



Arnold Schwarzenegger  
Governor

# 2005 CALIFORNIA GEOTHERMAL SUMMIT

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*Prepared By:*

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Collaborative**

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## 1 OVERVIEW

On June 9, 2005 the California Geothermal Energy Collaborative (CGEC) conducted the *2005 California Geothermal Summit*; the event was co-sponsored by the California Energy Commission (CEC) and the U.S. Department of Energy's (DOE) GeoPowering the West (GPW) Program. The meeting was held at the California Energy Commission in Sacramento, California. The purpose of the meeting was to bring together geothermal stakeholders to concentrate on current geothermal issues, innovations and roadblocks in California, and to conduct interactive sessions to outline the Collaborative's role for increased geothermal production in the state.

The objectives of the Summit were carried out through presentations to meeting participants and facilitated break out discussion sessions. The following sections summarize these presentations and discussions. Over 90 people attended the summit. The meeting agenda is provided as Appendix A, the attendee sign-in list is provided as Appendix B, and a summary of the meeting evaluations is included as Appendix C. Copies of all the presentations provided at the Summit can be found on the CEC web site at:

[www.energy.ca.gov/geothermal/documents/index.html](http://www.energy.ca.gov/geothermal/documents/index.html).

## 2 PRESENTATION SUMMARIES

The meeting commenced at 9:00 a.m. with Karl Gawell of the Geothermal Energy Association (GEA) welcoming the participants to the *2005 California Geothermal Summit* and thanking the group for their efforts over the past year in getting the Collaborative up and running. He also thanked those in attendance for their efforts in pushing for more geothermal energy in California. He then focused on the role of the Collaborative in the future, and the Summit's goal of bringing people together to discuss ideas and gather input to bring the geothermal resource to its most beneficial and abundant use. Next, Val Tianco of the CEC welcomed attendees to the meeting and introduced the two keynote speakers, Shannon Eddy of the California Public Utilities Commission (CPUC) and Commissioner John Geesman of the CEC.

Shannon Eddy began her remarks by stating that Gov. Schwarzenegger has outlined eleven goals as part of his aggressive climate change strategy; and renewable energy is primary among these goals. The renewable energy goal is targeted at obtaining 33% of all electricity requirements in the state from renewables by 2020, which will require a significant commitment. Without this commitment, and if the renewable energy goals are not met, then it will be nearly impossible to meet the overall climate change goals. To meet this commitment, the CPUC is stepping up its efforts to support the Renewable Portfolio Standard. Further, to meet the RPS requirements, the CPUC is looking to the geothermal industry for supplying half of the 20% requirement - with a significant portion (~2000 MW) potentially coming from the Imperial Valley with additional contributions provided by the Geysers resource. The CPUC is looking at both the potential of new sites as well as additional development and increasing output at existing sites. She concluded her remarks by commenting that the CPUC is looking to build a broader coalition to break down barriers, streamline the development process, and accelerate the development of geothermal resources in the state.

Next, Commissioner John Geesman addressed the Summit, and started by asking the attendees to focus on what improvements need to be made to California's geothermal programs, as the legislature has placed a higher priority on geothermal programs and is looking to further support and improve them. Commissioner Geesman stated that currently, we are conducting an assessment of the RPS and we are in a time of re-appraisal of the RPS by the Executive Committee. And, while many are not satisfied with the way the RPS program is working, our colleagues (including the CPUC) are looking at ways to improve the program and make corrective measures. We envision that there will be a fair amount of legislative interaction to help get this work done. Our primary objective is ensuring the adequacy of the energy infrastructure, which will

translate into a more reliable transmission system to build out for renewables. He also mentioned that California is an interesting place in that it has an international reputation for "NIMBYism". Yet, at the same time, the public has demonstrated overwhelming support (80%+) for doubling the amount of renewable energy resources in the state. It is important for us to take advantage of that public support.

Next, Commissioner Geesman focused his remarks on the implementation of the RPS. He stated that they were currently completing the first RPS solicitation, and that a key frustration was that the procurement processes has become too elongated. He cited the example of the SCE process, wherein it took 19 months to procure about 142 MW of renewable power, and noted that at this pace it will be not sufficient to carry us to our goals - and also stated that similar start up inertia is expected with the PG&E and SDG&E solicitations. He went on to say that the process is currently more like a bilateral poker game rather than the open auction process that was expected, with projects forced to compete against each other on factors other than price, and noted that we need to streamline the procurement process in order to yield more tangible results. He also stated that if the utilities do not show more progress, that the state will step in and develop standards for the process, as the intention of the legislation was to encourage price competition. As part of the revamping of the process, more specificity will be needed regarding the term "least-cost / best fit" in order for it to become useful. He also stated that we need to be more specific in defining what the RPS goals really mean. For example, what does 20% really mean? It really means 20% of *delivered* sales.

Commissioner Geesman covered some broader aspects of the RPS, mentioning that the program has been intended to be a "west-wide" initiative including resources from other western states, and said that they are currently working with the Western Governors' Association (WGA) to develop and implement the WREGIS (Western Renewable Energy Generation Information System) to facilitate REC (Renewable Energy Credit) trading and compliance with the California RPS. He concluded his remarks by stating that from the very beginning the RPS program has not been easy to implement, and while we are not where we want to be today, we believe that we are moving in the right direction.

The following summarizes the questions asked of Shannon Eddy and Commissioner Geesman and their responses:

**Q.** Regarding the problems with the RPS legislation, is there more flexibility allowable in the language in the future?

**A.** More flexibility is possible, but we want to first see how the existing language works and then see what changes may be necessary.

**Q.** How does the proposed SEMPRA coal plant (1500 MW) across state lines impact the RPS goals?

**A.** The proposed SEMPRA project results in limiting the capacity on the DC intertie line for importing more renewable energy into California. It is a competing perspective in that many feel the tap on the DC line should be developed anyway, and utilized for renewable energy generation imports from northwest Nevada. Another related topic is whether the state should adopt prescriptive standards for coal-based power procurements in order to accomplish CO<sup>2</sup> reduction goals, which the state is considering.

**Q.** What is the potential for expediting the permit process for geothermal projects?

**A.** The mechanism is there and is general to the resource. The expedited process has been attempted for natural gas combustion turbine projects, but there can be no significant adverse environmental impacts for it to work.

Following the two keynote speakers, a session was conducted entitled "The Current Status of Geothermal Energy". The panel of speakers was comprised of Jonathon Weisgall (MidAmerican Energy Holdings on behalf of CGEC), Dan Schochet (Ormat on behalf of the WGA), and Dr. Roy Mink (U.S. DOE Geothermal Program).

Jonathan Weisgall started the panel off by presenting the overriding theme of his remarks - "The geothermal industry is poised for rapid expansion". He discussed his perspective on the California market saying that Commissioner Geesman postulated an interesting dilemma in that there is overwhelming support for renewable energy in the state, yet California is the home to "NIMBYism". And, while there is an inconsistency in this position, we are working though it and breaking down the barriers. One of the ways that it is being worked through is via the recognition that all politics is local, and people are starting to see the local economic development benefits - and as a result people are starting to support local geothermal/ renewable energy development. In addition, several groups are working on transmission issues and state entities are really getting behind renewable energy development.

Mr. Weisgall then turned his remarks to the Federal level, stating that there will be an Energy Bill this year and the most important component of it for the geothermal industry is the PTC (Production Tax Credit). The geothermal PTC is in the bill, but only with a one year extension, and this does us no good. Congress understands that a year-to-year extension does geothermal no good, and what we really need is a "three-year placed in service" agreement for the PTC. There is an aggressive plan in place to send the Energy Bill to the Senate floor by the July 4<sup>th</sup> recess. We are waiting to see what tax credit provisions are in the final bill, and hopefully we will see a three-year PTC extension.

Next, Dan Schochet, on behalf of the Western Governors' Association (WGA) provided an update on the WGA's Clean and Diversified Energy Initiative. The WGA initiative has agreed to concentrate on supporting clean energy in the West, and as such has set out to:

- Achieve a goal to develop 30,000 MW of clean energy in the West by 2015 from resources such as energy efficiency, solar, wind, geothermal, biomass, clean coal technologies, and advanced natural gas technologies;
- Increase the efficiency of energy use by 20% by 2020. While energy efficiency does not eliminate the need for new generation, it is critical that western states pursue an energy efficient system;
- Meet the West's generation and transmission needs over the next 25 years. Deliverability of energy resources will be examined, including an assessment of promising new resources and technologies. The evaluation will also consider price, reliability, and environmental impacts. In addition, the project shall examine the obstacles to both intrastate and interstate transmission siting and construction in order to access clean energy resources; and
- Determine overall resource adequacy and deliverability in the West.

The WGA's Clean and Diversified Energy Initiative Advisory Committee (CDEAC) is developing a policy roadmap to meet the above goals, and these actions are an opportunity for the geothermal industry to participate in the process and provide input to the individual task forces. Mr. Schochet stated that we need more involvement from the major stakeholders, including the IOUs. He said that many entities are working on reports for various organizations to determine the cost of geothermal energy, and the results to date have included a plethora of ranges of costs; this is in area that we need to get a better handle on in order to determine geothermal's role in supporting the 30,000 MW goal. There are four subgroups supporting the CDEAC working in the following areas:

- Resource location;
- Resource;
- Timeline and project execution; and
- Policy options.

These subgroups are on a tight schedule to finalize their reports, presentations and recommendations, which in turn, will feed into a CDEAC final report due by June of 2006.

Rounding out the panel was Dr. Roy Mink, who discussed the geothermal industry from a DOE perspective. He highlighted the fact that the DOE Geothermal Program includes both electrical generation and direct use

applications. He also commented that California leads the nation in installed geothermal capacity. He stated that the DOE goal for geothermal electrical generation is to reduce the cost from the current 10-16 cent per kWh range to less than 5 cents per kWh by 2010 with an overall mission of establishing geothermal as the base load resource of choice of renewable technologies. An additional goal is to bring more geothermal on-line to achieve the 40,000 MW target, which will require EGS (Enhanced Geothermal Systems) deployment. As such, EGS will be a major focus of the future within the DOE geothermal program. DOE is also working with the USGS to push for another national resource assessment, in addition to working with the national laboratories and universities on resource exploration and R&D -- including a focus on deep hot resources and how to best tap them. Dr. Mink stated that the majority of future financial resources will focus on EGS exploration and drilling research. One of DOE's Geothermal Program Areas, "GRED", has had significant activity in the past, and will continue into the future -- pending future funding. DOE will also continue to focus on information transfer and working with states via GPW to break through barriers and bring projects on-line faster. The House has given geothermal the same mark in the budget as last year. Dr. Mink mentioned that there are five issues that DOE will continue to address going forward, including:

- Land use and permitting;
- PTC;
- RPS -- working with states, and there is talk of a national RPS;
- Transmission constraints; and
- USGS national geothermal survey.

Dr. Mink closed his remarks by commenting that the Collaborative in California and other states are extremely effective in supporting DOE's goals and moving the industry forward.

The following summarizes the questions and answers following this first panel session:

**Q.** For Dr. Mink, in looking at EGS, does the GRED program play a role?

**A.** Not at this time, as GRED is focused on near-term hydrothermal projects.

**Q.** For Dan Schochet, can you expand on the views of the WGA and geothermal heat pumps?

**A.** Geothermal heat pumps have been handed over to the energy efficiency task force, and you should check out the WGA web site for contact information on this task force.

**Q.** For the panel, regarding "NIMBYism", how do you go about addressing local public concerns?

**A.** Shannon Eddy responded that there is an issue in addressing the pollution that you see versus the pollution you don't see, and as we transition to renewable energy from fossil fuels more education and re-education of the public is necessary. Dan Schochet cited the example of the Steamboat geothermal project wherein people noticed the drill rigs, but not the existing projects that have been in place for years; as a result, we have informed them that when complete there will be enough generation in place to supply the entire residential population in Reno in a pollution free manner. Informing the public upfront, and being honest with them, is the key to minimizing opposition. Jon Weisgall added the example that farmers in Iowa are asking for wind turbines on their farms citing that it's a money issue for many people -- and people who are directly impacted by renewable energy projects should be compensated.

**Q.** Why can't we organize a monthly newsletter like the wind industry to publicize our efforts?

**A.** Dan Schochet responded that GRC is one mechanism for more public relations activities.

**Q.** Four major geothermal companies dominate the industry. How many MegaWatts of new capacity do your companies anticipate in the next 5-10 years?

**A.** Dan Schochet responded that he couldn't answer that question, as Ormat is a publicly held company. Jon Weisgall said that they could do 2,000 MW in the next 10-15 years, adding that they can do 200-300 MW



projects at a time every 2-3 years, and do about six projects at a time - pending transmission, permitting, and other issues.

### **3 BREAKOUT DISCUSSION SESSION SUMMARIES**

The following sections detail the presentations and discussions in each of the five breakout sessions.

#### **3.1 Breakout Session #1 - The RPS: Does Geothermal Fit the Bill?**

Edward Randolph of the Assembly Committee on Utilities and Commerce kicked off the RPS session by providing some background to the participants citing that the original RPS bill (#1078) required all retail utilities (except municipals) to meet 20% of their electricity requirements from qualifying renewable energy resources. The goal of the RPS was to promote development of new renewable resources as fast as possible. Large hydroelectric power plants were not considered a qualifying resource, as large hydro would make the RPS moot and pointless; plus no new large hydro plants are likely to be built. This same theory applied to geothermal resources, in that if existing geothermal resources were included that they would crowd out other renewable resources. However, recently there has been recognition that geothermal may not have this "crowding out" effect. This is reflected in the two new RPS bills (#1262 and #107). If geothermal is as cost-effective as industry says it is, then supplemental payments will not be a problem. These two bills also specify that "renewable energy credits" (RECs) can count towards the RPS goals. In addition, there is a third new bill that proposes an RPS goal of 33% by 2017.

Next, Mr. Randolph discussed some of the issues with RPS implementation to date, citing that SDG&E has been having problems with RPS compliance due to transmission constraints. He also stated that the munis are having problems with compliance as well. Originally, the munis were required to develop programs that recognized the goals of the RPS, and while the large munis (SMUD and LADWP) largely match the RPS guidelines, the smaller munis are having a harder time meeting the requirements since they have long-term hydro contracts. Thus, in order for the smaller munis to comply with the RPS guidelines, they would have to buy power they don't need. Mr. Randolph concluded his remarks by stating that he would like to see more stringent reporting requirements for the munis.

**Q.** Geothermal is not just competing with other renewable energy sources, but also with the utilities own plants. Could you comment?

**A.** Mr. Randolph responded that this issue is not only with renewable energy but all energy projects and that this is a long-term issue, balancing the impacts on the ratepayer versus allowing a rate of return.

**Q.** Who owns the RECs? Originally it was planned that the developers would retain them, but now we are seeing that utilities demand them.

**A.** Mr. Randolph responded that these bills do not address these issues, and while WREGIS will help track them, it does not address the ownership issues. Under existing statute, RECs cannot be used for RPS compliance. One audience member commented that plant owners should just sell the renewable generation as "brown power" and then sell the RECs separately.

**Q.** By allowing a rate of return, utilities will be able to retain a value in complying with the RPS, since new renewable power plants are high risk propositions.

**A.** Mr. Randolph responded that the RPS does put a value on renewable energy through supplemental payments, and that ratepayers are picking up the costs through public benefits charges on their utility bills.

Next, Paul Douglas of the CPUC's Energy Division discussed the Phase I implementation of the RPS in 2004 and the tools that were required to be developed per #1078, including:

- "Least Cost - Best Fit" criteria;
- Standard Terms and Conditions; and
- Market Price Methodology.

Mr. Douglas then discussed the status of a number of RPS items and stated that the Commission is currently reviewing numerous RPS procurement contracts with the IOUs. The utilities have filed plans, which are expected to be approved after which the utilities will implement procurement programs and solicitations. Looking forward, Mr. Douglas stated that they are implementing a feedback loop in 2005 to examine lessons learned, as well as decisions that impact the ESP's role in the RPS and the MPR (Market Price Record) methodology. In addition, he stated that "lessons learned" workshops would be held at the end of 2005. He concluded his presentation by stating that the CPUC is looking at the RPS targets specified for 2010 and examining the feasibility of reaching those targets, and also reviewing the existing Standard Terms and Conditions.

The next speaker on the panel was Marwan Masri of the CEC, who initiated his comments by stating that RPS implementation is a joint effort between the CPUC and the CEC, and that each entity has a distinct role and responsibilities.

The CEC responsibilities are:

- Certifying eligibility of resources;
- Calculating Supplemental Energy Payments over MPR; and
- Verifying compliance with the RPS.

Then, Mr. Masri discussed the additional renewable energy generation and capacity per year needed in order to meet the RPS requirements. He detailed the eligibility requirements for certifying geothermal facilities for new and incremental projects by date of installation, as well as provided details on the Supplemental Payment calculations and the requirements for certification under the RPS.

Jack Pigott of Calpine addressed the topic of the RPS from the developer's perspective. He began by stating that without the RPS, the geothermal industry wouldn't have a lot to talk about, and that the industry is growing again because the RPS has done its job. This is evidenced by the fact that utilities are showing an unprecedented level of interest in geothermal power. However, the RPS is not perfect. It's a cumbersome process to get through -- although Phase II is addressing many of the shortcomings seen in the Phase I implementation. He stated that currently, the entire process, from RFQ to signed contract, takes about one year. In addition, the RPS provisions regarding low impact geothermal are more stringent than for other renewable technologies. Mr. Pigott suggested that these eligibility restrictions on existing geothermal resources should be removed by amending the legislation, and that the need for Supplemental Payments by geothermal unnecessarily trigger "public works" provisions of the law that should also be addressed through amendments. In closing, Mr. Pigott stated that the RPS is groundbreaking legislation, which will create opportunities for geothermal power development for years to come.

The last speaker of the session was Vince Bartolomucci of San Diego Gas & Electric providing the utility perspective on the RPS. Mr. Bartolomucci stated that SDG&E has some issues regarding RPS compliance, namely that there is limited renewable energy potential in the region coupled with transmission constraints. Cost is also an issue for utilities, and while geothermal provides base load, reliability and environmental benefits, it is more expensive. And, just one geothermal project can require a large amount of the available SEP funds.

The following summarizes the question and answer session held at the end of the breakout session:

**Q.** What are the criteria used to calculate MPR, and what methodology is being used.

A. The criteria are based on two proxy plants; a peaker unit and base load unit. The methodology is based on an instant cash flow model with a natural gas price model (NYMEX gas strip for five years and then forecasts for Henry Hub natural gas prices after that).

Q. How do you resolve the debt vs. asset issue with utilities building their own plants vs. contract purchases?  
A. RPS procurements are based upon RPS guidelines. Other procurements are encouraged to utilize a greenhouse gas adder to help level the playing field. There is a balance in risk assessment in buying electricity versus owning power plants. Other factors include ensuring reliability.

Q. Can you address the point made earlier that geothermal is more expensive than wind?

A. While I can't address the cost ranges, we do for example account for the intermittent nature of wind versus the base load benefits of geothermal power.

Q. Regarding SEPs, no awards have been requested or granted. The payments have a 10-year window, but geothermal has 20-year contracts - how do you address this?

A. Marwan Masri responded that the SEP contracts specify payments for 10 years or the length of the contract -- whichever is less. But, since there have been no requests for SEPs for geothermal facilities the CEC has not determined how to address this issue.

Q. What is the timeline for responding to SEPs?

A. Mr. Masri responded that 30 days is the response window, but there are other issues to consider such as how the decision would impact other projects and future requests for SEPs.

### **3.2 Breakout Session #2: Remembering the Forgotten Renewable: Geothermal Public Outreach**

Ted Clutter, Executive Director of the Geothermal Research Council (GRC) provided an opening statement for the outreach session commenting that GRC has formed a single committee on public outreach of which he is the chairman. Mr. Clutter stated that the committee has tasked itself to draft a generic geothermal outreach plan and the next step is develop a detailed strategy and tools that will take us in the right direction. One of the goals of the public outreach committee is to dispel the myths about geothermal power, something the geothermal industry has not done well in the past. And while the geothermal industry has shrunk over the years, the GRC will support public outreach efforts as it begins to grow again and focus on education and information dissemination to legislatures and the general public. He completed his remarks by stating that this forum was going to be very valuable.

The first presentation of the session was from John White of the Center for Energy Efficiency & Renewable Technologies. The presentation began with a discussion on the Imperial project, where he described the process of working with SDG&E and other groups to foster a consensus to build renewables. In discussing the benefits of geothermal, he highlighted the fact that the resource is the environmentally friendly, base load resource alternative to coal. And, while it is an environmentally friendly alternative, environmental impacts do play role, in addition to disputes about the use of public lands for geothermal power production - namely the "NIMBY" syndrome. Siting of geothermal resources is an area where particular experience is required, and is an area that many developers lack skills to overcome. Another focus of public outreach centers on "why should people care about developing these resources?" Mr. White suggested that people don't recognize the value geothermal provides in terms of economic development, environment, reliability, and financial return on investment. He also said that if California is going to make progress on its global warming goals, then it can't buy anymore coal; if it is going to buy coal then the only alternative is the use of environmentally friendly coal gasification technologies. He followed that by saying Imperial has the potential to provide LNG, and although transmission has to be built, it has a lot of potential. It is estimated that approximately 700 MW could be constructed and brought down the DC line. He concluded his presentation by saying that the story with media groups should have a beginning, middle, and end - and that they should recognize all the issues that need to be

considered. In addition, the media should focus on the positive side of the story which is that when we develop the geothermal resource, all the fuel costs are paid for up front in the construction of the project -- and that this is a future-oriented technology with vast potential for the state.

The next presentation was from Steve Kelly of Independent Energy Producers, who outlined his presentation by stating that he wanted to focus on three areas related to public outreach:

- "Out of sight out of mind"
- Image and symbols
- Determining the audience and targeted outreach

Mr. Kelly stated that concerning "Out of sight out of mind" we should do outreach within the companies internally, including the pipe fitters and drillers, to build a pot of support. We then need to reach out to a broader spectrum of constituents to bring everyone in to the discussion. For example, there were people from the investment community attending the recent AWEA conference for the wind industry. We need to have the same strategy as the wind industry, with the same effect of bringing in investors to support the geothermal industry. We also need to encourage the industry to work with the investment community, and assist them with their due diligence to bring in financing to the industry. We also need to not rely too much on the government to foster the growth of this industry, as government works too slow. And, other than the production tax credit, it is the money side (private financial investment) that will spur the industry's growth - not the government.

Mr. Kelly then discussed the concepts of "images and symbols" and suggested that the geothermal industry does not have an image. We need to ask ourselves, "What does geothermal mean to me?" A good picture of this response has not yet been developed. For example, when you think of wind, one envisions wind turbines on the hills; but when you think of geothermal, the public has a blank image. We need to determine what types of images work for geothermal. Finally, Mr. Kelly focused on the concept of "who is our target audience?" He suggested that the audience is the public, and that we need to follow the approach of the wind industry, which has done a good job of conveying the benefits of wind energy on a broad public level.

The next speaker was Laurie McClenahan of MHA Environmental Consulting who focused on siting issues and public outreach. She discussed the fact that the industry needs to design a set of recommended principles for addressing public concerns over geothermal energy development. To do this, we need to take a look at all the comments in public processes over the years and address them. Ms. McClenahan suggested that one site for more information is the National Geothermal Collaborative web site ([www.geocollaborative.org](http://www.geocollaborative.org)).

She then described the process of picking sites, which is critical from a public outreach perspective, and how this process is based upon resource availability, environmental considerations, communities, and potential development impacts. She stated that we need to look at the lessons learned from the Four Mile Hill project in northern California in the late 90's, and the Newberry project done in the early 90's. In these projects, public comments focused on issues such as the impact on air and water quality, and concern about the amount of noise. It is important for the industry to educate on all levels and to begin early in the process. The first step in the educational process is to determine what the stakeholder's existing knowledge base is. Education should encompass all potential stakeholders from the person on the street to policy makers in an effort to garner overall community support. The industry needs to educate these stakeholders that geothermal development has no significant impacts. She gave the example that while locals may not see the plant, they may see a steam cloud; and, while some may mistake the steam cloud for a regular cloud, others may see it as a significant impact.

The final speaker of the panel was Ms. Charlene Wardlow of Calpine. She began her comments by citing an example of the Calpine Geothermal Energy Visitor Center, which is open to the public and allows them to learn more about geothermal projects. She also commented that the National Geothermal Collaborative, which is funded by DOE, should go back and get funded to look at previous comments from geothermal public

processes. Then, it should document consensus development strategies and look at whether the mitigation processes worked, as well as develop a lessons learned document on what worked and what didn't. She concluded her comments by stating that in her experience with project siting, she has learned that most people have no clue where their electricity comes from until the lights go out. We need to determine better ways to help people get over their fears of geothermal technologies and debunk common myths that geothermal means drilling into magma or that it will impact Old Faithful.

### **3.3 Breakout Session #3: Geothermal Resources of California: Moving from Assessment Towards Development**

The moderator of this breakout session, Colin Williams of the U.S. Geological Survey, kicked off the session with a presentation on geothermal resource assessment, and begun by providing an overview of geothermal power plant components and a schematic of a geothermal reservoir and how it is tapped and developed for power production. He then provided some terminology as a starting point, stating that the term "*geothermal resource*" is characterized by the degree of knowledge (discovered vs. undiscovered) and economic/technical feasibility. He also differentiated between the terms "resource" and "reserve" and defined them as follows:

- *Resource*: The portion of the resource base that can be recovered as useful heat under current and potential economic and technological conditions
- *Reserve*: The identified portion of the resource that can be recovered economically using existing technology

Mr. Williams then built upon these definitions and discussed the McKelbe Diagram which characterizes resources and reserves. He focused on the reserves section of the diagram and said that they were looking at expanding the boundaries of the economic reserves through advances in exploration and production technology. Next, Mr. Williams discussed the geothermal resource potential in California, and where it was located throughout the state. He also highlighted the status of geothermal in the state, commenting that at one point, ~2800 MW was installed in the state, and the current capacity is ~2000 MW. California has the largest geothermal resource in the nation in terms of both installed capacity and potential.

Mr. Williams focused on the more recent advances in the geothermal industry, including:

- Ability to capture lower temperature, lower depth resources for power production
- New systems discovered;
- Improved techniques for characterizing reservoirs;
- Increased use of injection to so sustain production;
- Development of Enhanced Geothermal Systems (EGS) technology; and
- Potential for more accurate estimates of undiscovered resources.

Mr. Williams concluded his remarks by outlining future directions for USGS in supporting resource mapping and identification including: 1) conducting comprehensive resource assessments (combining national, state, and local information in a single coherent product), 2) confirmation of resources, 3) refined land use plans, 4) exploration, 5) continuing development of EGS technology, and 6) new and unconventional applications (i.e., hydrogen production, local use in urban areas).

Jim Lovekin of Geothermix then provided a presentation entitled, "*Moving Geothermal Sites from Exploration Prospects to Economic Projects*". He began his comments with some background on terminology, defining resources, reserves, and generation capacity. He then discussed how projects were ranked based upon: 1) maturity, 2) generation capacity (MW), and 3) cost. With respect to maturity, he stated that the challenge is to objectively assess and compare resources at different stages of development, and characterized maturity rankings into the following categories:

- Existing power plant is operating;
- No operating plant, but at least one well with tested capacity of 1 MW or more;
- No well tested at 1 MW or more, but downhole temperature of at least 212°F; and
- Not meeting A, B, or C: resource properties from other sources (geology, geochemistry, geophysics)

Mr. Lovekin then discussed generation capacity in California in terms of total capacity, capacity in use, and incremental capacity, citing that there is ~2,000 MW existing and ~3,000 MW of incremental capacity available. He discussed the methodology for determining project capital costs, as follows:

- Exploration
  - Up to drilling first full-diameter well
- Confirmation
  - Drilling until 25% of specified capacity is available at the wellhead
- Development
  - Drilling until 105% of specified capacity is available at the wellhead
  - Surface equipment at \$1,500 / kW
  - Transmission-line interconnection

After discussing the methodologies, Mr. Lovekin detailed the resulting costs of the analyses for each of the above categories. He concluded his presentation by stating that geothermal resource assessment has a "chicken-and-egg problem" in that we have to define a sufficiently large target to guide public policy (including transmission) and attract investment, but at the same time we have to avoid over-selling potential to maintain credibility. In addition, using the probabilistic approach to assessing generation capacity allows some appreciation of both the risks and the potential rewards. And finally, by ranking projects by costs (both initial capital and levelized life-cycle costs), the results show where to focus development efforts in near term by focusing on the least expensive projects. He added that a copy of the results of this study have been incorporated into the PIER geothermal database, which can be downloaded from [www.geothermex.com](http://www.geothermex.com).

The next speaker for Session #3 was Sean Haggerty of the Bureau of Land Management (BLM) who discussed a report developed by Barbara Farhar of the National Renewable Energy Laboratory entitled, *Opportunities for Near-term Geothermal Development in the US*. This report takes into consideration what resources exist on public lands, and looks at what has happened in the past to determine how it could impact the future use of these resources. It reviews BLM lease applications back to 1978. Mr. Haggerty then described the BLM lease process stating that when an application is filed, no resource data is supplied by the applicant. He noted that they found that the majority of the leases were in KGRAs (Known Geothermal Resource Areas), but some were in lesser known and smaller areas. As a result, this gave them an idea of where to go back in and explore for additional opportunities and potential. The report identified nine areas of geothermal resource, and then examined the current status of leases in those areas. The report summarizes the status of lease applications in California, citing that 86 leases have been issued, and 22 of these are in KGRAs. There are not many pending leases (39), and, of these, 17 are on BLM land and the rest are on US Forest Service land. Mr. Haggerty concluded his comments by stating that the report summarizes all this information via a map of the state and its public lands with an overlay of lease applications and pending leases.

The final presentation of the panel was by Marshall Reed of the USGS, who discussed the results of a cost-shared study entitled, *Understanding Geothermal Resources*. First, he described the methodology of the study, which utilized:

- Conceptual models, temperature profiles, reservoir geometry, and water chemistry;
- Location of fractures, and fluid flow paths; and
- Interactive reservoir models and optimum location of production and injection wells.

Then, he highlighted the Geysers project and detailed its history and characteristics with a discussion of its field production and injection since its development. He indicated that the Geysers is a sealed reservoir at its edges, so no natural recharge takes place. As a result, production peaked in the late 80s, and a number of questions arose which needed to be answered, including:

- Will increased injection be effective?
- What is the optimal location for injection?
- Is there a potential source of injection water?

To answer these questions, cooperative research was undertaken that focused on the following areas:

- Seismic surveys
- Temperature gradient and heat flow surveys
- Core and cuttings analysis
- Fluid inclusions and secondary minerals
- Tracer tests
- Injection tests

After discussing the results of this research, Mr. Marshall stated that it was determined that two sources of water were available, one from Clear Lake and one from sewage treatment wastewater. The sewage treatment water was selected as the source for injection into the reservoir, boosting production of the facility.

Mr. Marshall also discussed the results of research at the Dixie Valley geothermal field which focused on answering two questions: 1) "Why are some wells along the fault good producers and some are not?" and 2) "What is the optimal location for injection?" To answer these questions the research utilized a borehole televiewer to identify stress indicators and where fractures are occurring in the rock. The results of the research provided 1) seismic surveys for reservoir structure, 2) temperature distribution and geometry, 3) borehole imaging for fractures, core and cuttings analysis for fluid changes, 4) tracer tests for fluid flow directions, and 5) injection tests for pressure maintenance.

The following summarizes the question and answer session held at the end of the breakout session:

**Q.** Regarding abandoned leases in KGRAs -- would an EIS be required or need to be updated?

**A.** Sean Haggerty answered that if the lease is expired, then we would need to look at the original NEPA document and a determination would be made.

**Q.** Is it feasible to include a lot of the environmental assessment in an individual lease application in a comprehensive assessment for each KGRA?

**A.** Sean Haggerty answered that this is the strategy being employed (on a KGRA basis), but that a statewide assessment (as some propose) would take too much time and involve too many issues.

**Q.** How long would it take from initial lease application to lease approval?

**A.** Sean Haggerty responded that he couldn't answer that question definitively, but that an Environmental Impact Statement would require 12-18 months. In addition, this assumes that funding is available to perform the assessment, which is not necessarily the case since funds are limited.

**Q.** 200 degrees F is the new minimum threshold for the USGS assessment. Is there a limitation to the accuracy of this, in terms of calculating total MW production estimates?

**A.** Colin Williams responded that, yes, it will have an impact - but not significant in terms of adding additional MW estimates to the study's total.

**Q.** What is the potential for small projects outside of KGRAs?

A. Jim Lovekin responded that projects like these need a champion, and cited that there are many examples of leases approved, wells drilled and then the site is abandoned. Then, after the lease expires, a new owner comes in and develops it. The key is to get a champion to work the system.

### **3.4 Breakout Session #4: Transmission Issues: Connecting Geothermal Energy to the Grid**

The first speaker of the session was Glenn Steiger of Imperial Irrigation District (IID) who discussed transmission initiatives in the IID region. He commented that load is growing by about 7% in the region, and that IID's role is to ensure that the power needed for the service area has a pathway. He focused his initial comments on transmission planning, and how we move from the planning stages to implementation. He cited the example that in the Eastern US, only 1% of the transmission system is owned by public power utilities, while in the West, 43% of the transmission system is owned by public power. This needs to be taken into consideration in planning for future transmission needs. He then outlined the transmission initiatives being undertaken by IID, including:

- The Imperial Valley Study Group;
- CANDO: which focuses on control areas, and is a group put together a year ago which consists of four control areas (ISO, LADWP, SMUD, and IID);
- PPIW: which focuses on large public power transmission needs was initiated 2-3 years ago, and has made major strides in transmission planning initiatives. It is a voluntary collaboration of transmission owners located in the Western Interconnection that are not subject to FERC jurisdiction. Its objective is to continue Public Power's voluntary coordinated effort to identify enhancements to the grid throughout the Western US;
- wesTTrans.net: which focuses on OASIS, and is one of the PPIW initiatives that looks at trading and transmission allocation, from the Mexican border all the way to Canada;
- West Connect: which is a regional IOU/public transmission planning group that started out as movement for development of an RTO, but is now a regional and public planning group; and
- "Green Path": which is a transmission vehicle formed for providing 2000 MW+ of geothermal power to region, as well as additional undefined renewable energy through our system.

With regard to PPIW, its approach is to:

- Preserve our individual business models;
- Provide simple solutions that are cost justified;
- Examine incremental improvements to minimize risk or unintended consequences; and
- Work to complement the goals of the Commission.

Its accomplishments to date include garnering improvements to FERC Order No. 888 by creating a common OASIS for accessing ATC, featuring:

- Independent, third party administration;
- Improved user friendliness of the OASIS site – for example, by allowing reservations involving multiple transmission providers;
- Facilitated access to a workable secondary market; and
- A market approach to transmission congestion management.

With regard to "Green Path", which is available near the Salton Sea, Mr. Steiger noted that the real focus is on the fact that the corridors are in place - so we are looking at upgrading a system that is already in place. In addition, we are looking to utilize the 230kV line and upgrade areas in Yucca to connect to the 230kV line, as well as work with SDG&E to provide a 500kV link into the ISO and San Diego areas. Green Path will go to Devers, into IID and Yucca and make its way into the grid. The question is "How do we do this?" We will need to focus on load growth and partner with others, like SDG&E and APS to access certain allocations, and



LADWP in certain areas. IID is very committed to Green Path and providing energy and reliability that will result in a win-win situation for everyone -- adding that renewable energy is the future of IID.

The next speaker for Session #4 was Transmission Consultant Dave Olsen of the Imperial Valley Study Group. He began his presentation by discussing the Study group's mission and purpose, which is to specify transmission upgrades for the export of 2,000 MW of geothermal power. This will be accomplished via a phased development plan and consolidated permitting for the entire project. The group wants to form a consensus recommendation by stakeholders to create enough support sufficient to get upgrades built and overcome local opposition.

The outcomes of the Study Group's work consists of a detailed plan for entire build-out that ensures 1) reliability, 2) least-cost impact, and 3) proposes triggers for each construction phase. Mr. Olsen said that one of the remaining questions is "What should be the events that trigger each phase?" since the entire project will have to be built in phases. The Study Group is also developing a permitting strategy that covers the entire build-out at one time, rather than in small increments, which will result in more cost effectiveness. This leads to CPCN filing(s) for IOUs (SDG&E and SCE). The Study Group will also recommend a financing/cost allocation-cost recovery plan, as well provide suggestions on how this is all going to be funded and financed. However there will have to be cooperation within other control areas. The second major goal of the Study Group, which it is trying to achieve, is advocacy for final approval and construction, and determining what future steps are needed for the transmission system to be actually built.

Mr. Olsen noted that the stakeholders involved in the Study Group are transmission owners/operators, potential power purchasers, generators/power project developers, counties/landowners (10 or 12 agencies actively participating in the group right now), and is open to the public.

The Study Group structure is as follows:

- 1) Steering Committee: Recommends plans for phasing development, permitting, ownership/operation, and funding;
- 2) Technical Work Group; Reviews power flows, dynamic studies, production simulations, and also examines transmission alternatives by ranking them in order of benefit; and
- 3) Permitting Work Group: Works on the plan to consolidate approvals for all phases of generation and transmission development.

The Technical Work Group includes IID, SDG&E, CA ISO, SCE, APS, WAPA, MWD, CFE, and Cal Energy, and it provides regular reports to STEP (Southwest Transmission Expansion Project). It looks regionally in the southwest, and is examining how the regional flows of power would be impacted by 2000MW of additional power. The study's schedule is:

- Routing alternatives identified (November, 2004);
- Base cases developed for 2014, Heavy Summer and Light Autumn loads (January / March 2005)
- Power flow studies (March/April 2005)
  - Determine impacts at key delivery points vs. base case
  - Narrow study alternatives
- Dynamic studies (May 2005)
- Production simulations (June/July2005)
  - Develop cost estimates; rank by ratepayer benefit/cost
- Report/recommended transmission plan (September 30, 2005)

The third speaker was Jeff Miller of the California ISO, who presented the Southwest Transmission Expansion Plan (STEP) which includes the regions of southern California, Arizona, Las Vegas, and Northern Mexico.

Jeff mentioned STEP is a sub-regional planning group formed in November of 2002 that coordinates planning interests for a variety of entities, including:

- Transmission owners;
- Permitting agencies;
- Generation developers;
- Landowners;
- Environmental groups; and
- Ratepayers

A key aspect of this group is the understanding that broad involvement leads to better projects with more widespread support. The group studied 26 alternative transmission plans over the last 2+ years which has led to a single-phased transmission expansion plan. Currently, the STEP Transmission Plan Has Four Phases:

1) Arizona/California short-term upgrades with a cost of \$150 million that is expected pay back within two years.

- Approved by ISO board in June 2004;
- Service date is June 2006;
- Consists of Devers 500/230 kV transformer, Palo Verde Devers 500kV upgrade, Imperial Valley phase shifting transformer, and the Hassayampa-north Gila-Imperial valley 500 kV upgrade.

2) Arizona/Nevada short term upgrades

- Consists of Navano-Crystal 500kV upgrade, Moenkopi-El Dorado 500kV upgrade, and the Perkins-Mead 500 kV upgrade.

3) Palo Verde/Devers, new 500kV line estimated to cost \$680 million, currently in permitting.

4) New 500 kV line into San Diego

- Currently in the planning stage
- Estimated service date of 2011
- Will help deliver geothermal generation

The final speaker of the session was Ron Davis of Davis Power Consultants who discussed the performance of a Strategic Value Assessment (SVA) for the California PIER Program. He began his presentation by stating that SVA is a methodology for evaluating renewable technology benefits and assessing the renewable energy resource potential for meeting RPS goals. The assessment identifies key focus areas, evaluates economics and timeframes, examines points of interconnection, and considers solutions with environmental, economic and non-energy benefits. It also provides solutions that can defer transmission upgrades and reduce transmission congestion. The result of the study is to prioritize renewable energy implementation and transmission infrastructure needs. The SVA analysis approach consists of:

- Resource assessment;
- Technical potential;
- Economic potential;
- Transmission impact; and
- Assessment of other benefits.

The prioritized results will in turn seek to:

- 1) Identify resource potential and filtering criteria (technical and economical);
- 2) Optimize the development and deployment of renewables based on their benefits;
- 3) Overlay renewable technologies by location to find optimal mix for development; and
- 4) Graphically display and integrate solutions for planning needs.

One of the concepts resulting from the assessment is to determine transmission locations and pathways that will benefit the system and which ones developers would want to build in a quicker timeframe to facilitate putting renewable power onto the system.

Mr. Davis concluded his remarks by posing the following transmission related questions to the participants:

- How do we get utilities and developers to provide technical and location data?
- How can we evaluate potential geothermal areas without infringing on confidentiality?
- How can we best address California transmission issues with geothermal development?
- How can we get all parties to participate and incorporate this new methodology into their analysis?

### **3.5 Breakout Session #5: Getting New Geothermal Projects in California off the Ground**

Karl Gawell led off the final breakout session of the day with the comment that its tough to make geothermal projects work and be profitable; thus, we are focusing our efforts in this session on how to bring projects to market. He then discussed the survey being administered by the Geothermal Energy Association (GEA) to geothermal leaseholders on issues and barriers to increased geothermal development - and requested that the participants of the meeting review it and provide any comments back to GEA. He stressed that he didn't want the meeting participants to fill out the survey, but rather to comment on the survey instrument.

Next, Elaine Sison-Lebrilla of the California Energy Commission highlighted the unique opportunities available to the geothermal industry through the GRDA and PIER programs. She stated that the PIER program has \$62.5M total that is available for numerous different program areas, but that it can fund geothermal electricity generation research and development projects. In addition, the GRDA program includes a broader scope of support for geothermal projects including geothermal planning, development and mitigation. Last year under the GRDA program, ~\$5M was awarded to one planning project, three development projects, and four mitigation projects. Around the end of June, the \$3.9M GRDA solicitation will be available. Applicants will have 60 days to submit a pre-application under the solicitation, and then be given 60 days to submit the full application

**Q.** How would you phase the GRDA solicitations, since the first phase is about six months behind?

**A.** Elaine answered that the CEC has two years to encumber monies, so we plan the solicitations as we have the resources to implement them. Then, we have two years to liquidate the funds.

Leroy Mohorich of the BLM then addressed the group on the topic of leasing on California public lands and described its process and status. Mr. Mohorich described BLM's role in the leasing process at both the national and state levels and mentioned that the BLM had completed a National Strategic Plan with regards to resource development on public lands. He cited the goals of the plan included timely exploration for resources as well as to expedite the permitting process, and the plan contains 29 action items for the BLM to implement. This plan was written in response to the President's National Energy Strategy. He also stated that in California, the BLM has developed a State Action Plan. The current status of geothermal lease applications in California is that there are 17 applications pending, but at current funding levels it is unlikely that these applications will be awarded any time soon. And, while the action plan has a goal of approving all leases by February of 2007, this assumes that funding is available to process the leases. The plan also calls for eliminating the backlog of applications and designates high and low priority areas to assist in ranking the order in which applications are processed. The two high priority areas in California are Truckhaven and Superstition Mountain. In addition, Mr. Mohorich stated that the primary impediment to approving lease applications is NEPA. He concluded his remarks by summarizing the BLM's 2005 activities, including the fact that they have received some additional funding, and that by September 30 they expect to put an RFP on the street to start the NEPA process for at least one high priority area (most likely Truckhaven).

**Q.** What kind of budget does BLM in California need?

**A.** Mr. Mohorich answered that \$1.2-\$1.3M is needed for the three high priority applications, which is a significant increase over the current budget of \$350,000.

**Q.** If the Geothermal Steam Act is changed to a fully competitive process, what happens to the existing leases?

**A.** Mr. Mohorich answered that they would be processed under the old law.

The next speaker was Steve Munson of Vulcan Power Company who discussed geothermal power development from a small developer's perspective. He started his presentation by showing a map of California, which highlighted the geothermal resource areas, and discussing the areas of highest development potential as well as projects and markets. After providing an overview his company, he then focused on suggestions for how to fix the transmission constraints in the West to facilitate more geothermal power on the grid. He also stating that the geothermal leasing and permitting process was impacting the California market, noting that while Nevada has made progress with its lease applications, California has a very poor record - which is inhibiting geothermal development. Then he showed a chart comparing transmission costs of known wind and geothermal projects - and suggested that the Pacific DC Intertie can move a lot of power quickly and cheaply, and in a short amount of time, which is an incentive for more geothermal development that could feed into that line. Next, Mr. Munson discussed transmission constraints and outlined options for low cost transmission upgrades and/or new taps on existing lines to alleviate existing congestion points, and noted that the PDCI/Aurora Green Tap could support 500 MW of new geothermal power.

Then, Mr. Munson highlighted a new regional Geothermal Transmission Working Group whose members include the CPUC, CEC, geothermal developers, and Green Tap public policy advocates who are working along with SCE, PG&E, PacifiCorp and LADWP. The purpose of this new working group is to support the evaluation and staffing to agency leadership for policy determinations regarding three existing regional transmission upgrade projects. These three upgrade projects are designed to alleviate long-existing constraints in the areas of North of Lugo (PDCI), Cottonwood and Round Mountain. The working group is focused on developing policies dealing with CAISO boundaries, COI use and PDCI use, and new stakeholders are strongly encouraged to participate.

Mr. Munson then discussed issues associated with the California/Oregon Intertie (COI) including:

- If COI is 4,800 MW capacity (north to south), what is appropriate renewable loading order reserve rule?
  - a) 10% = 480 MW    b) 20% = 960 MW    c) 33% = 1,600 MW
- Should COI renewable loading order reserve be phased to match new RPS/DWP/Muni contracts?
- Where does CAISO control end in NP 15?
- Where is delivery point from California and Oregon projects delivering to California utilities?
  - a) At COI?    b) At Cal-Oregon border end of PG&E/Other lines?    c) At Round Mountain Substation?
- Which agency can make these policy rules and when?
  - a) CEC    b) CPUC    c) CAISO or d) all three?

Mr. Munson concluded his presentation by provided two suggestions for developing a priority basis for phased transmissions projects, as follows:

- Suggestion 1: Set In-State and Neighbor State geothermal grid constraint upgrade plans in three phases:
  - Phase 1: Signed Calif PPAs thru Q3, 2005 for grid upgrade completion by 2008;
  - Phase 2: Signed Calif PPAs thru 12/31/06 for grid upgrade completion by 2008-2009 timeframe;
  - Phase 3: Transmission upgrades for 2011-2020 PPA projects if 33% RPS passes for grid upgrade completion by 2011.
- Suggestion 2: Set Imperial County geothermal transmission at phase I and II levels, supporting diversified geothermal resources with input from both Geothermal Working Groups.

The final speaker of the session was Ms. Charlene Wardlow of Calpine who presented the results of a research paper developed with input from government agencies, environmental groups and geothermal developers to come up with strategies to expedite the permitting process and streamline the project development process. Some of the key conclusions and recommendations resulting from the report included:

- Consider the development of "SWAT Teams" comprised of federal and state experts with expertise in all necessary areas to move the process along and get projects done;
- Establish and keep to deadlines in the project permitting, leasing and development process;
- Put a funding mechanism into place that would send geothermal royalties back to BLM to fund more geothermal work (i.e., processing lease applications); and
- Determine whether NEPA is meeting its original intent; consider holding hearings around the country on NEPA to determine what is and isn't working and how to improve the process.

#### **4 CLOSING SESSION -- WRAP UP AND SUMMARY**

The final session of the day involved a wrap up of the day's breakout sessions led by Karl Gawell. Mr. Gawell asked each of the moderators of the breakout sessions to summarize the key points of their sessions, and asked the participants to add any additional points that they felt were important to include. The following summaries highlight the key points resulting from each of the day's breakout sessions.

##### **Breakout Session #1 - The RPS: Does Geothermal Fit the Bill?**

- The RPS is working, contracts and solicitations are in place and going forward
- Although munis are exempted from the RPS, they are participating and signing contracts
- New legislation amendments (bills) are seeking to move the 20% RPS goal from 2017 to 2010
- Market Price Record (MPR) methodology is being reviewed
- Current provisions in the RPS except existing geothermal facilities
- Solicitations coming out soon and will likely determine if the RPS is a success
- Need to get standard contracts more standardized
- As many of us from the geothermal industry as possible should attend the upcoming CPUC meetings on MPR methodology

##### **Breakout Session #2: Remembering the Forgotten Renewable: Geothermal Public Outreach**

- Unlike wind and other renewable energy resources, geothermal does not have an image, and we need to develop one
- We need to convey a message of why people should care about geothermal
- The industry needs to conduct target marketing activities, including marketing internal to our industry, so that we are on the same page. We also need to expand marketing efforts to Wall Street and other renewable energy constituents (i.e., the wind and solar industries)
- Need to address key messages of geothermal - including the "green" message
- Education is key
- Focus on relationship building to create credibility
- Need to use low cost PR tools
- Need to do a monthly newsletter featuring high-end science and technology advancements and company profiles
- Need to conduct education and outreach around counties where projects are being considered and/odeveloped, and we should consider working with the USDA county extension services in our outreach efforts

- Much of the information needed for education and outreach exists, it just needs to be pulled together in one place, such as a website
- Going forward, the GRC will contract with the California Geothermal Energy Collaborative to conduct PR and outreach activities

**Breakout Session #3: Geothermal Resources of California: Moving from Assessment Towards Development**

- The California geothermal resource was examined in terms of existing (~2,000 MW) and potential (~3,800 MW) capacity;
- 1700 MW is available at below market prices
- The Barbara Farhar report on geothermal on public lands looks at projections for project development based upon past leasing activity
- BLM needs funding to accelerate and keep up with leasing activities
- The industry is conducting cost-shared research to define and change the resource projections
- We need to not let the small projects slip through the cracks and we need to continue to support them

**Breakout Session #4: Transmission Issues: Connecting Geothermal Energy to the Grid**

- The California Geothermal Energy Collaborative will keep its stakeholders updated on all developments related to transmission, which is quickly becoming one of the greatest issues impacting geothermal development in the state
- Imperial Irrigation District discussed what they are doing with transmission (i.e., Green Path Transmission System) to promote additional development of geothermal resources
- Southwest Transmission Planning Group is looking at additional lines tying the Imperial Valley to Arizona
- Several groups are looking at transmission congestion and the siting of geothermal facilities to un-congest the system
- Several groups are also looking at the integration of all renewable energy within the transmission

After the summaries of the breakout sessions were completed, Karl opened up the floor for any announcements prior to adjourning the meeting. Roger Hill of Sandia National Laboratories announced a workshop would be forthcoming on tribal issues and geothermal development, and said that no date had yet been set, but that announcements would be forthcoming. Judy Fischette of the California Geothermal Energy Collaborative announced that she would be working on a website for the Collaborative. Joe Bourg of Millennium Energy and Billy Quach of Davis Power Consultants recorded the details of the Summit, from which Mr. Bourg will be developing the proceedings of the meeting. These proceedings will be posted on the CEC's and the Collaborative's web site along with the PowerPoint presentations from today's meeting. The meeting was adjourned at 4:30 PM

Appendix A: Meeting Agenda  
**2005 California Geothermal Summit**

Thursday, June 9, 2005  
California Energy Commission  
1516 Ninth Street, Sacramento, CA

**Presented by the California Geothermal Energy Collaborative**

Co-sponsored by the California Energy Commission and  
the U.S. Department of Energy GeoPowering the West

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The face of energy production is changing. As traditional energy providers deal with higher prices and lower reserves, industry leaders and governmental officials are looking towards renewable energy sources as a solution. Geothermal energy is one of the strongest components of California's renewable energy portfolio. The 2004 Geothermal Summit focused on the formation and structure of the new California Geothermal Energy Collaborative. This year's Summit will concentrate on current geothermal issues and roadblocks to development. In interactive sessions, attendees will help outline the Collaborative's role in expanding geothermal energy production in the state.

### **Agenda at a Glance**

8:30 a.m.	Hearing Room A - Attendee Check-in
9:00 a.m.	Welcome & Keynote Speakers
9:30 a.m.	Updates on the Current Status of Geothermal Energy
<hr/>	
10:00 a.m.	<b>BREAK</b>
<hr/>	
10:15 a.m.	<b>Breakout Sessions 1 &amp; 2 - Check the Sessions List for your selection</b>
Hearing Room A	Session 1- The RPS - Does Geothermal Fit the Bill?
Hearing Room B	Session 2 - Remembering the Forgotten Renewable: . Geothermal Public Outreach
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11:30 a.m-1:00 p.m.	<b>LUNCH (On Your Own)</b>
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1:00 p.m.	<b>Breakout Sessions 3 &amp; 4 - Check the Sessions List for your selection</b>
Hearing Room A	Session 3 - Geothermal Resources of California: Moving from Assessment towards Development
Hearing Room B	Session 4 - Transmission Issues: Connecting Geothermal Energy to the Grid
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2:15 p.m.	<b>BREAK</b>
<hr/>	
2:30 p.m.	<b>Breakout Session 5</b>
Hearing Room A	Session 5 - Getting New Geothermal Projects in California off the Ground
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3:45 p.m.	
Hearing Room A	Closing Session
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# 2005 California Geothermal Summit Agenda

**8:30 a.m.**      **Attendee Check-in**  
**Hearing Room A**

**9:00 a.m.**      **Welcome and Keynote Speakers**  
**Room A**            **Moderator: Valentino Tiangco**, California Energy Commission  
                         **Keynote Speakers:**  
                         **Commissioner John Geesman**, California Energy Commission  
                         **Shannon Eddy**, California Public Utilities Commission

**9:30 a.m.**      **The Current Status of Geothermal Energy**  
Three members of the geothermal community will bring us up to date on geothermal energy from the state, western region and national point of view.  
                         **Jonathan Weisgall**, MidAmerican Energy Holdings for CGEC  
                         **Dan Schochet**, ORMAT for the Western Governors' Association  
                         **Roy Mink**, Department of Energy, Geothermal Program

**10:00 a.m.**      *BREAK*

**10:15 a.m.**      **Morning Breakout Sessions 1 & 2**  
**Room A**            **Session 1 - The RPS: Does Geothermal Fit the Bill?**  
The Renewable Portfolio Standard (RPS) law is the main driver behind the resurging interest in renewable development in California. To achieve the RPS goal of 20% renewable energy, California will need to add the equivalent of 3,000 MW of base load renewable resources. The CPUC sets the rules and administers competitive solicitations for power under the RPS. The CEC certifies renewable facilities as eligible for the RPS and administers Supplemental Energy Payments to cover above market costs of power. This session will discuss how geothermal can compete for power contracts under the RPS.  
                         **Moderators: Vince Bartolomucci**, San Diego Gas & Electric  
   **Jack Pigott**, Calpine Corporation  
                         **Panel: Paul Douglas**, CPUC Energy Division  
   **Edward Randolph**, Assembly Committee on Utilities and Commerce  
   **Marwan Masri**, CEC Energy Efficiency, Renewables, and Demand

**10:15 a.m.**  
**Room B**            **Session 2 – Remembering the Forgotten Renewable:**  
**Geothermal Public Outreach**  
The geothermal industry in California provides approximately half of the state's non-hydro/ biomass renewable energy, but is forgotten when renewables are mentioned in the news media and government publications. Working with the geothermal industry, the Geothermal Resources Council and the California Energy Commission, the California Geothermal Energy Collaborative seeks to inform and educate geothermal stakeholders and members of the public about the benefits of geothermal energy. Our first steps in this session are identification of key audiences, messages, strategies and methods to maximize our outreach efforts.  
                         **Moderators: Ted Clutter**, Geothermal Resources Council  
   **Charlene Wardlow**, Calpine Corporation  
                         **Panel: John White**, Center for Energy Efficiency & Renewable Technologies  
   **Laurie McClenahan**, MHA Environmental Consulting, Inc.  
   **Steve Kelly**, Independent Energy Producers

**11:30 a.m. – 1:00 p.m.** *Lunch (on your own)*

**1:00 p.m.**      **Afternoon Breakout Sessions 3 & 4**  
**Room A**            **Session 3 - Geothermal Resources of California:**  
                         **Moving from Assessment towards Development**



This session covers new assessments of identified and undiscovered geothermal resources in California as well the potential impact of new technologies for the future of geothermal energy. Topics that will be discussed are how a resource assessment is conducted, the impact of DOE-funded research, how federal land is leased for geothermal development, and what the geothermal industry must do in exploration and in drilling and testing of wells to go from estimated resources to confirmed reserves in a geothermal field. The session will look at who will contribute to the assessment effort and what will be the long term vision for the geothermal community.

**Moderators: Colin Williams & Marshall Reed, USGS**

**Panel: Sean Hagerty, Bureau of Land Management**

**Jim Lovekin, Geothermex**

**Marshall Reed, USGS, Western Region**

**Room B      Session 4 - Transmission Issues:  
Connecting Geothermal Energy to the Grid**

Connecting geothermal energy to the grid is a key factor in increasing energy production. This session will identify impediments to connecting geothermal to the grid and exploring potential solutions. Some of the impediments to be discussed will include "marrying" the physical and financial rights models, financing transmission construction, and siting and permitting issues.

**Moderator: Kim Kiener, Imperial Irrigation District**

**Panel: Dave Olsen, CGEC Transmission Advisor**

**Ron Davis, Davis Power Consultants**

**Glenn Steiger, Imperial Irrigation District**

**Jeff Miller, California ISO**

**2:15 p.m.      BREAK**

**2:30 p.m.      Afternoon Breakout Session 5  
Room A      Session 5 - Getting New Geothermal Projects in California off the Ground**

This session addresses geothermal development in the near term with the major focus on bring new projects to market. Factors that will be covered include leasing, permitting process, exploratory funding, tax treatment, incentives and any other nuts and bolts needed to turn a known resource into an active project.

**Moderator: Karl Gawell, Geothermal Energy Association**

**Panel: Elaine Sison-Lebrilla, California Energy Commission**

**Leroy Mohorich, Bureau of Land Management**

**Steve Munson, Vulcan Power Company**

**Charlene Wardlow, Calpine Corporation**

**3:45 P.M.      Closing Session**

**Room A      Moderator: Karl Gawell, Geothermal Energy Association**

**4:30 p.m.      Adjourn**



## Appendix B: Attendee List

1	Adams	Jeffrey	California State Lands Commission	200 Oceangate, 12th Floor	Long Beach	CA	90802	adamsj@slc.ca.gov	562-590-5389
2	Barker	Benjamin	Geothermal & Petroleum Engineering Consultant	237 Dartmouth Way	Windsor	CA	95492	benbarker@earthlink.net	707-838-0238
3	Bartolomucci	Vince	San Diego Gas & Electric	8315 Century Park Court Rm CP 21D	San Diego	CA	92123	vbartolomucci@semprautilities.com	858-650-6164
4	Bastian	Beverly	California Energy Commission	1516 9th Street, MS 40	Sacramento	CA	95814	bbastian@energy.state.ca.us	916-654-4840
5	Bastian	Roger	Cooper Cameron Corp., Cameron Div.	930 Shiloh Rd, Bldg 44 Suite F	Windsor	CA	95492	bastianr@camerondiv.com	707-836-1611
6	Batham	Mike	SMUD	6201 S Street	Sacramento	CA	95817	mbatham@smud.org	916-732-6261
7	Battocletti	Liz	Bob Lawrence & Associates, Inc.	345 S. Patrick Street	Alexandria	VA	22314	ecbatto@aol.com	703-836-3654
8	Benoit	Dick	Sustainable Solutions	629 Jones St.	Reno	NV	89503	dickbenoit@hotmail.com	775-323-3078
9	Beyer	John Henry	California Energy Commission PIER	1516 Ninth Street, MS-43	Sacramento	CA	95814	jbeyer@energy.state.ca.us	916-654-4609
10	Blaydes	Paula	Blaydes & Associates	1275 Fourth St. # 214	Santa Rosa	CA	95404	peblaydes@comcast.net	707-537-8727
11	Bourg	Joe	Millennium Energy LLC	26596 Columbine Glen Ave	Golden	CO	80401	millnrg@earthlink.net	303-526-2972
12	Box	Tom	Calpine Corporation	10350 Socrates Mine Road	Middletown	CA	95461	tom@calpine.com	707-431-6106
13	Bruton	Carol	Lawrence Livermore National Laboratory	P.O. Box 808, L-221	Livermore	CA	94550	bruton1@llnl.gov	925-423-1936
14	Carter	Anna	Geothermal Support Services	87 Verde Circle	Rohnert Park	CA	94928	annacartr@aol.com	707-585-2111
15	Clutter	Ted	Geothermal Resources Council	2001 Second St. Ste. 5	Davis	CA	95616	tclutter@geothermal.org	530-758-2360
16	Combs	Jim	Geo Hills Associates, LLC	2445 East Lakeridge Shores	Reno	NV	89509	jimjeany@ix.netcom.com	775-827-1960
17	Coyner	Alan	Nevada Division of Minerals	400 W. King St. #106	Carson City	NV	89703	acoynr@govmail.state.nv.us	(775) 684-7047
18	Davis	Ron	Davis Power Consultants	2980 E. Capitol Expressway, Suite 50-309	San Jose	CA	95148	rdavis@davispower.com	408-531-1255
19	Dellinger	Mark	Lake County Sanitation District	230 A North Main Street	Lakeport	CA	95453	markd@co.lake.ca.us	707-263-0119
20	Denning	Carol	Sol Building	789 Downing Avenue	Chico	CA	95926	Cholmes2@pacbell.net	530-624-5251
21	De Rocher	Ted	Calthness Operating Co., LLC	9790 Gateway Drive, Suite 220	Reno	NV	89521	tderocher@calthnessenergy.com	775-850-2235
22	D'Olier	William	Geothermal Energy Consultant	310 Hume Lane	Bakersfield	CA	93309	WKDolier@aol.com	661-832-9592
23	Douglas	Paul	California Public Utilities Commission	505 Van Ness Avenue, Area 4-A	San Francisco	CA	94102	PSD@cpsc.ca.gov	415-355-5579
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25	Dudley	Rich	GFP Advisors	150 California Street, 11th Floor	San Francisco	CA	94111	rdudley@gfpadvisors.com	415-274-0800
26	Eddy	Shannon	California Public Utilities Commission	505 Van Ness Avenue	San Francisco	CA	94102	SED@cpsc.ca.gov	415-703-2109
27	Fischette	Judy	California Geothermal Energy Collaborative	P.O. Box 1677	Davis	CA	5617	fischette@sbcglobal.net	
28	Floyd	Melissa	County of Lake, Resource Planning	255 N. Forbes St.	Lakeport	CA	95453	melissab@co.lake.ca.us	707-263-2221
29	Freedman	Matthew	The Utility Reform Network	711 Van Ness Avenue #350	San Francisco	CA	94102	freedman@turn.org	415-929-8876
30	Gawell	Karl	Geothermal Energy Association	209 Pennsylvania Ave., SE	Washington	DC	20003	karl@geo-energy.org	202-454-5264
31	Geyer	John	John Geyer & Associates, Inc.	5910 NE 82nd Avenue	Vancouver	WA	98662	jgeyer@jgainc.com	360-882-5050
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35	Hagerty	Sean	U.S.D.I. Bureau of Land Management	2800 Cottage Way, Rm W-1834	Sacramento	CA	95825	shagerty@ca.blm.gov	916-978-4375
36	Hill	Roger	Sandia National Laboratories	P.O. Box 5800 MS 0708	Albuquerque	NM	87185	rrhill@sandia.gov	505-844-6111
37	Hodgson	Susan	Ca. Division of Oil, Gas, and Geothermal	801 K Street, MS 20	Sacramento	CA	95814	cosmos@dcn.org	916-445-9886
38	Hoops	Richard	BLM, Nevada State Office	1340 Financial Blvd.	Reno	NV	89502	rhoops@nv.blm.gov	775-861-6568
39	Johnson	Elizabeth	Cal. Division of Oil, Gas, & Geothermal	801 K Street, MS 20-21	Sacramento	CA	95814	ljohnson@consvr.ca.gov	916-323-1786
40	Jones	Randolph	U.S. Government Accountability Office	301 Howard Street, Suite 1200	San Francisco	CA	94105	lonesrd@gao.gov	415-904-2235
41	Kelly	Steven	Independent Energy Producers Association	1215 K Street, Suite 900	Sacramento	CA	95814	steven@iepa.com	916-448-9499
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43	Kiener	Kim	Imperial Irrigation District	P.O. Box 937	Imperial	CA	92251	kmkiener@iid.com	760-339-0505
44	Konesky	Peter	Nevada State Office of Energy	727 Fairview Dr., Suite F	Carson City	NV	89701	pkonesky@dbi.state.nv.us	775-684-8735
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52	Miller	Jeffrey	California ISO	151 Blue Ravine Road	Folsom	CA	95630	jmillr@caiso.com	916-351-4464
53	Mink	Leland (Roy)	US DOE Geothermal Technologies	1000 Independence Ave. SW, EE2C	Washington	DC	20585	roy.mink@ee.doe.gov	202-586-5463

## Attendee List (cont.)

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55	Monastero	Francis	Naval Air Weapons Station, Geothermal, ESC-25	429 E. Bowen Road, Mail Stop 4011	China Lake	CA	93555	<a href="mailto:francis.monastero@navy.mil">francis.monastero@navy.mil</a>	760-939-4046
56	Morris	Christy	Nevada Division of Minerals	400 West King St.	Carson City	NV	89703	<a href="mailto:clmorris@govmail.state.nv.us">clmorris@govmail.state.nv.us</a>	775-684-7045
57	Munson	Steve	Vulcan Power Company	1183 NW Wall St., Suite G	Bend	OR	97701	<a href="mailto:smunson@vulcanpower.com">smunson@vulcanpower.com</a>	541-317-1984
58	Nemzer	Marilyn	Geothermal Education Office	664 Hilary Drive	Tiburon	CA	94920	<a href="mailto:mnemzer@marin.org">mnemzer@marin.org</a>	415-435-4574
59	Ogle	Kris	Pacific Tsunami Inc.	8039 Fallbrook Ave.	West Hills	CA	91304	<a href="mailto:krismo_2000@yahoo.com">krismo_2000@yahoo.com</a>	818-486-4777
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61	Phelps	Rick	High Sierra Energy Foundation	P.O. Box 3511	Mammoth Lakes	CA	93546	<a href="mailto:rdp104@earthlink.net">rdp104@earthlink.net</a>	626-664-97-96
62	Pigott	Jack	Calpine Corporation	4160 Dublin Blvd.	Dublin	CA	94568	<a href="mailto:jackp@calpine.com">jackp@calpine.com</a>	925-479-6646
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72	Schochet	Dan	ORMAT Nevada, Inc.	980 Greg St.	Sparks	NV	89431	<a href="mailto:dschochet@ormat.com">dschochet@ormat.com</a>	775-356-9029
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91	Yoder	Ronald	County of Lake Resource Planning	255 N. Forbes St.	Lakeport	CA	95453	<a href="mailto:rony@co.lake.ca.us">rony@co.lake.ca.us</a>	707-263-2221

**Appendix C: Evaluation Results Summary**  
**2005 California Geothermal Summit**  
**June 9, 2005**  
**28 Evaluation Forms Returned**

**Rate the overall Summit: 1 (poor) to 10 (excellent)**

- X The Summit increased your knowledge of geothermal energy's current status 7.8
- X The Summit developed future goals to support increased geothermal production 6.4
- X The setting was a good conference environment 7.8
- X The date (month and day) was convenient 8.5
- X Handouts were helpful 6.6

**Panel Sessions - rate the ones that you attended 1 (poor) to 10 (excellent):**

**Session One - RPS**

- X Presentation helpful 8.2
- X Presenters knowledgeable 9.2

**Session Two - Outreach**

- X Presentation helpful 8.0
- X Presenters knowledgeable 8.6

**Session Three - Geothermal Resources**

- X Presentation helpful 7.1
- X Presenters knowledgeable 8.6

**Session Four - Transmission**

- X Presentation helpful 7.8
- X Presenters knowledgeable 9.1

**Session Five - New Geothermal Projects**

- X Presentation helpful 7.4
- X Presenters knowledgeable 8.5

**What improvements would you suggest or what additional material would you have liked to see covered?**

1. Action items from questions/concerns noted;
2. Update on new projects with time tables & MW capacities;
3. More back and forth in sessions;
4. We need to see action with results – actions speak louder than words;
5. Request summary handouts be available from the presenters and make available a written post-summit summary;
6. Tribal session;
7. Future activities needed to move ahead;
8. Hold to times;
9. More input from Commissioners and PUC members;
10. More opportunity to “network;”
11. California is kind of a complex state - an organizational chart, flow chart, or road map through the various agencies might be helpful;
12. With groups as small as this meeting was it would be nice to have everyone introduce themselves;
13. More direct-use topics - district heating, cascaded geothermal projects from binary plants; environmental impacts from geothermal development. I hope the tribal lands component will still

- be held. Although most geothermal plants are small, it might be useful to included Energy Commission siting information. We permit 50 MW or above;
14. Prefer not to have competing sessions and more time for questions & answers. Would like to see a longer closing session with time to set goals for coming year;
  15. I would have liked to have seen a closing session that identified action plans for future work;
  16. More handouts. My view of the summit is flavored by my long experience in geothermal. It is probably more important to get more outsiders to attend. However, several of the sessions had outstanding people with some excellent suggestions to the jaded old timers;
  17. Session 3 didn't really cover the topics described in the agenda. The primary issue is that BLM has been incapable of issuing new geothermal leases on federal lands for many years, and neither the industry nor BLM can find a solution. Serious roadblocks were discussed, but it was not apparent that committed teams would organize themselves to address the problems. GEA is trying, but Karl can't do everything. I would like to see committees with dynamic leaders established and report back to GEA monthly
  18. Have the summit identify/adopt development objectives (amount of MW to be brought on line by a specific date). This would focus the summit on near-term, practical activities necessary to achieve those objectives. The goal of the summit would be not just to share information but also to articulate an industry-wide development plan. Workshops could address different components of a development plan to support expanded/expedited geothermal development in the state/region. These include, e.g., coordinating project development with RPS procurement; ISO tariff changes to allow priority interconnection for RPS generation; policy action to enable transmission funding/construction, and setting a timeline to measure progress against. The summit could establish work groups to take responsibility for achieving specific tasks. A (GEA) plan for 1) increasing cooperation among industry participants and 2) for raising the visibility of the industry with policymakers and the public would also be very helpful;
  19. Nothing really stands out as deficient in topics or materials. Topic selection was driven by those folks involved in the trenches, so with all things considered, it was a good conference. Thanks for all the hard work putting it on – congratulations on a successful conference.
  20. You are going to need a bigger room.

### **What did you find the most helpful at the Summit?**

1. Network of geothermal constituents from various backgrounds/organizations;
2. Understanding issues of each organization;
3. Opportunity to network;
4. Discussions about image of geothermal (PR) and problems with BLM;
5. Personal interaction with participants;
6. Meeting and contact with those active in the industry and regulating agencies;
7. New geothermal projects session;
8. Collaborative update, what California is doing throughout the year;
9. Updated information on California geothermal status;
10. Good to have agenda early;
11. The discussion on RPS;
12. Overview discussions of RPS-Value problems;
13. Networking;
14. The people I met;
15. It is a good venue to get the geothermal community together and to show the state regulators and officials that we exist;
16. I thought that there was good participation and representation of industry. Having them provide

- more of their status, issues, and problems with policy matters might be good;
17. The industry perspective is useful to people involved in permitting;
  18. The comments of John White and the Independent Power Producers' representative;
  19. A diverse and knowledgeable group of speakers covering the most important geothermal issues;
  20. Identification of issues to be overcome by the industry;
  21. I liked the introduction, in particular. Jonathon Weisgall is great as well as Dan Schochet. These are knowledgeable people that should be given more time;
  22. The sessions on RPS and transmission which I briefly sat in on. I learned a lot from those;
  23. Shannon Eddy's comments that the administration understands that to meet the RPS, 50% must come from geothermal. But it is not apparent that the administration is doing anything to address the roadblocks. A committee with connections to the Governor and his Energy Advisor needs to work on this;
  24. Networking/information sharing with industry participants;
  25. Opportunity to "connect" again with folks I don't see as often as I should.
  26. Hearing about new projects.

Thank you for your input!