

The proposal must be submitted as two separate documents. The technical approach to the problem will be described in Part One, and a cost breakdown that is priced by task will be described in Part Two. The cost proposal document should include all costs associated with conducting the proposed program. The technical proposal shall not be longer than 10 pages in length.

CRC expects to negotiate a cost-plus fixed fee or cost reimbursement contract for the research program.

Contract language for intellectual property and liability clauses is presented in Exhibit C and in Exhibit D, respectively.

Important selection factors to be taken into account are listed in Exhibit E. CRC evaluation procedures require the technical group to complete a thorough technical evaluation before considering costs. After developing a recommendation based on technical considerations, the costs are revealed and the recommendation is modified as needed.

Electronic copies of the technical and cost proposals should be submitted to:

Brent K. Bailey
Coordinating Research Council
5755 North Point Parkway, Suite 265
Alpharetta, GA 30022

Phone: 678-795-0506
Fax: 678-795-0509
E-mail: bkbailey@crcao.org

The deadline for receipt of your proposal is **March 17, 2017**.

Yours truly,

A handwritten signature in blue ink that reads "Brent K. Bailey". The signature is written in a cursive style with a large initial "B".

Brent K. Bailey
Executive Director

EXHIBIT A

Statement of Work

Scoping Study for Rewrite of MOVES for Efficiency

Objective:

The ultimate goal is to make it quicker for state and local air agencies and US EPA to obtain the MOVES (Motor Vehicle Emission System) results. This project intends to focus on the architecture MOVES uses to calculate the results.

\$20K is approved for the project.

Background:

MOVES began development in April, 2001 to replace MOBILE6. MOVES was required for implementation beginning in 2005. The original MOVES architecture has not been changed. However, over 15 years have passed since original code was written. Many improvements have occurred in computing since then. Meanwhile, regional, state, local, and tribal regulatory agencies, as well as academia and the EPA, are dependent on the on-road emissions estimated by EPA's MOVES model. The MOVES model stakeholders have experienced significant computational barriers. For example, currently developing a national modeling inventory takes over 32,000 CPU hours. The Amazon cloud requires the same amount of hours, but is faster due to using many computers to perform the calculations. This computation time has created a significant barrier to inventory development. Time consuming components could include code complexity, computational resources, multiple disparate computer languages, and computational scalability.

While data are sometimes provided by state and local air quality agencies as part of the NEI process, many states are unable to provide such data. Reducing the MOVES computation time should make it easier for state and local air agencies to produce the MOVES results.

For reference, EPA has:

- Created an “Advanced Performance Features” panel that allows users to save calculations for reuse.
 - Reduced table size and indexed tables extensively to speed up table joins.
 - Multi-threaded many components of the model to take advantage of multiple processors.
 - Created a grid of Virtual Machines so the model can be tested in different configurations
 - Evaluated the components of MOVES to identify those that take the most time for different types of runs.
 - Re-written bottleneck code in the GO language, demonstrating significant time savings.
- Even though all these improvements are not ready for usage, these steps do not need to be repeated.

Methodology:

This project is seeking a contractor to evaluate MOVES architecture, i.e. the core MOVES model methodologies and languages. This work is to be done independently of the EPA MOVES team. The contractor should:

Evaluate the coding language used to develop MOVES and propose alternatives that can accomplish all relevant components. We expect a traditional database is will not efficiently speed up the model. CRC's expectations are to increase processing speed 40+ times from the next release MOVES efficiency improvements.

Estimate the expected contracting cost and challenges to perform a language rewrite.

To accomplish 1 & 2, we would expect the results to include:

Evaluate those components of the process most responsible to slow processing (after the above mentioned improvements) and how those code elements are likely to be improved upon rewrite.

Evaluate the components that can be multi-threaded. Evaluate how multiple instances of the model can be run simultaneously on the same system with multiple CPUs and many systems to provide increased scalability.

Evaluate components of the process that are redundantly run by the model, but could be stored for multiple runs. NOTE: Documentation for storing and re-using Core Model Input Table (CMIT) data may be the most useful objective for this project.

Project Deliverables:

Specific deliverables are:

Work plan with details.

Monthly status reports and a final report suitable for journal publication are required.

The proposal should factor the purchase of any data into the cost.

It is not the responsibility of CRC to provide or purchase data.

If any computer code is developed as part of this project, the code should be made available without any licensing restrictions.

If there is any reason the contractor cannot complete the project by June 30, 2017, it should be explained clearly in the proposal.

Utilization of Deliverables:

The expected products from this project would be used by EPA, states, and stakeholders to evaluate a further project to rewrite the model in a form that would be acceptable by EPA as a SIP approvable replacement for MOVES. These results would provide talking points for these discussions.

EXHIBIT B
REPORTS

MONTHLY TECHNICAL PROGRESS REPORTS

The contractor shall submit a monthly technical progress report covering work accomplished during each calendar month of the contract performance. An electronic Microsoft® Word compatible file (<1 MB) of the monthly technical progress report shall be distributed by the contractor within ten (10) calendar days after the end of each reporting period. The report shall contain a description of overall progress, plus a separate description for each task or other logical segment of work on which effort was expended during the reporting period.

FINAL REPORT

The contractor shall submit to or distribute for CRC an electronic (Microsoft Word) copy transmittable via email of a rough draft of a final report within thirty (30) days after completion of the technical effort specified in the contract. The report shall document, in detail, the test program and all of the work performed under the contract. The report shall include tables, graphs, diagrams, curves, sketches, photographs and drawings in sufficient detail to comprehensively explain the test program and results achieved under the contract. The report shall be complete in itself and contain no reference, directly or indirectly, to the monthly report(s).

The draft report must have appropriate editorial review corrections made by the contractor prior to submission to CRC to avoid obvious formatting, grammar, and spelling errors. The report should be written in a formal technical style employing a format that best communicates the work conducted, results observed, and conclusions derived. Standard practice typically calls for a CRC Title Page, Disclaimer Statement, Foreword/Preface, Table of Contents, List of Figures, List of Tables, List of Acronyms and Abbreviations, Executive Summary, Background, Approach (including a full description of all experimental materials and methods), Results, Conclusions, List of References, and Appendices as appropriate for the scope of the study. Reports submitted to CRC shall be written with a degree of skill and care customarily required by professionals engaged in the same trade and /or profession.

Within thirty (30) days after receipt of the approved draft copy of the final report, the contractor shall make the requested changes and deliver to CRC ten (10) hardcopies including a reproducible master copy of the final report. The final report shall also be submitted as electronic copies in a pdf and Microsoft Word file format. The final report may be prepared using the contractor's standard format, acknowledging author and sponsors. An outside CRC cover page will be provided by CRC. The electronic copy will be made available for posting on the CRC website.

EXHIBIT C

INTELLECTUAL PROPERTY RIGHTS

Title to all inventions, improvements, and data, hereinafter, collectively referred to as (“Inventions”), whether or not patentable, resulting from the performance of work under this Agreement shall be assigned to CRC. Contractor X shall promptly disclose to CRC any Invention which is made or conceived by Contractor X, its employees, agents, or representatives, either alone or jointly with others, during the term of this agreement, which result from the performance of work under this agreement, or are a result of confidential information provided to Contractor X by CRC or its Participants. Contractor X agrees to assign to CRC the entire right, title, and interest in and to any and all such Inventions, and to execute and cause its employees or representatives to execute such documents as may be required to file applications and to obtain patents covering such Inventions in CRC’s name or in the name of CRC’s Participants or nominees. At CRC’s expense, Contractor X shall provide reasonable assistance to CRC or its designee in obtaining patents on such Inventions.

To the extent that a CRC member makes available any of its intellectual property (including but not limited to patents, patent applications, copyrighted material, trade secrets, or trademarks) to Contractor X, Contractor X shall have only a limited license to such intellectual property for the sole purpose of performing work pursuant to this Agreement and shall have no other right or license, express or implied, or by estoppel. To the extent a CRC member contributes materials, tangible items, or information for use in the project, Contractor X acknowledges that it obtains only the right to use the materials, items, or information supplied for the purposes of performing the work provided for in this Agreement, and obtains no rights to copy, distribute, disclose, make, use, sell or offer to sell such materials or items outside of the performance of this Agreement.

EXHIBIT D

LIABILITY

It is agreed and understood that _____ is acting as an independent contractor in the performance of any and all work hereunder and, as such, has control over the performance of such work. _____ agrees to indemnify and defend CRC from and against any and all liabilities, claims, and expenses incident thereto (including, for example, reasonable attorneys' fees) which CRC may hereafter incur, become responsible for or pay out as a result of death or bodily injury to any person or destruction or damage to any property, caused, in whole or in part, by _____'s performance of, or failure to perform, the work hereunder or any other act of omission in connection therewith.

EXHIBIT E

PROPOSAL EVALUATION CRITERIA

- 1) Merits of proposed technical approach.
- 2) Previous performance on related research studies.
- 3) Personnel available for proposed study – related experience.
- 4) Timeliness of study completion.
- 5) Cost.