

The Geysers Steamline

WWW.theGGA.org

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GEYSERS GEOTHERMAL ASSOCIATION

FALL 2008

GGA Fall Gathering unites old friends, delicious meal and outstanding program

GGA members enjoyed another great dinner at Charlie's, overlooking Windsor Golf Course in Windsor November 11. The evening was highlighted as friends from afar returned to Santa Rosa to graciously present the evening program.

Guest speaker, Charlene Wardlow, Ormat's Director Business Development, talked about the Israeli-based company's history and record of success. Before starting work at Ormat's Reno, NV office in 2006, Charlene was employed by Calpine, and had worked for more than 20 years at The Geysers. During that time she served as GGA president, from 1994 through 1996.

Although it now operates worldwide, Ormat began as a very small, vertically integrated, engineering and

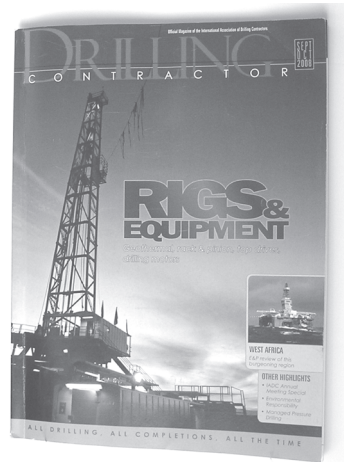
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Santa Rosa Recharge Project begins expansion

The Geysers Recharge Project, a collaboration between the City of Santa Rosa and Calpine Corporation, was named the Institution of the Year by the National Water Reuse Association at their convention in Dallas, Texas on September 8. The controversial project was completed five years ago, and has proven to be so successful that the City has plans to expand their output to the steam field.

Since start of operation, the project has conveyed an average of 11 million gallons of treated wastewater per day, or 4 billion gallons per year through 41 miles of pipeline from Santa Rosa to The Geysers steam field. There is a 3,000-foot climb between the lowlands of Santa Rosa to the mountainous project area, requiring four powerful pumping stations to make the grade.

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A ThermaSource drilling rig is featured on the latest issue of Drilling Contractor magazine along with a detailed story inside. The magazine reaches 30,000 drilling and completion professionals.

ThermaSource makes the cover of industry magazine

ThermaSource, a long-time drilling, engineering and consulting business at The Geysers, was featured on the cover of the September-October issue of Drilling Contractor Magazine, the official magazine of the International Association of Drilling Contractors. In a five-page spread focusing on the sudden expansion of geothermal energy due to unpredictable oil prices, the article points to geothermal drilling as an exciting new market in an era when consumers are looking for greener options.

Santa Rosa-based ThermaSource was founded in 1980 by Louis Capuano, Jr., who, in 1982 became GGA's first president. Back in those days his fledgling company was strictly a geothermal engineering and consulting firm specializing in locating viable steam supplies and contract- drilling using leased drilling rigs. Capuano's expertise in drilling and geothermal drilling fluids has kept his company in demand at The Geysers and in steam fields across the United States and around the globe.

It wasn't until 2006, when new technology combined with revitalization of the industry, that ThermaSource decided to acquire its own drilling rigs and expand its geothermal services. They started out with one refurbished rig purchased from the oil/gas drilling market.

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President's Message

By Ron Sues

Did you ever have the sense of being “firmly planted in mid-air?” Nothing is settled; there appears to be no firm foundation; confidence in the financial realm is flagging; the sense as to which way to go can appear to be challenging if not overwhelming.

There is no compass that creates that sense of bearing right now. This really means there is no bearing at all! Matters can go in any direction, depending on which way the financial winds blow. Right now, bottom line, there is no certainty with regard to the financial future.

The question begged is, “How will this ‘mid-air’ experience affect all matters financial, not to say anything about how they will affect the geothermal industry?” It is patently clear that we are at a tipping point. We in the geothermal industry, and certainly we that are associated with The Geysers, need to assess our bearing and to determine now what to do.

First, we need to make certain we have a bearing and understand what it is and where it is presently leading us. One cannot know where one is going without knowing where one actually is.

Second, it would be prudent for us to commit to staying the course that we have already set as per step one, above. We should maintain it until the critical factors make it abundantly clear that a course correction is absolutely necessary to survive.

Third, we need to increase our diligence of all matters financial so we are able to penetrate through the froth and bubble of conventional wisdom and make informed decisions followed by appropriate actions, all according to the best information we can gather.

Fourth, if we have need to make a course correction, then we should maintain flexibility after the fact so as to be able to change course as often as required to keep our bearing in time of storm and reach our safe harbor.

Finally, implementing these four steps should allow us to navigate these uncertain financial environs, to

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Recharge expansion

The new plans will increase the delivery of recycled water to the steam field to as much as 7.1 billion gallons per year. The expansion agreement guarantees delivery of a maximum of 5.5 billion gallons per year over the next 30 years and allows the City to deliver an additional 1.6 billion gallons to accommodate anticipated growth and excess water due to inflow and infiltration from heavy rains.

The City has already increased average delivery of recycled water to 12.6 million gallons per day, however the City must spend another \$2.5 million to expand their pumping station and add redundancy elements. Under the amended expansion agreement, Calpine provides 20 megawatts—or about 75 percent of the power needed for pump station operation—and will pay the Subregional Water Reuse System \$300,000 per year for the recycled water.

The project will not be fully completed for several years. The recycled water injected into the steam field generates enough green power to supply up to 100,000 homes with electricity.

The Santa Rosa project was modeled after the highly successful Lake County Geysers Recharge Project, which sends its treated water through 29 miles of pipeline from Lake County’s Southeast Regional Treatment Plant near Clearlake to the Southeast Geysers. That project broke ground October 6, 1995, and has been declared a great success by the County and the geothermal industry at The Geysers.

As the need for green energy grows, geothermal has attracted more interest than ever. Recharge projects are a good way to sustain productivity while solving wastewater problems for municipalities. One unexpected benefit is cleaner steam from wells that have been reinjected!

Geysers Geothermal Association

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President's Message

sustain our industry, and even to prosper in spite of them. We have confidence in our industry, and we certainly have confidence in our ability to adapt, to be creative, and to manage our industry.

By correcting our compass, assessing our bearing, and maintaining our course until such time a course correction is merited, we are well positioned to weather the storm financial of uncertainty and, not only survive this crisis, but even prosper in spite of it. Hence, we can overcome any sense of being planted in mid-air and, thereby, manage the tipping point to go our way. We, at The Geysers, are fully capable of making this happen to our advantage.

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ThermaSource

From that point on the company more or less ballooned outward. The magazine quotes Jim Hanson, ThermaSource executive vice president of operations,



who described the expansion as “going from just three employees to more than 235 employees in 2008. It also went from one rig to eight—plus two more on order as of August.”

In addition to expanded drilling capabilities the company is starting three service companies, ThermaSource Cementing, ChemTech, and a mud logging company. The new ThermaSource offices are located at 3883 Airway Drive in Santa Rosa.

—Thermasource photo

A brief note from Mitch Stark

Editor's Note: Ralph Aviles asked Mitch to write a short note for the newsletter before he departed for Manila last June. We wish him well in his new position with Chevron.

My last day at Calpine was June 11, and I started at Chevron June 30. I will soon start an assignment in Manila as Geoscience Manager, working on Chevron's two Philippines geothermal fields.

I previously worked there from 1995-1998 in a similar capacity for Unocal. Chevron's Philippines geothermal operation is headed by Tony Yee, known by many GGA members as Unocal's operations manager for The Geysers during the late 1990's.

I'm looking forward to returning to the Philippines, but will miss the daily challenges at the Geysers and all the great people who give 100 percent to meet those challenges every day.

—Mitch Stark

New Committee Chairs

Marilyn Sanborn, Windsong Designs, has resumed editorship of The Geysers Steamline and chairmanship of the newsletter committee.

Former editor, Kathy Enedy, has published the newsletter since 2001. Kathy, owner of Graphic Vision and longtime consultant at The Geysers will devote more of her time to her growing consulting business.

Marilyn served as editor of the Steamline for 16 years prior to taking a 'time out.' She is now making plans to relocate her home and business to Oak Run, 27 miles east of Redding in Shasta County, CA. She and her husband, Eric will complete their move in January.

Anyone wishing to submit news articles to the newsletter can call Marilyn through January at 707 578-4286 or email her: msanborn@sbcglobal.net. In February, the phone number will be 530 472-6442, and email will change to msanborn@frontiernet.net.

Assisting on the newsletter committee will be Ben Barker, GGA secretary, and Margaret Lewis, GGA PR chairman. Anyone interested in serving on the newsletter committee can contact Marilyn.

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GGA Fall gathering

manufacturing company that also sold equipment. After 40 years of experience developing environmentally sound geothermal technology, they have emerged as a major player in the field. Ormat now owns and operates power plants in the United States, Guatemala, Kenya, Nicaragua and New Zealand. They also own four drilling rigs under their company called GeoDrill, LLC.

“Ormat specializes in technology based on their original Ormat Energy Converter, or OEC, which can utilize low and medium temperature heat sources—sources not hot enough to produce energy using other technologies,” she explained. “The OEC utilizes the Organic Rankine Cycle, or ORC power system, which is a closed loop heat exchanger so there are no geothermal emissions as there are in The Geysers.”

Charlene added that “Ormat’s recovered energy generation projects, or REG’s, are also key to their business. These include options to utilize exhaust gas from gas compressor stations along interstate pipelines, midstream gas processing facilities and other energy-intensive industries, such as cement production.” She said, “one of applications for their energy converters is in remote power units, another closed system, primarily binary, that uses solar power to pump. These can be run without any workers present for long periods of time.”

Gene Suemnicht, who formerly worked at The Geysers also now works at Ormat. Gene finished off the presentation by adding information and fielding questions on Ormat’s exploration projects.

The next GGA gathering will be the Spring Dinner, which includes installation of officers. It also marks the deadline for dues to be paid for the 2009-2010 term. Dues invoices and reminders will be sent to members in the mail.

GGA website

Have you visited our GGA website lately? If not, you might be surprised at the wealth of geothermal-related information that you will find there, including links to other informative sites

Our webmistress, Dorothy Beebee welcomes contributions and comments. theGGA.org. Go there!

New Committee Chairs

Marilyn will also become chairman of the membership committee, formerly headed by Steve Eney, NCPA. Please contact her or Margaret with address changes.

Steve, who has chaired the scholarship committee for many years, has handed that job over to Louis Capuano Jr., of ThermaSource. We will miss Steve and Kathy’s involvement on the committees and wish them the best.

Membership Drive

Do you know someone who would like to be a GGA member? If so, send us their contact information and we will invite them to the spring membership dinner. If they sign up as a corporate member either before or at the dinner they will get 10 percent off their first year’s dues! And don’t forget to send them to our website to learn more about us. Send information to Marilyn Sanborn or Margaret Lewis.

New CEO for Calpine

Jack A. Fusco joined Calpine as President and Chief Executive Officer and a member of its Board of Directors in August 2008. He recently served as Chairman and Chief Executive Officer of Texas Genco Inc. until 2006. From 2002 until July 2004, Mr. Fusco was the exclusive energy investment advisor to Texas Pacific Group. Earlier, he helped found Orion Power, an independent power producer, serving as a Board member and the Company’s Chief Executive Officer.

Prior to the establishment of Orion Power, Mr. Fusco was a vice president in Goldman, Sachs & Co., where he focused on wholesale electric commodity trading and marketing. Before joining Goldman Sachs, he was executive director for International Development and Operations for Pacific Gas & Electric’s nonregulated subsidiary. In that role, Mr. Fusco was responsible for the development and implementation of PG&E’s international business strategy and the launching of International Generating Company (InterGen), an international independent power producer focused on emerging markets. Mr. Fusco, who started his career as an operator at power plants in California, has nearly 25 years of experience in the power industry.

Supporters herald the next generation of geothermal energy

By Marilyn Sanborn

It's being hailed as the 'next generation of geothermal energy,' and there is so much excitement about it that money from the Department of Energy and private investors is already in the hands of developers. So what is this new geothermal technology all about? It is called Enhanced (or Engineered) Geothermal Systems (EGS), and it's making a very big splash in the alternative energy wave.

EGS utilizes geothermal technology in a way that can harness heat from the earth even if steam is not overtly present. The process calls for drilling deep—miles down—to granite rock where the heat is, and creating man-made fracture networks. As water is circulated through the system, enough steam is made to produce electricity in a conventional turbine.

Theoretically, since this type of heated rock can be found anywhere on the planet, geothermal energy could become 'portable,' spreading far beyond the KGRA. Its proponents believe this gives it the potential to power the world many times over, reducing or eliminating the need for coal or other fossil fuels.

Who are these proponents? Well, Google, for one. Google's public-spirited division, Google.org, has added EGS to its list of projects to support the fight against global warming. They have already disbursed the following grants for EGS research and development:

- Potter Drilling, Redwood City, CA: \$4 million investment focused on developing breakthrough hard rock drilling technologies for EGS.
- AltaRock Energy, Inc., Sausalito, CA: \$6.25 million investment in EGS technologies and project development to support the advancement of enhanced geothermal systems.
- Southern Methodist University Geothermal Lab, Dallas, TX: \$489,520 grant to improve geothermal techniques and update the Geothermal Map of North America.

Google.org is dedicated to addressing poverty and emerging disease in addition to climate change. Their

energy strategy is to 1) financially help boost renewable energies such as solar, wind, geothermal and others to the point where they will be cheaper than coal and 2) accelerate commercial use of plug-in vehicles.

The DOE in the meantime, presented Ormat's Reno, NV division with a grant for nearly \$3.4 million last October to apply EGS stimulation techniques at their Brady facility located near Reno. Ormat, the DOE, GeothermEx Inc., and other stakeholders will develop fracture networks to enable currently non-commercial wells to communicate with the productive reservoir and enhance generation.

The Brady EGS project follows a current DOE-funded EGS demonstration and development project at Ormat's Desert Peak geothermal power plant located about ten miles from the Brady area. Upon completion of the EGS project, the Desert Peak facility will be the first application of EGS technology to supply a producing power project in the United States—but not the first in the world. Ormat has a commercial EGS project in Landau, Germany, where a 3.2 MW EGS power plant has been in operation for more than a year. Another pilot EGS project is in France.

Google has good reason to be optimistic: a landmark study by MIT could find no big downside to accessing a large percentage of the vast, newly available U.S. resource, and says that the remaining challenges can be solved at a reasonable cost and in a relatively short time, according to Google's website.

Nevertheless, the technology has not yet proven commercially viable. There is concern about its high demand for water and the potential to ignite earthquakes by disturbing fault structures. But money is perhaps the biggest obstacle to be overcome. These plants can cost hundreds of millions of dollars, even though the electricity that is eventually generated by them could be cost competitive with coal.

For more information Google EGS Geothermal.

Information for this article was compiled from a variety of industry sources.

Western GeoPower reports successful start, drilling 50 percent of steam resources with three wells at The Geysers

VANCOUVER, Canada, October 22, 2008. Western GeoPower Corporation, a renewable energy development company, recently announced that 50 percent of the steam resource required to supply the planned 35 MWe Western GeoPower Unit 1 plant at The Geysers geothermal field, has been successfully placed behind pipe with the drilling and completion of the third well, WGP-3. The three wells have established a power capacity of 19.7 MW (gross) or 17.8 MW (net). Well WGP-3 is located approximately one mile northwest of the WGP-1 well.

Flow testing carried out by independent consultants, GeothermEx, Inc., on completion of well WGP-3 has demonstrated an initial steam production rate of 114,000 pounds per hour at a flowing wellhead pressure of 80 psia. Given the plant requirement of 16,130 pounds per hour per MW (gross) or 17,740 pounds per hour MW (net) at a flowing wellhead pressure of 80 psia, this well is estimated to have a power capacity of 7.1 MW (gross) or 6.4 MW (net).

Recent flow testing carried out on well WGP-1 established a power capacity of 10.0 MW (gross) or 9.0 MW (net) and well WGP-2 established a power capacity of 2.6 MW (gross) or 2.3 MW (net). The average power capacity for the three wells is 6.5 MW (gross) or 5.9 MW (net).

“The results of drilling to date have been very satisfactory, with well WGP-1 being the most productive well drilled at the Geysers over the past two decades and well WGP-3 being one of the most productive,” said Dr. Subir Sanyal, President of GeothermEx. “The average well capacity of the three wells is far above the average capacity at The Geysers field today.”

Richmond-based GeothermEx is a recognized international authority in the evaluation of geothermal resources and has been involved in the development of

all the producing geothermal fields in the United States and over 750 projects worldwide. Their knowledge of The Geysers geothermal field is extensive, having been associated with the development of the field for over 30 years.

The rig is currently being set up to begin drilling well WGP-4 which is designed to intersect known productive zones accessible from the current pad. Completion of WGP-4 is projected for early 2009. Initial projections called for the drilling of a total of eight production wells and one injector. Should the drilling of the additional wells continue to yield higher than anticipated capacity factors, fewer wells may be required. An existing well is being assessed for re-work and may be used as a second injection well. The drilling program is scheduled for completion in late 2009 and the 35 MWe Western GeoPower Unit 1 plant is projected to start commercial operations in early 2010.

The Geysers geothermal field, located 75 miles north of San Francisco, California, is the largest producer of geothermal electricity in the world. Commercial geothermal power has been generated continuously at The Geysers field since 1960, the present generation level being about 900 MWe of clean, baseload electricity. Western GeoPower’s Unit 1 project is situated in the south-western region of The Geysers field in Sonoma County.

Western GeoPower Corp. (TSX Venture Exchange Trading Symbol: WGP) is a renewable energy company dedicated to the development of geothermal energy projects for the delivery of clean, sustainable, baseload electricity generation. The Company is developing The Western GeoPower Unit 1 geothermal power plant at The Geysers Geothermal Field in California, United States and the South Meager Geothermal Project in British Columbia, Canada.



GGA BUSINESS DIRECTORY

Support the businesses that support the GGA

The following businesses are Corporate Members who are the backbone of the GGA.
Keep our organization strong by calling on them when you need the following services:

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		<p>Jackson Equipment Co. • Wayne Jackson PO Box 669 Middletown CA 95461 707 987-3660</p>		

New geothermal opportunities appearing on horizon

New geothermal opportunities may be right around the corner, or at least in some heretofore unavailable territory. In a news release October 22, Interior Secretary Dirk Kempthorne announced plans to make available 190 million acres of federal land in a dozen Western states for development of geothermal projects, a move that could produce enough electricity for 5 million homes.

The twelve states include Alaska with 3 new leasing areas, Arizona with 8, California 14, Colorado 10, Idaho 20, Montana and Nevada 8, New Mexico 9, Oregon 10, Utah 18, Washington 1 and Wyoming 13.

Kempthorne announced completion of an environmental review of the proposed leasing program which will include both federal forests and rangelands. National parks will remain off limits to leasing, he said.

The plan, expected to be made final in two months, calls for leasing land to project developers with the proceeds shared by local, state and federal governments.

The broader environmental review for the overall leasing program calls for 118 million acres of land managed by Interior's Bureau of Land Management, and 79 million acres under the U.S. Forest Service, to be made available for potential geothermal development.

"These lands hold a huge energy potential," said Kempthorne. He said it is estimated that the available leases could produce enough energy to generate 5,540 megawatts of electricity, enough to power 5.5 million homes. Geothermal energy also can be used directly for heating buildings.

The government has had a geothermal leasing program underway for years. Since 2001, the Bureau of Land Management has issued 380 geothermal leases. Currently 1,275 megawatts of electricity are being produced from geothermal resources on federal land.

But the new plan calls for making more federal lands available, leases that could begin to produce significant amounts of power by 2015.

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