

**Legislature of the State of Wyoming
Clean Coal Technologies Research Program**

CALL FOR PROPOSALS

Issued by:

School of Energy Resources
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Issue date: October 12, 2009

Closing date: December 1, 2009

Additional copies of this solicitation for the Clean Coal Technologies Research Program are available from the School of Energy Resources or at <http://www.uwyo.edu/ser/>

This program is subject to the affirmative action requirements that are prescribed by Executive Order 11246 (as amended), Section 202; by the Rehabilitation Act of 1973 (as amended), Section 503; by the Vietnam Era Veterans' Readjustment Assistance Act of 1974 (as amended), Section 402 (38 USC 2012).

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1. INTRODUCTION

The Clean Coal Task Force (CCTF), composed of the members of the Wyoming Energy Resources Council to the University of Wyoming School of Energy Resources, requests proposals for research concerning clean coal technologies. The research will be funded in part by the Clean Coal Research Account created by Original House Bill No. 301, Enrolled Act No. 121, enacted by the Legislature of the State of Wyoming during the 2007 General Session and updated during the 2008 and 2009 Legislative Sessions. The duties of the CCTF are described in W.S. 21-17-121, a copy of which is attached.

The Clean Coal Technologies Research Program was created to stimulate research to enhance and improve the use of primarily sub-bituminous coal at high altitudes. Proposals are solicited from academic institutions and private industry. They will be evaluated competitively based upon their probable benefits to the State of Wyoming through improved use of Wyoming's coal resource. The results of the research shall be available for public dissemination.

The Legislature of the State of Wyoming has appropriated funding for this research program that now totals \$16,900,000. Just over \$6,425,000 remains to fund additional projects. Expenditure of these funds requires a dollar-for-dollar match from non-state funds. Funds for successful proposals approved by the CCTF will become available soon after review by the Joint Minerals, Business and Economic Development Interim Committee at their meeting that is anticipated to occur in January 2010. Funds must be expended by June 30, 2012.

2. RESEARCH TOPICS

The Clean Coal Task Force (hereafter referred to as the "task force") will accept proposals in two main categories – research and development, and demonstration of emerging technologies. This RFP is being issued in an attempt to create better balance in the overall program by soliciting proposals across a more limited set of categories and technology areas than has been the case previously. The areas of interest for this RFP are outlined below.

- **Pre-combustion/pre-gasification coal technologies** – the task force will accept proposals outlining research examining new coal pulverization technologies, coal pretreatment, pre-combustion clean-up of regulated materials such as mercury and metalloids, or new technologies examining coal feed including slurring, dry feed or others that may support gasification, advanced combustion or existing combustion technologies.

- **Combustion and gasification design technologies** – the task force seeks proposals outlining new methods supporting ultra-supercritical, supercritical or oxy-combustion using Wyoming coals as the fuel source. For this solicitation, the CCTF specifically encourage pilot-scale demonstration projects. These studies may include projects that demonstrate mitigation of known effects of altitude, water use or fuel source that currently cause concern about the placement of ultra-supercritical, supercritical or oxy-combustion facilities in Wyoming. In addition, proposals seeking to demonstrate refined gasifier design – and thereby alleviate the current constraints on such facilities caused by altitude, water need or fuel source – will be considered. Demonstrations of any other technologies that improve reactor design and therefore remove barriers to their use in Wyoming are encouraged.
- **Post-combustion/post-gasification gas clean-up technologies** – proposals examining gas clean-up technologies are sought. The task force will entertain pilot-scale demonstration projects aimed at removing regulated materials – SO_x, NO_x, and/or carbon dioxide – from either coal combustion or coal gasification facilities. Proposals demonstrating cold, warm and hot gas clean-up are welcome.
- **Advanced cycle technologies** – proposals outlining advancement in the use of steam, heat or synthesis gas use are encouraged. We encourage proposals describing new polygeneration technologies, and new steam, synthesis gas, and heat capture and use technologies. The entire range – from research to demonstration – of advanced cycle technologies is a priority for this solicitation.
- **Air separation technologies** – proposals outlining new technologies that reduce the cost of air separation – and specifically for the generation or introduction of oxygen at higher altitudes to feed the advanced combustion and gasification technologies – are sought. Air separation technologies are a priority for this solicitation.
- ***In situ* gasification technologies** – proposals outlining *in situ* coal gasification, both biological and thermochemical, are sought. The task force recognizes that a vast amount of Wyoming coal cannot be mined with current technology. Proposals for *in situ* gasification research must center on those elements of the technology that make this process amenable to Wyoming coals and must evaluate these technologies relative to environmental issues known to be associated with this type of gasification.
- **Coal-to-liquids/coal-to-natural gas** – proposals examining new technologies whereby Wyoming coal may be converted to liquids – including fuels and chemical feedstocks – or natural gas are encouraged. These studies may outline the use of new catalysts. Advancements made in known technologies using Fischer-Tropsch or water gas shift reactions are encouraged. Also, studies that focus on commercial-scale bioconversion of coal to natural gas are welcome. These studies must focus on how these technologies may be developed or modified for their deployment in Wyoming.

- **Economic analysis** – studies examining the cost/benefit of combustion and gasification of Wyoming coals at altitude are sought. It is important to understand how location, altitude, fuel source, water and external factors such as carbon dioxide emissions mitigation (such as tax or cap and trade) will affect the ability of industry to install facilities in Wyoming. The result of economic studies should be written in such a way as to provide information from which policymakers can craft legislation and regulation.

3. FUNDING LIMITATIONS AND PROJECT PERIOD

Proposers may request between \$250,000 and \$5,000,000 in research program funding to be matched dollar for dollar by non-state funds. The Clean Coal Task Force will forward to the Joint Minerals, Business and Economic Development Committee the projects they recommend by no later than February 15, 2010. Currently, projects are expected to be completed by, and unexpended funds revert on June 30, 2012.

4. APPLICANT ELIGIBILITY AND QUALIFICATIONS

Participation in this program is open to all university and community college faculty and staff, to private industry, to government agencies, and to individuals. Qualifications of the investigators and appropriateness of the research topics will be major determinants during review of the proposal. The task force encourages investigators to collaborate with two or more groups (e.g. industry and academia) if they judge this will result in a better project. Where appropriate, the task force also encourages interdisciplinary interactions between researchers.

Proposals will only be considered if documentation verifying that the matching funds have been committed is included. Verification in the form of a signed letter from the actual non-Wyoming state funding organization(s) is required.

5. PROPOSAL PREPARATION

A. Minimum requirements

To be eligible for funding, proposals must describe how the research relates to improved use of Wyoming coal at high altitude. All proposals submitted must contain each of the following:

1. Signed application form (Attachment 1)
2. Signed Confidential Disclosure Agreement (Attachment 2)
3. Table of contents
4. Abstract (300 words or less) (Attachment 3)
5. Introduction

6. Detailed explanation of the relationship of the research to improved use of Wyoming coal, increased use of Wyoming coal and transfer of the results to the State of Wyoming and user groups.
7. For those proposals seeking funds in the main category of demonstration of emerging technologies, a side-by-side comparison with existing commercially available technologies/applications is requested for the purpose of evaluating the potential advantage of the technologies/applications proposed.
8. Scientific discussion (including experimental design)
9. Statement of work (including schedule and methods)
10. Discussion of how success of the research will be gauged (i.e., what milestones, goals, developments, deliverables, and/or accomplishments must be reached to determine that the research has met stated objectives?).
11. Identification of all information in the proposal that the investigators deem proprietary, both by highlighting the proprietary text and by notation at the top of each page that contains proprietary information.
12. Description of how this research compares with and may advance the state of the art.
13. Literature references
14. Appendix, to include:
 - a. Short vitae (maximum 3 pages) for principal investigators
 - b. Description of facilities and equipment to be used
 - c. Other pertinent information bearing on qualifications to conduct project
15. Budget (see below)

B. Budget format

A detailed budget is required. The following minimum information must be included.

1. Personnel costs – include descriptive job titles, rates of pay, and man-hours/months/days. Fringe benefits should be shown as a separate item, with a brief explanation of the formula used.
2. Supplies – show a breakdown by major category.
3. Equipment – show a breakdown by item. Non-consumable equipment purchases will not be an allowable cost but will be considered as a match.
4. Travel – only travel necessary to conduct the research plus attendance by one or more principal investigators at the annual project review seminar is allowed. Include detail about the purpose of travel. If a per diem rate is used, please explain the rate fully.
5. Consultant costs – information similar to that requested above for personnel items should be shown.
6. Matching – the portion of the total project budget that will be supplied or matched from other sources, full information on the sources of the funds should be outlined.

We recommend a budget format that includes a separate column for each source of funds.

7. Subcontracted work – funds that will be dedicated to outsourced work through subcontract require full details as described in the previous items are requested.
8. A clear statement of the total amount that is requested from the Clean Coal Technologies Research Program.
9. Indirect costs are allowable for outside agencies – specify the rate that is charged.

A budget with the same level of detail must be included for the matching funds from a non-state source. This budget detailing matching funds must include an authorizing signature.

6. SCREENING AND EVALUATION PROCESS

The members of the Clean Coal Task Force will screen all proposals. The members of the task force may choose to submit any proposal to external reviewers and each proposal will be reviewed by at least two individuals with relevant technical expertise. All reviewers will execute the Confidential Disclosure Agreement (Attachment 2) prior to receiving individual proposals.

After consideration of any comments from external reviewers, the members of the Clean Coal Task Force will review each proposal and will forward recommendations to the Governor and the Joint Minerals, Business and Economic Development Committee.

A. Evaluation criteria

Proposals will be reviewed initially for compliance with the Proposal Preparation guidelines above, especially for verification of matching commitments of non-state funds. Those proposals that are found to be in compliance with those guidelines will be evaluated by use of the evaluation criteria described below. Budget information will be reviewed in detail and is a critical element of the proposal. Those proposals that are found not to be in compliance with the guidelines will be returned to the sender with a short deadline for resubmission.

The Rating Form (Attachment 4) will be used for the review of proposals by the members of the task force and by the external reviewers.

B. Applicant notification

All investigators who submit proposals for consideration will be notified by letter of the recommendation of the Clean Coal Task Force to the Governor and Joint Minerals, Business and Economic Development Committee in February 2010.

7. RESEARCH CONTRACT REQUIREMENTS

The research contract requirements in this section are being recommended by the Clean Coal Task Force to the Joint Minerals, Business, and Economic Development Interim Committee. These reporting requirements are set forth in legislation as a condition of appropriating funds from the Clean Coal Research Account. Investigators whose proposals are funded are required to:

1. Execute an **agreement** for the research to be performed
2. Submit **Semi-Annual Progress Reports** during the life of the project
3. Submit a **Final Executive Summary Report**
4. Submit a **Final Technical Report** and
5. Present a **Final Seminar** to user groups at a Clean Coal Technologies Workshop organized by the University of Wyoming School of Energy Resources.

1. Execute an agreement for the research to be performed

This agreement shall specify the terms and conditions under which the funds shall be disbursed, including but not limited to:

- A methodology, including the ability for the State of Wyoming to audit records as necessary, to ensure that matching funds required under the proposal are available and actually expended for the research to be performed.

- A means for the executive summary and final technical report to be submitted to the State of Wyoming to verify that the research described in the proposal for which funding was provided was accomplished in a manner and of a quality that was represented in the proposal.

For entities that are subcontracting portions of this award – the University of Wyoming will require a sub-contract document be in place prior to the actual effort begins. SER will work closely with your contracting offices to setup this up soon after notification of award.

2. Semi-Annual Progress Reports

These reports shall be submitted by December 1 and June 1 of each year of active grant status to the Director of the University of Wyoming School of Energy Resources. Progress reports will be made available only to the task force. Progress reports should not exceed three pages, and should report status of work, variance in timing and activity versus project plan, and status of project budget.

3. Final Executive Summary Report

This report should be a concise non-technical summary of project results and recommendations. We intend the audience to include user groups, the general public, and non-specialists in the field. The Final Executive Summary Report should be less than 15 double spaced pages in length.

4. Final Technical Report

The Final Technical Report is intended for use by professionals and other scientists in the general field of clean coal technologies. It should contain a complete and thorough report of project activities conducted. Minimum content of the technical report should be as follows:

- A. Abstract (less than 300 words)
- B. Introduction
- C. Objectives
- D. Methods
- E. Results
- F. Technical Information (not to exceed 40 double spaced pages)
- G. Conclusions and Recommendations
- H. Appendix with the following:
 1. Abstracts of resulting theses/dissertations
 2. Full citations for resulting publications and for manuscripts submitted for publication
 3. Data on scientific collaborators (persons who worked more than 40 hours in one year), with full identification)
 4. Description of inventions
 5. Other information that was specifically required by the terms of the award

The Final Executive Summary Report and the Final Technical Report are due September 30, 2012, or 90 days after the completion of the projects, whichever comes first. **The Final Report should be submitted in hardcopy and electronic format in order that it be placed it on the School of Energy Resources website.**

5. Final Seminar

The School of Energy Resources will host a Clean Coal Technologies Workshop in late 2012. All investigators who are awarded funds from this offering of the Clean Coal Technologies Research Program will present a seminar at this workshop, which will be open to the public.

All presentations and publications that result from work that are supported wholly or in part with funds from the Clean Coal Research Account should acknowledge this support by use of the following language:

1. Funding for this research project was provided by the Wyoming State Legislature.

2. The state and federal awarding agencies reserve a royalty-free, nonexclusive, and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, for state and federal government purposes:
 - a) The copyright in any work developed under a grant, sub-grant, or contract under a grant or sub-grant, and
 - b) Any right of copyright to which a grantee, sub-grantee or a contractor purchases ownership with grant support.

In cases where funds from the Clean Coal Research Account result in intellectual property that may be copyrightable and/or patentable, an investigator is free to copyright and/or patent the property according to the rules and policies of their employment. However, the condition applies that the Federal government and the State government reserve a royalty-free, non-exclusive, and irrevocable right to manufacture, produce, publish, copy, or otherwise use and authorize others to use the copyrighted and/or patented property developed with funding provided from the Clean Coal Research Account for purposes of government-sponsored work.

SUBMITTAL INFORMATION

Please deliver the original proposal, both in electronic and hard-copy form, to the address below before 5:00 pm Friday, December 4, 2009. No exceptions will be made for late arrival of proposals.

School of Energy Resources
University of Wyoming
209 Bureau of Mines
Department 3012, 1000 E. University Avenue
Laramie Wyoming 82071

The electronic copy of the proposal should be emailed to serpros@uwyo.edu with “Clean Coal Technologies Proposal” in the subject line.

If you have questions regarding this funding program or if you need more information, please contact the School of Energy Resources at 307-766-2663 or email serpros@uwyo.edu with “Clean Coal RFP query” in the subject line.

**CLEAN COAL TECHNOLOGIES RESEARCH PROGRAM
APPLICATION FORM**

(Please complete this form for each investigator)

Name			
Title			
Organization			
Address <i>Street or Box number</i>			
	<i>City</i> <i>State</i> <i>Zip</i>	<i>City</i> <i>State</i> <i>Zip</i>	<i>City</i> <i>State</i> <i>Zip</i>
Contact Info	<i>Phone</i> <i>FAX</i> <i>E-mail</i>	<i>Phone</i> <i>FAX</i> <i>E-mail</i>	<i>Phone</i> <i>FAX</i> <i>E-mail</i>
PROPOSAL TITLE			
Total \$ requested from AML program:			

Please complete abstract on attachment 3

Signature of Investigator		Date
Authority (name, title and contact information) from Organization	<i>Please type or print</i>	
Signature of Authority		Date

CONFIDENTIAL DISCLOSURE AGREEMENT

(Please complete this form for each investigator)

University of Wyoming, SER/Clean Coal, Dept. 3012, 1000 E. University, Laramie, WY 82071 understands that [**representing proposal company involved,**] wish to disclose to **University of Wyoming, SER/Clean Coal**, information related to "[**title or description of technology**]" hereinafter referred to as "**Proprietary Information**" for evaluation purposes.

University of Wyoming, SER/Clean Coal, agrees (i) to hold Proprietary Information in confidence and to take all reasonable precautions to protect such Proprietary Information including, without limitation, all precautions that **University of Wyoming, SER/Clean Coal**, employs with respect to its confidential materials, (ii) not to divulge any such Proprietary Information or any information derived there from to any third party, (iii) not to make copies of any Proprietary Information except as necessary for the purpose expressly allowed hereunder, (iv) not to use the Proprietary Information for any commercial purposes, except with the prior agreement of the [**representing proposal company involved,**]. Disclosure of such Proprietary Information by **University of Wyoming, SER/Clean Coal**, shall only be made to those employees, directors, officers and consultants who have a need to know the Proprietary Information for the purpose described above and who are under similar obligations of confidentiality and non-use.

The foregoing obligations shall not apply with respect to information **University of Wyoming, SER/Clean Coal**, can document (i) is in or enters the public domain through no improper action or inaction by **University of Wyoming, SER/Clean Coal**, or (ii) was in its possession or known by its prior to receipt from the [**representing proposal company involved,**] or (iii) was rightfully disclosed to it by another person without restriction, or (iv) was independently developed by employees of **University of Wyoming, SER/Clean Coal**, without use of the subject Proprietary Information.

University of Wyoming, SER/Clean Coal, understands that nothing herein (i) requires the disclosure of any Proprietary Information; Proprietary Information shall be disclosed, if at all, solely at the option of the [**representing proposal company involved,**]; or (ii) requires the [**representing proposal company involved,**] to proceed with any proposed transaction or relationship in connection with which Proprietary Information may be disclosed.

UNIVERSITY OF WYOMING/SER/Clean Coal	Representing Proposal Company
<i>By:</i>	<i>By:</i>
<i>Typed Name: Dr. Mark Northam</i>	<i>Typed Name:</i>
<i>Title: Director, School of Energy Resources</i>	<i>Title:</i>
<i>Date</i>	<i>Date:</i>

Attachment 3

CLEAN COAL TECHNOLOGIES RESEARCH PROGRAM

PROPOSAL ABSTRACT
(300 Words or less)

Attachment 4

RANKING FORM FOR PROPOSALS FOR CLEAN COAL TECHNOLOGIES RESEARCH PROGRAM

PROPOSAL NUMBER _____ Describe briefly the focus of the project (one or two sentences).

EVALUATION CRITERIA: Please rank the proposal from 1-5 (1 being poor – 5 being excellent) in each of the following categories by circling the desired ranking.

1. ***Relevance and Importance:*** Does this proposal directly address research areas that can be directly related to clean coal technologies as described in the Call for Proposals? If so, does it deal with a subject of particularly high importance to present and future use of Wyoming coal? Does the project have relevance and importance to the economy of the State of Wyoming? Have format requirements been met?

Poor 1 2 3 4 5 **Excellent**

2. ***Scientific Merit:*** Does this proposal have potential to expand the fundamental knowledge in its specific area(s)? Is it scientifically sound? Is the investigator(s) cognizant of past work? Is the proposal well written, organized, and complete? If appropriate, does it represent an integrated interdisciplinary approach?

Poor 1 2 3 4 5 **Excellent**

3. ***Feasibility:*** Are the objectives, methodologies, designs, and techniques adequate and completely described? What is your judgment of the likelihood of success given the methods and time frame proposed?

Poor 1 2 3 4 5 **Excellent**

4. ***Technology Transfer:*** Does the proposal actively address the eventual transfer of results to user groups? Does it actively address the impact the results could have?

Poor 1 2 3 4 5 **Excellent**

5. ***Qualifications:*** Are the qualification of the investigator(s) commensurate with the proposed research? Are the facilities and equipment adequate? If appropriate, have external funding agencies and cooperators been identified? Has the nature of such cooperation been described?

Poor 1 2 3 4 5 **Excellent**

6. ***Budget:*** Is the budget reasonable and adequate for the work proposed?

Poor 1 2 3 4 5 **Excellent**

IMPORTANT! (EVALUATORS, PLEASE COMPLETE THE REVERSE SIDE OF THIS FORM)

PROPOSAL NUMBER _____

STRONG POINTS: (Novelty, need for study, exceptional qualifications, etc. Please feel free to use additional pages.)

WEAK POINTS: (Please provide substantive, constructive comments and state the shortcomings. Please feel free to use additional pages.)

NOTES TO REVIEWERS: Comments that do not appear on this form or on an attached sheet will not be considered. We will not search your copy of the proposal for comments. A synthesis of review comments will be provided to investigators if requested. Please return the Rating Form to: School of Energy Resources, University of Wyoming, 209 Bureau of Mines, Department 3012, 1000 E. University Avenue, Laramie WY 82071.