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Building Tribal Economic Diversity Through Geothermal R & D

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The Indigenous Nations Institute

The Indigenous Nations Institute (INI) at Idaho State University (ISU) is creating a new paradigm for tribal renewable energy resource development while assisting tribal communities to diversify economically and build technical, business and management expertise in a culturally sustainable manner. The INI comprises a diverse group of academic professionals in business, education, and research from within ISU and the Idaho Geological Survey (IGS) that operates within the university to promote education and training of Native students in energy systems technology, business, civil and environmental engineering, and geothermal R&D. The goal is to have the INI act as a broker that matches tribal and industry needs across a spectrum of technical, business and health management areas (Figure 1).

The INI paradigm recognizes that geothermal energy development by and for tribal interests requires

- direction from the tribal community regarding its renewable energy future;
- an identification of economic and cultural needs and the potential for capacity development from within the community;
- building tribal human resources and professional capacity through education and training; and
- achieving a sustainable level of economic self-sufficiency via commercial development and stewardship of the tribe's renewable energy resources.

Most recently, the INI involved research scientists from ISU, IGS and the University of Idaho to assist the Shoshone-Bannock Tribes' Energy Office in preparing a proposal to the Department of Energy (DOE). The Sho-Ban Tribes are actively developing a large wind-energy project on tribal land, but the Business Council

has until now been reluctant to explore geothermal development options. The Tribes now see their collaborative relationship with INI as a means to both assess the feasibility of geothermal energy utilization on the Fort Hall Reservation and develop education and training opportunities for Tribal members. The goals of the proposed DOE work plan are to (i) assess geothermal potential on the Fort Hall Reservation (high- and low-temperature), (ii) evaluate the economic benefits of using ground-source heat pump technology for residential and government / commercial buildings on the Reservation, and (iii) initiate professional development and community activities to help educate Tribal members in renewable energy and thereby build community-level support for its utilization.

The INI has also entered into a teaming agreement with the Northwestern Band of the Shoshone Nation (NWB) to assist the Tribe in developing the Renaissance geothermal prospect in north-

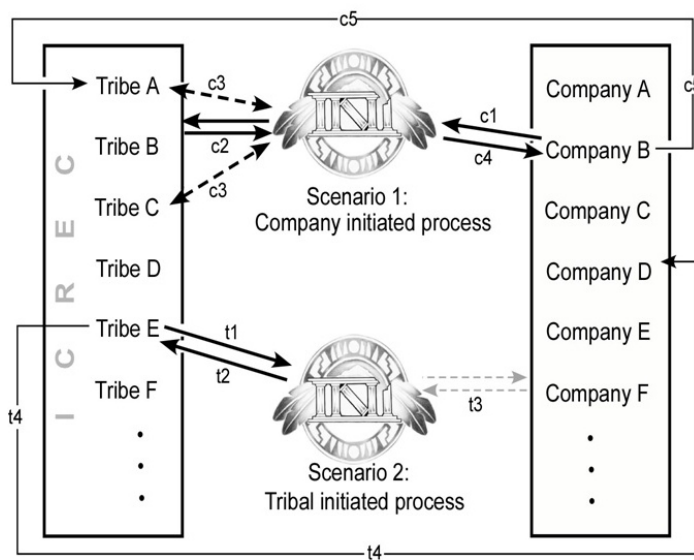


Figure 1. INI tribal – industry collaboration model. INI acts as a broker to allow tribes and industry to approach one another regarding specific technical, business or health management issues and to develop collaborative, mutually beneficial solutions.

central Utah that will service part of the Tribe's power purchase agreements with California municipalities. Unlike the Sho-Ban Tribes, the NWB is specifically targeting geothermal power development and is committed to that goal as well as to furthering Tribal members' STEM (science, technology, engineering and math) education opportunities to build its professional capacity. The NWB originally partnered with IdaTherm LLC which owns the Renaissance leases but has since dissolved that arrangement to work with the INI as its principal technical advisor. The INI is also working with outside business and tribal development inter-

ests to help the Tribe secure financial backing for the Renaissance development project.

The Renaissance Project

The Renaissance resource, described by Austin *et al.* (2006), is a saline geothermal reservoir situated beneath a major energy and commerce corridor near Brigham City, Utah (Figure 2). The prospect was originally drilled by Geothermal Kinetics and Utah Power and Light in 1974. Available down-hole information from the Davis #1 discovery well leaves much to be desired (inadequate thermal stabilization, questionable fluid sample integrity, and casing over of the productive interval), but it is clear that at least one producing zone exists at about 2500-2530 meters below surface. At this depth, the well began to flow spontaneously at 3500 gpm with a surface temperature reported in excess of 140 °C. Both measurements are likely minimum estimates of what the reservoir is capable of producing. Only one sample was collected from the flowing interval, but it revealed a Na-Cl type fluid with high SiO₂ content (305 ppm) and very high total dissolved solids (54,300 ppm). The major-ion composition of this fluid is similar to that of thermal brines issuing from the range-bounding Wasatch fault at Crystal Hot Springs, six km north of the exploration well.

INI's geoscientists and engineers at ISU and the IGS are advising the NWB on development options, including geochemical, remote sensing and structural interpretations of the resource, revised reservoir geothermometry estimates, and the technical merits of a novel closed-loop single well heat-exchanger that could circumvent environmental and engineering problems associated with the production of such saline fluids. The INI is also assisting the NWB in its attempts to attract investment capital for the project and to apply for sources of grant funding to develop a more detailed geotechnical and engineering evaluation of the prospect and pre-construction activities such as permitting and environmental impact assessments.

References

- Austin, C.F., Austin, R.R. and Erskine, M.C., 2006, Renaissance – a geothermal resource in northern Utah; *Geothermal Resources Council Trans.*, v. 30, p. 853-857.

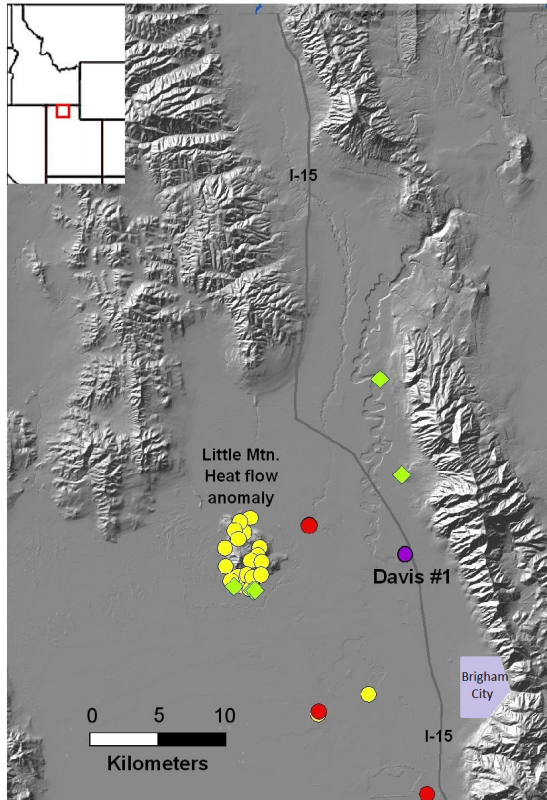


Figure 2. Location of the Davis #1 discovery well and availability of heat flow data (yellow), well chemistry (red) and hot spring chemistry data (green) in the vicinity of the Renaissance prospect.