

Fundamentals of Subsurface Flow and Transport: Hydrocarbon Recovery from Unconventional Reservoirs

REQUEST FOR PROPOSALS

Issue Date: November 24, 2014

Application Due Date: December 15, 2014

1. Mission of the research center

The Center for Fundamentals of Subsurface Flow (CFSF) is devoted to the development of original and fundamental interdisciplinary research in the area of multiphase multicomponent flow through porous media aiming at filling the knowledge gaps in the current state-of-the-art experimentation and modeling to ensure present and future access to subsurface energy resources. The center integrates research groups in experimental science, mathematical modeling, and computational science from various University of Wyoming departments and institutes and strives to create opportunities for training of high-caliber researchers and graduates for Wyoming's and the nation's scientific work force.

2. Funding opportunity description

The primary goal of CFSF is to promote research initiatives on fundamental aspects of multiphase flow and transport in subsurface formations by supporting scientists at UW to produce high quality science and enabling them to compete for external funding. All UW faculty and research associates are welcome to join CFSF as members, and membership is not required for the submission of proposals to any CFSF RFPs. Some good research projects that do not fit within the goals of this RFP may be rejected. The PIs of such projects are encouraged to seek funding for their proposed work through other internal and external sources. We welcome proposals that address research components relevant to hydrocarbon recovery from unconventional reservoirs (e.g., low permeability and low oil viscosity reservoirs). Proposals that comprise interdisciplinary teams and those that involve graduate students will be given priority status.

3. Award information

3.1. Estimated funding

Approximately \$720,000 over 16 months is targeted for this notice

3.2. Expected number of awards

CFSF anticipates granting 6-8 awards under this notice. There is no ceiling for an award, but CFSF expects a typical grant to be on the order of \$100,000.

3.3. Period of award

The awards are anticipated to be made for a period of 16 months

3.4. Budgeting limitations

- a. Only a **total of one month** of summer salary may be included per grant over 16 months. This is regardless of the number of projects one may be involved in or number of PI and co-PIs involved in a project.

- b. The funds are to be used to promote research at the University of Wyoming, at any of its sites in Wyoming. If properly justified, the research work may involve visiting scientists from other institutions, or scientists elsewhere that provide 100% of their own funding.

3.5. Conditions

The PIs and co-PIs of the winning proposals will be expected to actively participate in fund raising initiatives, e.g., development of relevant research proposals in response to RFPs issued by various funding agencies.

All the papers, theses and reports resulting from the research supported by this initiative must include proper acknowledgments of CFSF and SER.

4. Proposal instructions, format, deadline, and submission requirements

We invite proposals from UW faculty and research staff for research in line with the objectives of this RFP listed below under [Section 5 - Goals](#). As specified below, under ranking criteria, higher priority will be given to those proposals addressing one or more of the research needs listed below in this RFP under [Section 7 - Research priorities](#).

Format and content requirements: Adherence to these format and content requirements is required.

- Five pages plus two-page biographical sketches, budget, budget explanation and current support, as follows:
 - Title page, including title, PI and PI contact information, list of collaborators (UW, agency, industry, etc.), project length, and proposed project cost
 - Text limited to 4 pages to include abstract (half page); justification and scope; objectives; significance; methods; time schedule and estimated labor hours for each PI, co-PI, and students and other personnel; products and deliverables; and references cited
 - Biographical sketches. For all key personnel, please provide a brief biographical sketch. Do not exceed two pages per person for the sketch. Up to five publications most closely related to the proposal and up to five other significant publications (including those accepted for publication) may be attached. A list of all UW collaborators, co-authors and co-editors during the last 48 months must be included. (The standard NSF format is appropriate. The biographical sketches will not count in the project narrative page limitation.)
 - Budget and budget justification must be prepared *using the attached template*. (These pages will not count in the project narrative page limitation)
 - Current support (These pages will not count in the project narrative page limitation)
- Single spaced with an intervening space between paragraphs, 12-pt Times New Roman font
- One-inch margins all around
- Headings as in this RFP

- Note on “List of Collaborators” to appear on the proposal Title Page: Proposal submitters should contact individuals in an agency(s), industry or other party(s) and be prepared to obtain letters or emails indicating willingness to participate, advise the project, or provide access to sites or samples, etc. by December 15th, 2014.
- Note on budgets and budget forms: This is an overhead free RFP. Submit a budget form showing proposed costs and justify the requests on the Budget Explanation and Justification page.

Deadline: Monday, December 15, 2014, by 11:59 pm MST. PIs of winning submissions will be informed by January 12, 2015.

Submission Instructions:

Proposals should be submitted electronically as a single PDF document via [upload here](#). Only a single PDF file will be accepted.

Projects are anticipated to start February 2015 and will be required to end June 1, 2016. Questions should be directed to Diana Hulme, Deputy Director of Research for SER, or Abby Scott, Assistant Research Scientist for SER.

5. Goals

PIs are required to focus on fundamentals of hydrocarbon recovery techniques from unconventional reservoirs characterized by, for instance, low permeability and high oil viscosity. Namely, research activities that aim at improving the current understanding of recovery methods, hydraulic fracturing, petrophysical properties, matrix/fracture interactions, pore space characteristics, wettability, etc. that can be used to improve reservoir models and field design.

6. Ranking and selection criteria

We will fund the best projects based on an anonymous review by knowledgeable experts. In addition to the scientific merits of the proposal and the proposed project, additional factors will be considered as listed below. Proposals that address these additional factors will be given preference.

- The proposed project directly addresses the research priorities listed below under the heading “Research priorities”.
- The project supports graduate student research. We especially encourage proposals that support PhD students.
- Interdisciplinary (cross-departmental and/or cross-college) teams of researchers are encouraged.
- The project has potential for follow-on external funding.
- The project advances research that will be able to exploit the supercomputing resources associated with UW’s Advanced Research Computing Center and the NCAR-UW partnership, as well as visualization facilities available in UW’s Energy Innovation Center.

7. Research priorities

Examples of areas of interest includes, *but not limited to*:

Priority A. Modeling Activities

- Mathematical and statistical modeling of subsurface flows:
 - o Novel techniques for the analysis of nonlinear, multi-scale, multi-physics problems
 - o Novel physically-based pore-level models for various aspects of flow and transport
 - o Novel models for compositional flows in fractured formations
 - o Novel pore-to-core-to-reservoir scaling techniques for flow and transport
 - o Wellbore integrity
 - o New transport concepts
 - o Computational modeling of subsurface flows: Algorithms and methods in multi-scale modeling
 - o Computational techniques for decoupling or model reduction
 - o Data driven science applications
 - o Fast and scalable numerical algorithms and solvers for high performance computing
 - o Flow and transport in tight formations
 - o Geomechanical effects on production from tight formations
 - o Hydraulic fracturing in tight formations
 - o Phase behavior of fluids at the nanometer scale
 - o Matrix/fracture interactions in tight formations

Priority B. Laboratory Experimental Activities

- Flow experiments studying geochemical processes
- Multi-scale imaging and segmentation techniques
- Pore-scale flow visualization
- Interfacial properties at reservoir conditions
- Condensation in micro and nano pores
- Surfactants and fracturing fluids
- Near wellbore multiphase flow, geomechanical and geochemical effects
- Geomechanical effects on the flow properties of tight formations
- Hysteresis in flow properties of tight formations
- Matrix/fracture interactions in tight formations

8. Performance assessment

Funded projects will be expected to prepare a progress report semi-annually and participate actively in annual workshops organized by CFSF. These workshops are intended to present the latest achievements of the scientists funded by this initiative.

9. Proposal review process

For the proposals submitted in response to this announcement, the following procedural steps will be taken:

- Each submitted proposal (in response to this RFP) will be reviewed by a minimum of two and the maximum of three reviewers (to be selected by the *Deputy Director of Research for the School of Energy Resources, Diana Hulme*).
- The reviewers for each proposal will exclude former (up to 48 months) and current collaborators/co-authors/co-editors of the PIs and co-PIs. This is to make sure that the conflict of interest is minimized in this process.
- The reviewers will complete a CFSF Proposal Review Form that will be used to rank proposals.
- SER staff will compile all the review forms and rank the proposals using only the average of the overall grades provided by the reviewers. This preliminary ranking does not guarantee funding.
- *Diana Hulme* will use the grades and comments by the reviewers to finalize the ranking.
- SER reserves the right to form a committee of non-CFSF scientists to carry out reviews of the proposals, if it chooses to do so.
- The director of the center does not play any special role in any aspects of the review process and decisions made afterwards.
- The final decision regarding the number of projects funded and possible budget adjustments will be made by *Diana Hulme*. It should be made clear that not all the targeted funding may be used to support projects.

10. Confidentiality

Members of the CFSF and review committee will conduct themselves under the guidance of professional and ethical conduct. If the PIs of a proposal come across any breach of confidentiality or intellectual property infringement, during the review process or afterwards, they are strongly encouraged to contact SER and the CFSF Director. If SER cannot resolve the issue internally, it will form an impartial panel to investigate the complaint. In such cases, the decision of the Deputy Director of Research for the School of Energy Resources, Diana Hulme, shall be final.

SER Centers of Excellence Budget Sheet						
Project PI:						
Project Title:					Requested Dollars	
					FY2015	FY2016
A. Senior Personnel				Person-Months		
	Rate	CAL	ACAD	SUMR		
1						
2						
3						
4						
5						
6						
Total Senior Personnel:						
B. Other Personnel						
1						
2						
3						
4						
5						
6						
Total Other Personnel:						
Total Personnel (A+B):						
C. Fringe Benefits						
<i>Insert Fringe Rate Used</i>						
Total Fringe Benefits:						
Total Salaries, Wages, and Fringe Benefits, (A+B)+C						
D. Supplies (Provide Detail on Budget Justification Sheet)						
Office						
Lab						
Field						
Total Supplies:						
E. Equipment (Provide Detail on Budget Justification Sheet)						
Total Equipment:						
F. Travel (Provide Detail on Budget Justification Sheet)						
Domestic (Including Canada & US Possessions)						
Foreign						
Total Travel:						
G. Consultant/Subcontracts (Provide Detail on Budget Justification Sheet)						
1						
2						
3						
Total Consultant/Subcontracts:						
H. Total Costs for Each Year, Sum of Sections A-G						
I. Total Requested Dollars, Sum of Columns F-H						

Complete each section below, specifically describing the benefit of each budget item to the project. Include a brief description of the calculations used to estimate each budget item.

Budget Sheet Justification: Please provide details as directed by Budget and RFP

1. Personnel Costs: Provide descriptive job titles, rates of pay and man-hours/months/days. Briefly explain formulas used for fringe benefits.

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2. Equipment: Show breakdown by item. Only include existing pro-rated costs for new non-consumable equipment, unless the equipment is an integral part of the technology, plant or implement to be developed.

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3. Travel: Include detail about purpose of travel. If a per diem rate is used, please explain the rate fully.

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4. Consultants/Subcontracted Work: Provide descriptive job titles, rates of pay and man-hours/months/days. Define which funds will be dedicated to outsourced work.

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