

# RECLAMATION

*Managing Water in the West*

Funding Opportunity Announcement No. R11SF80382

## Desalination and Water Purification Research and Development (DWPR)

### PRE-PROPOSAL SOLICITATION

Fiscal Year 2011

- Research and Laboratory Studies
- Pilot Scale Projects
- Demonstration Scale Projects



U.S. Department of the Interior  
Bureau of Reclamation

2011

## **Mission Statements**

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

## Overview

Federal Agency Name:	Department of the Interior, Bureau of Reclamation, Denver, CO
Funding Opportunity Title:	<i>Desalination and Water Purification Research and Development Program (DWPR)</i>
Announcement Type:	Pre-proposal Solicitation
Funding Opportunity Announcement (FOA) Number:	R11SF80382
Catalog of Federal Domestic Assistance (CFDA) Number:	15.506
Pre-proposal Due Date:	March 28, 2011 4:00 p.m. Mountain Daylight Time (MDT)
Eligible Applicants:	<p>Individuals, institutions of higher education, commercial or industrial organizations, private entities, public entities (including state and local), and Indian Tribal Governments.</p> <p>Foreign entities, other than United States-Mexico binational research foundations and inter-university research programs established by the two countries, are not eligible for funding under the authorizing legislation for this program.</p> <p>Federal agencies are not eligible to apply.</p>
Applicant Cost Share:	<p>None for <u>institutions</u> of higher education, including United States-Mexico binational research foundations and inter-university research programs</p> <p><u>Other applicants</u> must provide cost share of 75% of the cost of their project (This may be reduced to 50% if it is determined that the project is not feasible without such increased Federal contribution)</p>
Federal Funding Amount:	Up to \$150,000 for each research and laboratory study, \$200,000/year for each pilot scale project, and \$500,000/year for each demonstration scale project.
Estimated number of agreements to be awarded:	4 to 6
Total amount of funding available for award:	Up to \$1,000,000

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## Section 1. Funding Opportunity Description

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation), is currently requesting pre-proposals sponsored by the Desalination and Water Purification Research and Development Program (DWPR). Through this program, Reclamation is forming partnerships with private industry, universities, water utilities, and others to address a broad range of desalting and water purification needs. The intent of the program is to augment the supply of usable water in the United States. This will be accomplished by reducing the costs, improving operation and reliability, and developing innovations in desalination and water purification technologies. The Water Desalination Act of 1996, and the current Continuing Resolution, are the authorizing legislation for this program. The Act defines the following important terms: (1) Desalination or desalting means “the use of any process or technique for the removal and, when feasible, adaptation to beneficial use, of organic and inorganic ... compounds from saline or biologically impaired waters, by itself or in conjunction with other processes” and (2) Saline water means “sea water, brackish water, and other mineralized or chemically impaired water.”

### 1.1 DWPR Overview

The primary purpose of the DWPR is to develop more environmentally sensitive, cost-effective and technologically efficient means to desalinate water.

The program has three major goals:

- 1) Augment the supply of usable water in the United States
- 2) Understand the environmental impacts of desalination and develop approaches to minimize these impacts relative to other water supply alternatives
- 3) Develop approaches to lower the financial costs of desalination so that it is an attractive option relative to other alternatives in locations where traditional sources of water are inadequate

A number of objectives are inherent in these goals, including:

- 1) Water Supply: Increasing the usable water supply in the United States through the treatment of impaired waters
- 2) Environment: Understanding the environmental impacts of desalination and developing approaches to minimize these impacts relative to other water supply alternatives
- 3) Economics: Reducing the financial costs of desalination and water purification technologies so that they are attractive options relative to other alternatives in locations where traditional sources of water are inadequate
- 4) Technology: Creating new and innovative technologies, improving the reliability of existing processes, and strengthening the desalination industry in the United States
- 5) Efficiency: Developing methods to make desalting more energy efficient
- 6) Health: Developing methods to ensure desalting technologies have acceptable impacts on human health
- 7) Regulations/Permitting: Working with regulators and researchers to ensure that regulations for desalination processes are appropriate
- 8) Multiuse: Expanding the use of desalination processes for multiple uses such as municipal water, wastewater reuse, industrial, and agricultural uses
- 9) Technology Transfer: Ensuring full transfer of knowledge and commercialization of technology

## 1.2 Research Categories

The DWPR includes research in 3 categories: Research and Laboratory Studies, Pilot Scale Projects, and Demonstration Scale Projects.

### *Research and Laboratory Studies*

Duration: 13 months or less

Description: Research studies are typically bench scale studies that usually involve small flow rates less than 2 gpm. They are used to determine the ability of a process to work well or badly and they sometimes involve high degrees of uncertainty.

### *Pilot Scale Projects*

Duration: 25 months or less

Description: Pilot scale studies are typically preceded by research studies that demonstrate the technology works. They usually involve flow rates between 1 and 20 gpm on natural water sources. They are used to determine the physical and economic ability of a process. Costs are developed for capital and operation and maintenance costs.

For financial reasons, the program will not be funding new demonstration scale projects this year.

## 1.3 Research Priorities

For fiscal year 2011, Reclamation's research priorities are creative coupling of renewable power sources and development of technology suitable for small communities. Reclamation intends to fund a renewable power desalination project at the Brachish Groundwater National Desalination Research Facility.

## 1.4 Funding

For fiscal year 2011, Reclamation anticipates awarding four (4) to six (6) cooperative agreements of 13 months duration with a Reclamation cost-share portion of up to \$150,000 per agreement in the Research and Laboratory Study category, distributed among the five research tasks detailed below.

Reclamation anticipates awarding two (2) to three (3) cooperative agreements of 25 months duration or less, with a Reclamation cost-share portion of up to \$400,000 per agreement in the Pilot Scale Project category. This is divided as follows: up to \$200,000 for the first year for pilot plant design, construction and installation and up to \$200,000 for an optional second year for testing, modification and evaluation. These preference should not be interpreted to exclude other designable concepts that fall within the descriptions in Section 3 below.

The number of awards made and the amount awarded for each category will be based on the quality of the proposals received and Congressional funding available. Hence, although there is a goal of 4 to 6 Research Study projects, this number may be increased or decreased if pilot scale proposals receive lower or higher overall rankings.

Successful studies or projects may receive a limited amount of follow-on funding for additional work. Offerors (other than institutions of higher education) must cost-share at least 75% of the project cost. This may be reduced to 50% if the offeror can demonstrate financial need. Offerors proposing to provide additional cost-share will be given greater consideration. Cost-sharing may be made through cash or in-kind contributions from the offeror or third party, non-Federal, participants. Cost-sharing is not mandatory from institutions of higher education, but is strongly encouraged. The authorizing legislation for this program provides for up to a total of \$1,000,000 per year to be awarded to institutions of higher education, including United States-Mexico bi-national research foundations and inter-university research programs established by the two countries, without

any cost-sharing requirement. Since \$700,000 of this \$1,000,000 is committed to ongoing projects, most projects will have to be cost-shared. No profit or fee will be allowed.

### 1.5 Intellectual Property

Pre-proposals are kept strictly confidential. Pre-Proposals are destroyed unless a return is requested. Patent rights for any developments made under these agreements will be retained by the research partner (offeror) in accordance with provisions contained in the solicitation.

### 1.6 Facility and Equipment Resources

Reclamation's state-of-the-art water treatment laboratory and pilot-scale facilities may be available for use on a cost reimbursable basis. These include the Technical Service Center in Denver, Colorado, the Water Quality Improvement Center in Yuma, Arizona, and the Brackish Groundwater National Desalination Research Facility (BGNDRF) in Alamogordo, New Mexico. Information on these facilities can be found at URL <http://www.usbr.gov/pmts/water/research/facilities.html>. Reclamation's intention is to fund at least one new pilot scale project at the BGNDRF this year.

## Section 2. Who May Apply

Individuals, institutions of higher education, commercial or industrial organizations, private entities, public entities (including state and local), or Indian Tribal Governments, may submit a pre-proposal for consideration by Reclamation. Foreign entities, other than United States-Mexico bi-national research foundations and inter-university research programs established by the two countries, are not eligible for funding under the authorizing legislation for this program. Federal agencies are not eligible to apply.

### 2.1 Pre-Proposal Submission

Pre-proposals must be submitted in accordance with the instructions below:

Maximum of 6 pages including the "Pre-Proposal Information Sheet"

The following must be included:

- 1)Project Summary
- 2)Cost Estimate (Including labor, supplies and equipment, fringe benefits and indirect costs, and cost share)
- 3)Qualifications (Brief statement of principal investigator and primary support staff qualifications)
- 4)Pre-Proposal Information Sheet (refer to page 11)

Five (5) copies of the Pre-Proposals must be received by 4 PM on March 28, 2011, at the following address:

**By mail:**

Bureau of Reclamation  
Acquisition Operations Group  
Attn: Michelle Maher  
Mail Code: 84-27810  
P.O. Box 25007  
Denver CO 80225

**Overnight delivery:**

Bureau of Reclamation  
Attn: Michelle Maher Mail Code: 84-27810  
Denver Federal Center, Bldg. 67 Rm. 152  
6th Avenue and Kipling Street  
Denver CO 80225

2.2 Pre- Proposal Review Process

Pre-proposals will be reviewed for:

- 1)Overall scientific and/or technical merit
- 2)Potential contributions to Reclamation's DWPR program objectives
- 3)Technical and economic impact
- 4)Qualifications of the investigators
- 5)Reasonableness of the estimated project costs
- 6)Offerors of meritorious pre-proposals will be encouraged to submit a full proposal.

**The full proposal process does not require submission of a pre-proposal; however, offerors are strongly encouraged to do so in order to receive the benefit of the initial pre-proposal screening process.**

**Section 3. Research and Laboratory Studies Tasks**

Specific tasks have been developed to accomplish the DWPR objectives for Research and Laboratory Studies (Task I, II, III, IV and V).

Task I: Reducing Environmental Impacts

Projects sponsored under this task area focus on the impacts of desalination and water treatment plants on the environment including concentrate disposal and intake processes.

Examples of these projects include but are not limited to:

- 1)Recovery and use of irrigation return flows.
- 2)Field studies to assess environmental impacts of seawater intakes at existing plants.
- 3)Field studies to assess environmental impacts of brackish groundwater development at existing plants.
- 4)Recovery and use of salts or other materials contained in the reject stream of desalting plants.
- 5)Salinity modeling and toxicity analysis of concentrate discharges to the environment.
- 6)Development of cost-effective approaches for concentrate management that minimize potential environmental impacts.
- 7)Substitution of brackish concentrate for potable water in industrial applications.
- 8)Removal of supersaturated salts to permit further desalting of concentrate and reduce the volume of concentrate requiring disposal. Only technologies with the potential of becoming cost competitive with existing alternative disposal methods will be considered.
- 9)Development of improved intake methods at coastal facilities to minimize impingement of larger organisms and entrainment of smaller ones.
- 10)Development of an overarching assessment of the possible range of impacts from seawater and brackish water desalination in the United States based on a synthesis of rigorous site-specific studies.

### Task II: Integrating Renewable Energy

Projects sponsored under this task area focus on the general economic improvement of desalination processes.

Examples of these projects include but are not limited to:

- 1) Investigation of approaches for integrating desalination with renewable energy sources including photovoltaic, wind power, solar thermal, and geothermal.
- 2) Development of improved energy recovery technologies applicable to desalination, particularly for installations where the cost of energy may be relatively high.
- 3) Research and development of applications using waste (low quality) heat. Consideration must be given to methods of collecting the waste heat effectively.

### Task III: Reducing Costs

Projects sponsored under this task area focus on the general economic improvement of desalination processes and the investigation of non-traditional desalination or water purification techniques, to include the evaluation of economics and thermodynamic efficiency of these processes.

Examples of these projects include but are not limited to:

- 1) Reduction of primary energy use.
- 2) Use of low-grade heat or other small but widely available driving forces. Realistic costs for accumulation, storage and transport of energy and mass must be made in proposer's evaluation of such processes.
- 3) Evaluation and development of methods to improve the heat economy of thermally driven desalting processes.
- 4) Studies optimizing cost and/or design for different operating conditions.
- 5) Investigation of methods for increasing the economic efficiency of desalination processes, including hybrid systems or dual-purpose co-facilities with other processes involving the use of water.
- 6) Development of aspects of a small community desalination system where the community may be isolated and economically disadvantaged and where technical support may not be readily available.
- 7) Detailed economic surveys and cost models.

### Task IV: Expanding Scientific Understanding of Desalination Processes

The primary objective of this task area is to reduce the cost and increase the ease of operation of desalting and water treatment systems. Sponsored projects can apply to any portion of the desalting process, including pre- and post-treatment.

Examples of these projects include but are not limited to:

- 1) Development of investigative techniques relating to desalination processes.
- 2) Development of more robust, cost-effective pretreatment processes and/or processes that require less chemical or produce less sludge or other effluents.
- 3) Research and development studies of improvements in membrane process including reverse osmosis or electrodialysis or in thermally driven desalting processes including multi-state flash, multiple effect, or vapor compression distillation.
- 4) Increase of rates of mass transfer to membrane or to heat transfer surfaces.
- 5) Studies on presence and influence of biofilms on membranes or heat transfer surfaces.
- 6) Studies on adhesion of foulants, scalants or other materials to membrane or heat transfer surfaces.
- 7) Studies on cleaning, including frequency and effectiveness of cleaning and impacts of disposal of solutions containing cleaning agents.
- 8) Investigation of methods to reduce corrosion in desalting processes.
- 9) Studies on influence of minor components in groundwater on membrane or heat transfer properties.
- 10) Development of integrated or hybrid membrane systems, particularly to increase recovery.
- 11) Research on techniques for membrane storage or preservation and for biological control during plant operation.
- 12) Development of new, innovative alternative desalination processes.

12) Investigation of freeze desalination and innovative combined desalination processes. Only technologies with the potential of becoming cost competitive with existing membrane and thermal processes will be considered.  
13) Proposed projects should have the potential to become commercially viable and have wide applicability. Investigation of methods for stabilization of desalted water, particularly when it is to be mixed into existing water supply systems.

Task V: Improving the Quality and Suitability of Treated Water for Reuse

Projects sponsored under this task focus on investigation of possibilities of recycling and reuse of water that has already served a primary use.

Examples of these projects include but are not limited to:

- 1) Development of new wastewater treatment processes or improvements in existing treatment systems.
- 2) Resolution of small persistent operational problems in existing water treatment plants.
- 3) Lowering biological oxygen demand (BOD) and chemical oxygen demand (COD) in wastewater.
- 4) Membrane treatment of municipal wastewater for direct reuse or groundwater recharge.
- 5) Removal of organic contaminants, toxic substances, heavy metals, radioactive elements, etc.
- 6) Improvement of membrane polymers specifically for waste treatment applications.
- 7) Treatment of irrigation drainage waters to remove pesticides, herbicides, nitrates, etc.

Only technologies with the potential of becoming cost competitive with existing alternative disposal methods will be considered.

Task VI – Pilot-Scale Systems

Projects under this task consist of two stages (1) design, fabrication and shakedown of pilot-scale apparatus, and (2) testing and modification of the pilot-scale apparatus and evaluation of the process. Awards under this task typically result from successful research studies from one of the other tasks in the DWPR program that demonstrated a high level of success and provided a justification for further technology development. However, any researcher may submit a pre-proposal who can provide sufficient documentation indicating a high level of prior successful research has been accomplished and that the project is at the stage of pilot-plant testing.

#### Section 4. Full Proposal Review Process

Full proposals undergo a thorough review process by reviewers from within and outside of Reclamation. Some of the factors considered in the evaluation process are listed below.

- Scientific and technical merit
- Environmental impact
- Commercial potential and market impact
- Applicability to small communities
- Range of applicability
- Proposal cost/benefit
- Proportion of cost share
- Qualifications of investigators
- Familiarity of offeror with existing technology

Funding Opportunity Announcement for the full proposals will be available from URL [www.grants.gov](http://www.grants.gov) April 15, 2011.

#### 4.1 Schedule

Pre-Proposal Broad Agency Announcement:	February 7, 2011
Pre-Proposals Due:	March 28, 2011
Full Proposal Broad Agency Announcement:	April 15, 2011
Full-Proposals Due:	June 15, 2011
Research Awards:	September 30, 2011

BUREAU OF RECLAMATION  
 DESALINATION RESEARCH AND DEVELOPMENT PROGRAM  
 PRE-PROPOSAL INFORMATION SHEET

PROJECT TITLE: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

SUBMITTED FOR TASK AREA (Select only one task area):

- Task I..... – Reducing Environmental Impacts
- Task II ..... – Integrating Renewable Energy
- Task III ..... – Reducing Costs
- Task IV ..... – Expanding Scientific Understanding of Desalination Processes
- Task V ..... – Improving the Quality and Suitability of Treated Water for Reuse
- Task VII..... – Pilot Scale Projects

BUDGET INFORMATION:

	RECLAMATION	APPLICANT AND OTHERS	TOTAL
Labor *	\$ _____	\$ _____	\$ _____
Equipment, Supplies & Travel*	\$ _____	\$ _____	\$ _____
<b>TOTAL</b>	<b>\$ _____</b>	<b>\$ _____</b>	<b>\$ _____</b>

\* including fringe benefits, and indirect costs