Estimated Project Budget and Schedule

$520,000

Proposed Partners

Reclamation, University of Arizona, University of British Columbia (RES'EAU WaterNet), ProDes, Kll, Inc./ Suns River, and others to be defined.

Known Prior Research on This Topic

Various

WATER RESOURCES

Water Resources Project 1

Title

Desalination technologies and trace contaminants

Needs the Project Meets

Aquifers with high salinity can also hold trace contaminants (ppb vs. ppm)

- ClO_4-, As, radioactivity, Cr, others
- Constituents could change over years of use
- Rural communities have limitations
- Impacted by recent MCLs
- Limited finances mean low technical experience
- Little funding for consultant studies
- Need assistance from Reclamation and other federal or state agencies

Benefits of Project and Expected Outcomes

1. Rural communities
   - Education for health protection
   - Understand treatment needs and costs
   - Develop local water supplies
2. Industrial technology developers
   - Market identification

3. Reclamation
   - Strategies for future priorities and fund allocation
   - Help develop future water supplies

Research Objectives

- Identify potential community locations looking toward new brackish groundwater sources
- Assemble known water quality and water availability information about those sources
- Evaluate limitations of desalination technologies relative to trace contaminants
- Advise technology choices
- Outreach to potential users

Research Approach (numbered by task)

1. Collect available information
   1.1. Aquifer locations, depths, and extents
   1.2. Water quality analyses
2. Identify data gaps
   2.1. Spatial distribution of information
   2.2. Missing constituent analyses
   2.3. Analytical interferences
3. Produce report
   3.1. Technology recommendations for water chemistry combinations

Estimated Project Budget and Schedule

$326,000 + IDC; 24 months

Proposed Partners

[none provided]

Known Prior Research on This Topic

[none provided]

Water Resources Project 2

Title

Tapping on unutilized waste heat energy available in power generation facilities for co-generation of water

Needs the Project Meets

Utilization of an untapped energy resource for water production. This stretches the fuel used in the power generation process to also concurrently produce water.

Benefits of Project and Expected Outcomes

The waste energy in power generation facilities (e.g., waste-to-energy plants; fossil fuel, natural gas and coal fired power generation facilities) are at the moment not transferable to a centralized location, to maximize its utilization. Power generation facilities can tap on this waste energy to operate water generation facilities (e.g., membrane distillation, membrane processes) for its in-house use. It is estimated that waste heat energy can be as much as 50-70% of the heat energy generated at power generation facilities. Tapping on the waste heat energy to co-generate water, can reduce the cost of water production.

Research Objectives

Marrying the power generation and water production facilities, to produce cost efficient water.

To develop a strategy going forward on how to optimize the nexus between renewable energy power generation and water production.

Research Approach (numbered by task)

1. Create an inventory of existing power generation facility
    - Type of power generation technology adopted (collect information of layout of facility; where the waste heat is centered in the facility, etc.)
    - Source of water supply for the power generation facility (e.g., groundwater, seawater, surface water)
    - Location of facility (close to water demand – communities in need of water)
2. Evaluation of viability of co-generation in existing power generation facility (e.g., coal fired, gas fired, fossil fuel and nuclear power technology facilities and any existing renewable energy facilities)
    - Review in terms of technical feasibility, economic viability, and compliance with existing and possibly new environmental regulations.
    - Review policies and legislative framework to allow power generators to also produce water.
    - Identify opportunities for co-generation at a scale (including smaller and remotely located communities) for brackish groundwater desalination
3. Develop guidelines for new power generation facilities; with the view to co-generate water.
    - Innovative design of power facilities to accommodate water production
    - New financing model for purchase of power and water from cogeneration facilities, with additional focus on renewable energy desalination
    - Land use planning to maximize use of infrastructure to co-generate power and water

Estimated Project Budget and Schedule

$500,000; 24 months

Proposed Partners

Power generation facilities (e.g., waste-to-energy plants; fossil fuel, natural gas and coal fired power generation facilities)

- Water treatment process vendors
- Policy makers and land use planners to rethink land use planning and funding structure for projects
- Regulators (energy, water and environment)
- Municipalities and small community users

Known Prior Research on This Topic

1. Information on waste energy in power plants – "Working Document of the National Petroleum Council Global Oil & Gas Study (July 18, 2007)"

   http://www.npc.org/Study_Topic_Papers/4-DTG-ElectricEfficiency.pdf

2. Memstill membrane distillation – a future desalination technology (Desalination 199 (2006) 175–176)

   Jan H. Hanemaaijera, Jolanda van Medevoorta, Albert E. Jansena, Chris Dotremontb, Eric van Sonsbeekb, Tao Yuanc, Luc De Ryckb

WIND

Wind Project 1

Title

Guidebook for implementation of renewable energy for desalination for small systems

Needs the Project Meets

There is currently no guidance for small systems that would like to employ wind, solar or other renewable energies when considering desalination alternatives. While information exists for large systems, there is a need for those that are off the grid. If renewable energy (RE) is to be employed on a more widespread basis for small systems, then clear, concise and tailored guidance is warranted.

Benefits of Project and Expected Outcomes

1. A better understanding of renewable energy options, challenges, and directions so that small systems can make informed decisions when undertaking a desalination project.
2. Greater rate of implementation success for small-scale RE-desalination.
3. Ultimately, higher water quality for disadvantaged and off-the-grid small communities.
4. Provides a peer-reviewed decision making tool to manage risk associated with implantation of RE-desalination.