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## INSTITUTIONAL CONSIDERATIONS

### Institutional Considerations Project 1

#### **Title**

Guidance manual on financial implementation of renewable energy (RE) - desalination projects - options and implementation

#### **Needs the Project Meets**

1. Identifies sources of public financing for an RE-desalination project.
2. Identifies potential sources of private financing
3. Identifies tax and other incentives available to these types of projects
4. Identifies opportunities for exporting power/heat energy from oversized RE segments of a project as a co-generation project.

#### **Benefits of Project and Expected Outcomes**

Provides a clear road map for the project planners to identify and involve potential sources of financial assistance, tax incentives and commercial opportunities at the start of the project. This will enable the planners to fashion the project from the start of fully exploit all avenues of financing and particularly to start incorporating the technical features of the project necessary to meet the requirements of the financial stakeholders, particularly if commercial power sales are expected.

## Research Objectives

The expected outcome of this research effort is a guidance manual that will assist project planners in locating and involving sources of financing, tax incentive programs and commercial opportunities early in a project's life.

## Research Approach (numbered by task)

1. Identify the financial institutions traditionally offering public sector financing.
2. Identify federal and state tax incentives, rebates or other offsetting programs that would help defray the initial capital expenditure (CapEx) of the project.
3. Identify potential for commercial revenue for a project that may be suited to a co-generation approach.
4. Publish a guideline document that would be made available to any renewable energy - desalination project planning entity to assist them in setting up the initial contacts for a project and establishing the initial lines of communication.

## Estimated Project Budget and Schedule

\$100,000; 12 months

## Proposed Partners

Reclamation, National Water Research Institute, Electric Power Research Institute, etc.

## Known Prior Research on This Topic

None

## Institutional Considerations Project 2

### Title

Characterization of the brackish groundwater source in the United States

### Needs the Project Meets

The project will provide a basis for planning the development of desalination plants and identifying areas with a strong renewable energy resource. The project will provide characterization of brackish water sources.

### Benefits of Project and Expected Outcomes

The project will result in:

- a clearinghouse of data resources regarding the availability and depth to brackish groundwater
- a clearinghouse of data resources on the quality and constituents of the brackish groundwater sources
- identified potential demand locations for desalination technology in the United States
- identified known limitations on the development of brackish groundwater resources, i.e., issues with interstate compact agreements

The benefits of the clearinghouse would be the collection of existing data that is currently available in numerous locations. Data sources will include the oil drilling community logs and water well drilling logs and any other drilling logs and findings that were submitted to state agencies. Part of the effort will include collecting the information where available and creating a means for agencies and others to self report this information. Proprietary information will be generalized as necessary to make this information available.

The benefits of this clearinghouse would be a quick reference guide for planners, developers, and municipalities to identify locations where desalination could be a viable alternative for water supply. By overlaying the renewable energy resource maps the evaluation would be able to consider where renewable energy could be integrated into the desalination process.

### **Research Objectives**

Create a self-sustaining clearinghouse for identification of the brackish groundwater source in the United States.

### **Research Approach (numbered by task)**

1. Clearinghouse: The approach could consist of identification of data sets that are available and the collection of those resources to place in the clearinghouse. Taxonomy will need to be created and some standardization of the meta-data will be needed.
2. Potential Demand: This task of the project would require identification of projected water demands by location and the unavailability of other water resources such as groundwater or surface water supplies.
3. Limitations of Development: This analysis could consider overlaying interstate river compacts, endangered species compacts, or other constraints of development.
4. Overlaying Renewable Energy Resource Maps: The Renewable Energy layers are readily available from the National Renewable Energy Laboratory.

The clearinghouse could be seeded with data collected under this project and then a method and process could be available for self-submittal of relevant data by state agencies or other organizations.

### **Estimated Project Budget and Schedule**

\$200,000; two years

### **Proposed Partners**

USGS

### **Known Prior Research on This Topic**

[none provided]

## **Institutional Considerations Project 3**

### **Title**

Brackish groundwater treatment technologies

### **Needs the Project Meets**

Identify best technologies; develop and evaluate novel technologies, fundamental understanding of scaling issues specific for brackish water, and link technology to water source characterization.

### **Benefits of Project and Expected Outcomes**

Novel treatment schemes for brackish water, brine minimization, understanding of scaling phenomena, energy and resource requirements.

### **Research Objectives**

To evaluate and develop technologies to treat brackish water and dispose brine (the project will identify best and state-of-the-art technologies based on the array of source water and energy/resources available); to understand scaling mechanism and minimize its effect of process performance; to minimize the energy and resource needs for brackish water desalination.

### **Research Approach (numbered by task)**

1. Acquire/develop database of brackish water characteristics, nationally.
2. Identify current state-of-the-art and future technologies.
3. Understand interaction between specific brackish water and technology.
4. Evaluate technologies based on performance indicators (water quality, recovery, energy, resources)

### **Estimated Project Budget and Schedule**

\$500,000; four years

### **Proposed Partners**

Local and federal agencies, membrane and systems manufacturers, scale inhibitors, and chemical companies

### **Known Prior Research on This Topic**

University of Nevada Reno, Colorado School of Mines, Yale University

## **Institutional Considerations Project 4**

### **Title**

Identify and characterize stakeholders and their role in renewable energy (RE) - desalination implementation

### **Needs the Project Meets**

Stakeholders: federal, non-governmental organization (NGO), private, universities

1. Identifies the key stakeholders necessary for the successful implementation of an RE-desalination project.
2. Identifies the role of each of the stakeholders in the successful implementation of an RE-desalination project.
3. Generates protocol for participation and communication between stakeholders.
4. Generates required changes in institutional mores and practices to move projects forward to completion.

### **Benefits of Project and Expected Outcomes**

Provides a clear road map for project to surmount the institutional hurdles expected in every project but more so in RE-desalination. It is expected that RE-desalination will require more than the usual amount of

regulatory oversight expected for a single purpose water treatment plant (WTP). Thus it is critical for the water purveying agency (municipal, regional, authority, etc.) to have clear direction and a current knowledge of the stakeholders who will be involved, in addition to those that may have a single focus interest, such as environmental groups, taxpayers associations, etc. It is more important for an RE-desalination project to involve all of the stakeholders from day one, thus it is essential that all the nationally based stakeholders, as well as local stakeholders be involved from the onset of the project.

### **Research Objectives**

The expected outcome of this research effort is a tabulation of the nationally based stakeholders that should be reviewed and updated frequently. The project initiator will then have at their fingertips the tool necessary to involve the appropriate stakeholders so that initial conversations and planning for the project can move forward with open discourse, and stakeholder buy-in at every planning milestone.

### **Research Approach (numbered by task)**

1. Identify the federal agencies that may be involved through current legislative mandate in an RE-desalination project.
2. Identify any NGOs that may have involvement by charter, mission statement, etc.
3. Identify financial/legal organizations that express an interest in having a stake in the proposed project.
4. Identify academic institutions that have active programs that would benefit the project through their involvement.
5. Develop the roles in a RE-desalination project for each of the stakeholders.
6. Publish a guideline document that would be made available to any RE-desalination project planning entity to assist them in setting up the initial contacts for a project and establishing the initial lines of communication.

### **Estimated Project Budget and Schedule**

\$150,000; 18 months

### **Proposed Partners**

Reclamation, National Water Research Institute, Electric Power Research Institute, etc.

### **Known Prior Research on This Topic**

None