

Proposed Partners

Texas Water Development Board

Known Prior Research on This Topic

Texas Water Development Board RFP

NOTE: similar document/project should be executed for wastewater treatment systems

GEOHERMAL

Geothermal Project 1

Title

A survey of existing geothermal power plants and direct use facilities to determine near-term feasibility to cascade geothermal and heat energy water for desalination

Needs the Project Meets

Provide information from current geothermal facilities to apply in categorizing geothermal fluids and in order to match potential desalination applications.

Benefits of Project and Expected Outcomes

Project will provide a better understanding of the economic and technical potential for pairing existing geothermal facilities with desalination applications, including economic recovery of minerals.

Determine pretreatment requirements and provide preliminary information on most promising desalination technologies to use.

Research Objectives

Identify opportunities for geothermal and desalination applications. Identify regulatory, marketing and business challenges to implementing geothermal-desalination projects.

Research Approach (numbered by task)

1. Identify existing facilities
2. Literature search
3. Solicit stakeholder input for survey
4. Develop and apply survey tool
5. Interpret results
6. Prepare report

Estimated Project Budget and Schedule

\$150,000; 12 months

Proposed Partners

[not provided]

Known Prior Research on This Topic

[not provided]

Geothermal Project 2**Title**

Recovery of minerals from geothermal brines

Needs the Project Meets

Reduces the amount of material to be reinjected into reservoir; identifies potential revenue streams to offset the cost of the project.

Benefits of Project and Expected Outcomes

Value of recovered minerals could reduce the cost of water production; removal for minerals in pretreatment could simplify desalination of the water.

Expected Outcomes

A process for recovering specific minerals from a specific geothermal brine would be developed; the cost of recovery of specific minerals would be estimated.

Research Objectives

Identify minerals that might have market value (lithium, boron, zinc, gold, others); Identify processes for removing specific minerals.

Research Approach (numbered by task)

1. Review literature existing minerals in geothermal brines and means of recovery.
2. Collect brines from existing geothermal installations and perform analyses.
3. Chose two promising brines and perform separations.
4. Prepare final report.

Estimated Project Budget and Schedule

\$299,000; one year

Proposed Partners

UTEP, Witcher & Associates

Known Prior Research on This Topic

Susan Juch Lutz, Jeffrey B. Hulen, and William L. Osborn, Gold-Bearing Arsenide and Other Production-Well Scales from the Salton Sea Geothermal Field, California, Proceedings, Twenty-Sixth Workshop on Geothermal Reservoir Engineering Stanford University, Stanford, California, January 29-31, 2001.

Willem P.C. Duyvesteyn, Recovery of Base Metals from Geothermal Brines, *Geothermics*, 21 (5/6) 773-739, 1992.

W. Bourcier, S. Martin, B. Viani, and C. Burton, Developing a Process for Commercial Silica Production from Geothermal Brines, *Geothermal Resources Council Transactions*, 25, August 26-29, 2001.

Geothermal Project 3

Title

Development of a users' guide for assessing feasibility of geothermal technologies for small-scale, brackish desalination systems

Needs the Project Meets

We do not know of a screening document that users can access to help them determine applicability of the use of geothermal resources in a desalination project.

Benefits of Project and Expected Outcomes

Allow the desalination community to determine if it could be technically and economically feasible to use geothermal resources as part of a small-scale brackish desalination project. Expected Outcomes: because of the synergies gained from using a constant renewable energy source in the desalination process, more communities will be able to economically increase their production of water.

Research Objectives

1. There are two main types of geothermal resources (conductive and convective) and multiple desalination processes including reverse osmosis (RO), multi-stage flash distillation (MSF), multiple-effect distillation (MED), mechanical vapor compression (MVC), electrodialysis (ED)/electrodialysis reversal (EDR), and nanofiltration (NF). The objective of this research would be to develop guidelines for when synergies could be gained by using the water, power generation, heat, and/or cooling provided by geothermal processes in a desalination process.
2. Educate the public.

Research Approach (numbered by task)

1. Review existing guidance documents for small scale geothermal and desalination processes.
2. Develop a matrix of geothermal and desalination technology requirements
 - Energy generated or required
 - Water temperature
 - Water quality parameters

- Depth of water resource
 - Brine disposal options
3. Develop typical project profiles
 4. Case examples
 5. Project budgeting guidance

Estimated Project Budget and Schedule

\$250,000; 12 months

Proposed Partners

[none provided]

Known Prior Research on This Topic

1. National Resource Council, 2008. Desalination: A National Perspective. Washington DC: National Academy Press.
2. European Renewable Energy Council. Key Issues for Renewable Heat in Europe (K4RES-H). Key Issue 5: Innovative Applications: Geothermal Utilization for Seawater Desalination
3. UNESCO-EOLSS Integrated Power and Desalination Plants Project: Encyclopedia of Desalination and Water Resources DESWARE
4. W. Teplitz-Sembitzky. Sept. 2000. The Use of Renewable Energies for Seawater Desalination – A Brief Assessment
5. K. Bourouni, R. Martin, L. Tadrist, M.T. Chaib. Heat transfer and evaporation in geothermal desalination units. 1999. Applied Energy, Vol 64, Issues 1-4.
6. (Funded by KFW)

INFRASTRUCTURE

Infrastructure Project 1

Title

Technical and economic comparison of reverse osmosis (RO) and electrodialysis (ED) brackish water desalination units powered by hybrid wind/photovoltaic (PV) systems

Needs the Project Meets

The demand for fresh water is increasing due to population growth, change of life style, and industrial growth. As a result, there is a reduction in the volume of available fresh water resources, requiring the use of impaired water supplies. In order to meet the increasing demand for fresh water resources, we need a better balance of water management (including water conservation and recycling) and sustainable development of new water resources. This project utilizes an integrate hybrid renewable energy-desalination system designed for sustainable development of new water resources by the following approach: