36th GRC Annual Meeting, Part One
Promoting “Geothermal: Reliable, Renewable, Global”

It was a jam-packed week for the global geothermal community in Reno, Nevada in early October. Attendees at the 36th GRC Annual Meeting were spoiled for choice by numerous events and activities.

We will document the meeting in two parts. In this issue we will report on the Opening Session, Golf Tournament, Special Luncheons and Field Trips. In the January/February 2013 GRC Bulletin we will write about the GRC Awards, the Poster and Technical Session Awards and the winners of the 33rd Geothermal Photo Contest.

Opening Session
by Ian Crawford

There was standing room only for the showpiece of the 36th GRC Annual Meeting, the Opening Session. Over 1,000 attendees from the global geothermal community convened, once again, in the Peppermill Resort Spa in Reno, Nevada, USA.

General Chairman Jim Combs welcomed everyone to Reno and reminisced about the very first GRC Annual Meeting 40 years ago in El Centro, in the Imperial Valley of Southern California. “Since that time we have seen the GRC grow from small beginnings to now almost 1500 members, with almost 30 percent coming from the international community. Technical session presentations are being made by representatives from 31 different countries. We are now an international educational, technical and professional organization for the worldwide geothermal community.”

Combs gave a shout-out to this magazine: “The GRC Bulletin has progressed from a meager beginning as a mimeographed stapled set of pages appearing erratically, to the present glossy presentation sought by members and non-members alike, to view the latest happenings in the development of geothermal research, exploration, and development of direct use and electrical generation projects.” (See page 6 for an article on the 40th anniversary of the GRC Bulletin.)

GRC Interim Executive Director Steve Ponder welcomed the attendees from 33 different countries and relayed greetings from Senator Harry Reid of Nevada to the global geothermal community gathered in Reno.

Senator Reid said it was his pleasure to welcome attendees to Reno for the Geothermal Resources Council 36th Annual Meeting and the Geothermal Energy Association (GEA) Geothermal Energy Expo 2012. “I am delighted that the GRC and GEA have chosen to gather in the Silver State. Given the vast geothermal resources and industry presence in the region, you could not have selected a more ideal location for this event,” Senator Reid said.
GRC Annual Meeting: Opening Session

In an op-ed that appeared in the Reno-Gazette Journal just before the Annual Meeting, Senator Reid commended the GRC for its work and stressed the importance of ongoing federal support for the industry.

Pierre Audinet and Magnus Gehringer of the World Bank Energy Sector Management Assistance Program spoke about a new World Bank publication entitled Geothermal Handbook: Planning and Financing Power Generation. (More information on this publication can be found in the Publications, Videos, Maps section on page 43 of this issue). They spoke about the World Bank’s commitment to help develop geothermal power in countries where development would make the greatest difference.

Yoram Bronicki, President, Director and Chief Operating Officer of Ormat Technologies Inc. said the U.S. market is difficult for geothermal industry, but that this has some positive results. “I think that finite margins in the U.S. market really force us to find ways for better efficiencies, to have better equipment, better tools, better programs. Whatever is developed here can then be shared elsewhere in the world, and of course by doing so, we’re learning from what other people have done outside of the United States.”

Bronicki said that there were three requirements for getting projects on-line: the ability to prove a resource’s viability early in the project development phase, a smooth permitting process, and a clear horizon for Power Purchase Agreements.
Doug Hollett, Manager, U.S. DOE Geothermal Technologies Program (GTP) said the current priorities of the GTP are to identify new geothermal opportunities, EGS R&D and field lab, regulatory roadmaps and optimization, and project synergies.

Hollett commended the geothermal community for its efforts in handling induced seismicity issues. “The National Academy of Sciences referenced the geothermal community as being a model for all the other subsurface energy and extraction communities, on how to deal with the induced seismicity issue. Everyone who goes out and drills wells has been asked by the Academy to pay attention to the induced seismicity protocol formulated by the geothermal sector and to use it as a guideline.”

NOTE: Doug Hollett’s PowerPoint presentation can be downloaded at: http://goo.gl/MRMwx
Doug Hollett said that having a predictable budget for the program is important. Funding has been hovering around the $40 million mark the last few years. The budget request for next year has been marked at $30 million in the House and $65 million in the Senate.

Greg Raasch, Executive Vice President and Co-Founder, GeoGlobal Energy LLC, gave his views on the state of the geothermal industry. “The good news is that most countries place a premium on electrical power from renewable sources. Throughout the U.S. and around the world, we see many regulatory agencies adopting a renewable portfolio standard or imposing similar renewable energy requirements. The bad news is that in most cases, the utilities are indifferent as to whether that power comes from wind, solar, small hydro or geothermal. In promoting geothermal, we use terms like base load, reliability and availability. They look at cents per kilowatt hour.”

Raasch said that the geothermal industry does not have a good reputation in the financial world. He suggests some solutions: the industry needs to standardize geothermal plant designs; lower the costs and risks of exploratory drilling and take responsibility for its public image—“under-promise and over-deliver.” He also advised companies to “hire an intern,” to begin mentoring the next generation of geothermal specialists.

Craig Mataczynski, CEO, Gradient Resources said that geothermal has a difficult time getting traction among renewables. “The utilities have slanted the playing field away from our ability to extract a premium price where we have the opportunity – the base load. In California right now everything is slanted towards wind and solar. We get no credit for the value we provide from a base load perspective.”

Mataczynski also stressed the importance of managing risk in exploratory drilling. “I would argue that, from an investment perspective, if you can’t be close to 50 percent success rate on your early wells and above 90 percent on your later wells, you don’t represent a good investment,” he said.

Mataczynski is still hopeful for geothermal power. He made a series of suggestions on how the industry can effect change for the better. “I would like to see geothermal get on board with creating
enough change in the industry where we become the tail that wags the renewable’s dog; show everybody how it’s done.”

Gregg Rotenberg, Vice President of Strategy and Renewable Energy Investment at Chevron announced that the company is re-entering the U.S. geothermal power market after an absence of some years. (See Inside Geothermal on page 9.)

He also made a rallying call for the industry: “It’s time for geothermal to stop being renewable energy’s wallflower. It’s time for geothermal to take its rightful place as a leader among renewable energies. My challenge to you is that the only way we all get there is if we help our industry identify truly great projects. We need to provide the quality of knowledge that’s needed so that everyone knows which fork in the road leads to prosperity and success. Only then can we convince all the necessary investors, the lenders and the public, of our credibility, and only then will we succeed in creating a bigger, stronger geothermal industry.”

Richard Campbell, GRC president, with Paul Thomsen, president of the GEA at his side, spoke about the proposed consolidation of the GRC and the GEA. “An announcement was sent to all members of both organizations last year stating that both boards of directors determined that a consolidation of the two organizations was in the best interest of the geothermal community. A committee, consisting of members of both boards, is leading this effort and making good progress.”

“With unanimous support from the boards of directors of both the GRC and the GEA, a legal firm was jointly hired to investigate options for consolidating the entities. This firm pointed out the difficulties of merging a 501(c)(3) tax-exempt non-profit public benefit organization, the GRC, with a 501(c)(6) tax-exempt non-profit trade association, the GEA. The firm discussed options for moving forward and later this year we are planning a first joint meeting of the GRC and GEA boards to discuss these options.”

“I want you all to know that I give my total support to the joint relationship of the Geothermal Energy Association and the Geothermal Resources Council. I believe this will benefit the geothermal community worldwide.”

Edward Njoroge, CEO of the Kenya Electricity Generating Company (KenGen), and GRC member, made comments from the floor: “I want to thank the presenters for giving us a reality check because far too often we come to these conferences and it’s all good news. It is good to have a reality check on what we are doing.”

The crowded Opening Session adjourned and the attendees went out to take part in Technical Sessions, Poster Sessions, Workshops, Field Trips, the Membership Meeting and Awards Luncheon, and walk the aisles of the GEA Trade Show. It was going to be a busy and fulfilling week for all.
GRC Annual Charity Golf Tournament
by Patrick Hanson, Golf Tournament Chair

Another GRC Annual Meeting means another fantastic Sunday of golf with friends, colleagues, vendors, and customers. This year we hosted the GRC Annual Charity Golf Tournament at the Red Hawk Golf and Resort in Sparks, Nevada just 14 miles from the Peppermill Hotel and Casino.

The weather could not have been better and the course had just been upgraded. We had 104 registered golfers play on 26 teams in a four-man scramble format. Mulligans and raffle tickets were for sale—and every penny raised was for the American Lung Association, Nevada Chapter. We are proud to report, that we raised over $10,000. Thank you for all your support.

Congratulations goes to the winning team(s):
- 1st Place: Louis Capuano III, George Scheid, Don Wells, and Bob Aryaut
- 2nd Place: Steve Cook, Mike Gleason, and Terry Fletcher
- 3rd Place: Mike Hasting, Steven Bjornstad, Andrew Tiedman, and Mike Lazaro

• Longest Drive (Male): Bob Aryaut; (Female): Christa Wicks
• Closest to the Pin (Male): Larry Jenkins 6’6”; (Female): Christa Wicks 19’2”

This tournament could not have been possible without the generous support of our sponsors: Islandbanki, Air Drilling Associates, Scientific Drilling, Geothermal Resources Group, Capuano Engineering Consultants, Well Analysis Corporation, B&L Services, Sinclair Well Products, Geo Drilling Fluids, Aeropres, and Tenaris.

Edward Njoroge, CEO of KenGen teeing off with David Muthike, Transformation Strategy Manager of KenGen (on the right in background) and Charles Johns, Director of the American Lung Association, Nevada Chapter, looking on.
International Luncheon
by Fernando R. Echavarria, Ph.D.,
U.S. Department of State, Office of Space & Advanced Technology, Bureau of Oceans, Environment & Science (OES/SAT)

International participation at the 36th GRC Annual Meeting was especially strong this year, with more than 40 countries represented. The growth of geothermal energy activity in emerging markets today is significantly higher than that of the U.S., and should offer unique opportunities for U.S.-based providers of geothermal goods and services. For the fifth year, the annual meeting broadened its international outreach by hosting an International Luncheon on the first day of the conference. The idea for the luncheon is to bring together international attendees and U.S. geothermal stakeholders from both public and private sectors.

Chile:

Introduced by GRC’s Interim Executive Director, Steve Ponder, the first presentation was given by Professor Alfredo Lahsen of the University of Chile, who provided an update on his country’s geothermal energy developments.

Chile has vast, untapped, geothermal resources of 17,000 MWe and over 10 percent of the world’s land volcanoes, and more than 200 hot springs. The Chilean government has now awarded more than 69 geothermal exploration concessions and 4 exploitation concessions.

Exploration drilling has been completed in five areas: Tinguiririca, Calabozos, Laguna del Maule, Chillan and Tolhuaca (or San Gregorio). The latter two have completed production wells and are moving quickly to become South America’s first geothermal electric power generating projects.

Prof. Lahsen, who was instrumental in the drafting of the Geothermal Energy Law in 2000 that regulates the ownership of geothermal resources, described at least four projects that are in the pipeline. Domestic and international investment in the sector continues with players such as ENEL-ENAP, GeoGlobal Energy Chile, and multiple mining companies.

Kenya:

The second presentation was given by Edward Kiroge, Managing Director and Chief Executive Officer of Kenya Electricity Generating Company (KENGEN) who provided a review of Kenya’s aggressive geothermal expansion program.

His presentation provided a detailed review of the African continent’s unrivaled leader in geothermal energy development. His presentation was on behalf of Kenya’s two leading geothermal institutions, KENGEN and the Geothermal Development Company (GDC). Dr. Silas Simuyi, the Director of GDC, had been invited, but was unable to attend the meeting this year.

Edward Kiroge’s comprehensive presentation provided a wealth of statistics about Kenya’s geothermal development. As of 2012, Kenya’s national electricity installed capacity is 1708 MWe.
of which 51 percent is from hydro, 34 percent is from thermal, and 13 percent is from geothermal resources, a total of 207 MWe.

The country’s geothermal resources are large. KENGEN estimates more than 10,000 MWe. Kenya’s population has only 20 percent average access to electricity, and even lower (12 percent) for their rural population. With its population of over 40 million, electricity demand continues to outstrip supply. Since 2003 Kenya’s electricity demand has been growing at 8-10 percent per year. Their national capacity expansion vision for 2030 sees 30 percent of the total expected installed capacity of 15,066 MWe coming from geothermal resources.

Edward Kiroge reported that development partners for the expansion of the Olkaria I and IV projects (280 MWe by 2014) have committed over 920 million USD from a spectrum of players including: China, India, Japan, Korea, New Zealand, and the World Bank. Kenya is pioneering success with 5 MWe portable geothermal wellhead plants.

Mr. Kiroge concluded by announcing that Kenya is currently advertising for expression of interests for partners interested in a development of 560 MWe of geothermal power (to be divided into four phases with 140 MWe each). He also added that GDC is also in the process of developing the first phase of 400 MWe in Menengai geothermal field. He reiterated that Kenya’s national goal is to develop 5000 MWe geothermal capacity by 2030.

Turkey:

Finally, the last presentation was given by Tevfik Kaya from the Turkish Petroleum International Company (TPIC). Turkey’s geothermal energy potential is estimated at 30,000 MWe. As of September 2011, the country’s total installed electricity capacity is 53,106 MWe, of which only 114 MWe, only 0.3 percent is from geothermal resources. Currently, Turkey has proven 4,000 MWe of geothermal resources over 20 degrees centigrade of which 600-1,000 MW are high temperature fields able to produce electricity.

Due to its economic expansion over the past 8 years, Turkey has become one of the world’s fastest growing energy markets. According to Mr. Kaya, Turkey’s Electricity Transport Corporation (TETC) estimates that demand for electricity will increase at a rate of 6 percent per year between 2009 and 2023. The increase in geothermal electricity production between 2009 and 2011 was 9 percent. Much of this has been possible as a result of a Feed-In-Tariff of 5-5.5 cents Euros for renewables established in 2005. Mr. Kaya also reported on the continued increase in drilling activity in his country.

The presenters at this year’s International Luncheon have kindly made their presentations available at: www.geothermal.org.
Student Leadership Luncheon: A Networking First  
by Maria Richards, GRC Outreach Committee Chair

A new networking event debuted at the GRC Annual Meeting and GEA Expo. Eighty-six students and ten industry leaders met at a Student Leadership Luncheon to discuss areas of interest related to geothermal development. Hosted by GRC and GEA, the event gave students an opportunity to meet with numerous company representatives and get ideas for careers in the industry.

Topics covered and leaders were: Low Temperature Applications (John Fox, ElectraTherm, Inc.), Finance (Alan Kempner Davis, Starlight Investments), Geophysical Tools (Dave Blackwell, SMU Geothermal Lab), Geological Tools (Eric Klingel, Consultant), Plant Construction (Kevin Wallace, Power Engineers), Regulations and Leasing (John McKinsey, Stoel Rives LLP), Working Environments (Roy Mink, Consultant), Drilling (Patrick Hanson, Scientific Drilling), Direct Use (Andrew Oxner, ElectraTherm, Inc.), Canadian Projects (Craig Dunn, Borealis GeoPower, Inc).

The students came from universities across the U.S. Not only was it helpful for them to meet with the leaders, but it also gave them an opportunity to discuss ideas with each other.

In all, 140 students attended the 36th GRC Annual Meeting, demonstrating the renewed interest of this current generation in geothermal energy.

The students gave high praise for this first time event and definitely want to have it again next year at the 37th GRC Annual Meeting in Las Vegas.
Structural Controls on Geothermal Activity in the Western Great Basin Field, Parts I & II

Both of these two-day field trips focused on describing favorable structural settings for geothermal activities in areas of Nevada’s western Great Basin. Although fault zones primarily control the locations of geothermal fields in the Great Basin, many questions remain as to which types of faults and what fault segments are best for geothermal activities. Finding the most favorable settings is important for developing exploration strategies, particularly in blind or hidden geothermal systems. Some of the most favorable geological settings were visited, including belts of intersecting, overlapping, and terminating faults.

The field trips were organized and led by Nevada State Geologist, Dr. James Faulds, assisted by Nick Hinz, Terri Garside, and others. Dr. Faulds said the same geologic settings exist in the areas included in both field trips, although the areas visited in the first trip are generally more complex.

As we drove east from Reno into the miles of less-developed desert lands, Dr. Faulds noted that nearly every ridge is bounded by a significant fault. He said the stresses on Nevada’s Basin and Range systems have changed over the past several million years. Today the most active strain occurs in the northwestern part of the Great Basin, but this wasn’t always so. Many Nevada geothermal systems are hidden or blind. A combination of structural, soil-gas, and geophysical studies helps to find them.

Opaline sinter discovered at the surface, he said, is an indicator of recently active, high-temperature geothermal systems. Opaline sinter was found on the surface at a few stops during the field trip.

About 44 people signed up for the two trips, and as the first trip was ending, I asked some
about their experiences. “This is my first geology field trip. I learned a lot about structural settings and restrictions,” said Arno Schaaf, Director Business Development, Petroleum and Geothermal Research, CSIRO. “We discussed the importance of data sharing, of scientists working with industry—and of trying all the easy things before trying the hard ones.”

“Interesting details,” said Tim Conant of Calpine Corporation. “Faults intersect, break into smaller faults. It’s all based on the faults.”

Stillwater Geothermal/Solar Power Plant, Soda Lake Power Plant, Naval Air Station

A field trip to visit three geothermal locations, including two power plants, was undertaken by about 44 people. All the sites are in Nevada’s Basin and Range topography. One, Enel Green Power North America’s Stillwater Geothermal Power Plant, is the world’s first hybrid renewable-energy project to combine the continuous-generation capacity of binary-cycle, medium-enthalpy, geothermal power with the peak capacity of solar power. The solar power plant will generate around 43 million kWh of energy annually.

Alterra Power Corporation’s Soda Lake Geothermal Power Plant began operations on Christmas Day, 1987. Since then the project has undergone significant expansion and some ownership changes. Alterra Power Corporation is the current owner. In 2009, Alterra undertook a program to enhance the well field and improve the aging power plant, adding two additional production wells, an injection well, and a “steam heating brine” system. The site is expected to generate 74 GWh in 2012 and 84 GWh in 2013. The tour guides were Dick Benoit and Monte Morrison.

A portion of the geothermal resources in Churchill County, Nevada, are on U.S. Navy land at the Naval Air Station in Fallon. The air station areas with the highest amounts of

Members from Kenya pose against the blue Nevada sky during a field trip. PHOTO BY T. GARSDIE.
Group photo at the Stillwater Geothermal Power Plant. PHOTO BY T. GLADSON.

View of the Soda Lake Geothermal Power Plant. PHOTO BY T. GLADSON.
geothermal-development potential are the southern portion of the station and the north-northwestern portion of Range Bravo 19—with Lee Hot Springs and intersecting lineaments that could be conduits for geothermal fluids. The visitors toured the air station and enjoyed lunch at the Navy Officers Club.

**Steamboat Geothermal Power Plant Complex**

Ormat’s Steamboat Geothermal Power Plant Complex, located at the southern end of the city of Reno, produces over 86 MWe, net. The tour highlighted the geology of the Steamboat Basin and Range system plus the Galena III integrated two-level unit. Two tours were offered, one hosted by plant staff and one by corporate staff.

**The ElectraTherm Green Machine**

The ElectraTherm Green Machine generates fuel-free, emission-free electricity from low-temperature waste heat (190 to 240 °F) using an Organic Rankine Cycle and proprietary technologies. The company has 17 machines in the field.

“ElectraTherm recently received approval for Phases II and III of our U.S. Department of Energy grant to commission a Green Machine customized for geothermal applications. It will be designed in a shipping container for optimal plug-and-play installation, with an increased power output of 75 MWe,” said Steve Olson, ElectraTherm President and CFO. Mr. Olson guided about 16 people on a tour of the manufacturing plant in southern Reno.

**Peppermill Geothermal Direct Use**

Several geothermal tours of the Peppermill Resort Spa, the Annual Meeting venue, were offered throughout the meeting. About 150 people took the opportunity to learn how the hotel uses low-temperature geothermal waters and a heat exchanger to heat swimming pools, tap water, and melt snow. Originally natural gas was used for these activities. The tours were led by Dean Parker, Peppermill Executive Facilities Director.

“By 2013 another geothermal project will be underway at the Peppermill, one expected to generate 6 MWe of electricity,” said Ian Crawford, GRC Communications Director.

*Look for Part Two of this report on the 36th GRC Annual Meeting in the January/February 2013 issue of the GRC Bulletin.*