



COORDINATING RESEARCH COUNCIL, INC.

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WWW.CRCAO.ORG

March 9, 2016

In reply, refer to:

CRC Project No. E-102-2

Dear Prospective Bidder:

The Coordinating Research Council (CRC) invites you to submit a written proposal to provide services for “Review of Critical Parameters for Corn Ethanol and Soybean Renewable Diesel Pathways,” (CRC Project No. E-102-2). A description of the project is presented in Exhibit A, “Statement of Work.”

Please indicate by letter, fax, or email by **March 23, 2016** 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:

Dr. Christopher J. Tennant
Coordinating Research Council
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The deadline for receipt of your proposal is **April 8, 2016**.

Yours truly,

Christopher J. Tennant
Deputy Director

EXHIBIT A

Statement of Work

Review of Critical Parameters for Corn Ethanol and Soybean Renewable Diesel Pathways

Introduction

In 2013, the Coordinating Research Council (CRC) sponsored a study to better quantify sources of uncertainty and variability in selected LCA models that are being used to regulate fuels by conducting an in-depth evaluation of model inputs, and the associated uncertainties¹. The study assessed four LCA models used for regulation, namely GREET, RFS2, GHGenius, and BioGrace. The report reviewed the following pathways:

- Petroleum gasoline/diesel
- Corn ethanol
- Soybean biodiesel/renewable diesel (RD)
- Sugarcane ethanol
- Cellulosic ethanol
- Natural gas

For each pathway, key parameters were identified to evaluate the overall uncertainty in the carbon intensity (CI) of the pathway. The uncertainty analysis was based upon selecting statistical attributes for the parameter distribution vis-à-vis the default values in GHGenius model. This statement of work (SOW) proposes to support the uncertainty analysis with supporting data from published literature. The objective is to find a range of values and/or parameter distributions outside of the default values for a specific pathway in GREET, GHGenius, or BioGrace. The SOW is divided into the following sub-tasks:

Task 1: Review of Literature for Corn Ethanol Pathway

The specific objective of this task is to review the literature for N₂O emissions and ethanol plant energy use for corn ethanol pathway. The N₂O emissions (both direct and indirect) from nitrogen fertilizer use and the ethanol plant energy use have been determined to be the key parameters for the corn ethanol pathway based upon the CRC E-102 report¹. Most of the LCA models estimate the N₂O emissions based upon the Intergovernmental Panel on Climate Change (IPCC) methodology². The default IPCC value for the direct N₂O emission factor is 0.01 kg N₂O-N with the uncertainty range of 0.003 – 0.03. The indirect N₂O emissions are from volatilization of synthetic fertilizer and leaching/run off from managed soils. The selection of uncertainty range for volatilization and leaching emission factors is based upon climatic and soil conditions and are likely to inversely correlated (e.g. high volatilization would be accompanied with low leaching). The uncertainty range provided by IPCC for indirect N₂O emissions from volatilization and leaching/runoff cannot be added mathematically as it would lead to mass balance error on the amount of fertilizer applied.

¹ CRC (2013). Transportation Fuel Life Cycle Assessment: Validation and Uncertainty of Well-to-Wheel GHG Estimates. CRC Report No. E-102. <http://www.crao.org/reports/recentstudies2013/E-102/CRC%20E%20102%20Final%20Report.pdf> (Accessed 9th November, 2015)

² IPCC (2006). N₂O Emissions from Managed Soils and CO₂ emissions from Lime and Urea Application. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_11_Ch11_N2O&CO2.pdf (Accessed 10th November, 2015)

Ethanol plants in North America and the E.U. can be very different in terms of the energy used to operate the facilities. For instance, the E.U. predominately uses natural gas to operate their ethanol plants but also has cogeneration infrastructure. The U.S. and Canada use a variety of energy inputs in the form of coal, natural gas, and electricity to operate their ethanol facilities. The LCA models used in the U.S. and Canada (GREET and GHGenius, respectively) incorporate fuel mix shares based upon publicly available studies on ethanol plants. However, the E.U. uses only natural gas and electricity as fuel inputs into the LCA model (BioGrace). It is not clear whether a selected literature range of energy input values used in all three of these LCA models would be representative of the current technology mix of North America and the E.U. ethanol plants. The difference in ethanol plant operations requires a detailed technical evaluation in order to determine the appropriate energy input ranges for each of the different LCA models. The literature cited for default values for these parameters in GREET 2014, Bio Grace v. 4c and GHGenius v4.03a should be included. The time horizon for published data and/or literature is 2010 – 2015. The N₂O emissions would include both direct and indirect emissions. The ethanol plant energy use review should be representative of the industry's performance as of today. Much of the challenge in determining representative values is due to the variations in energy feedstock's going into the ethanol plants in the different countries. The range of values should be representative of the total plant energy use, total natural gas use, total coal use, and total electricity use.

The contractor will be required to write a final report summarizing literature review and provide a range of values for N₂O emissions and total ethanol plant energy use and process fuel share breakdown and also suggest an alternate default value if the current default value in the three models is not representative of technology mix and practices in use. The contractor is encouraged to review the literature cited in GREET 2014, BioGrace, and GHGenius. These range of values provided should be in GREET model units as well as the standard units for each model. The final report should include a detailed section on the steps taken in determining the range of values chosen. A list of literature references should be provided and cited in the report to support the selected range of values.

Task 2: Review of Literature for Other E-102 Pathways

In addition to corn ethanol, the CRC E-102 report also identified key parameters for petroleum and biofuel pathways listed in the Introduction section.

The specific objectives of this task are summarized below:

1. Conduct a literature review to determine a range of values for key parameters. The literature cited for default values for these parameters in GREET 2014, BioGrace v.4c and GHGenius v4.03a should be included. The time horizon for published data and/or literature is 2010 – 2015
2. Determine if there are additional key parameters for the each pathway listed above
3. Scan the literature to assess potential future trends for the key parameters

Similar to Task #1, the contractor will be required to write a final report summarizing literature review and provide a range of values for key parameters and also suggest an alternate default value for key parameters if the current default value in the three models is not representative of technology mix and practices in use.

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 thirty (30) 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.