

SUMMARY
2006 California Geothermal Summit
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1 OVERVIEW

On May 23, 2006 the California Geothermal Energy Collaborative (Collaborative) conducted the "2006 California Geothermal Summit"; the event was funded by the California Energy Commission (CEC) and co-sponsored by the US Department of Energy's (DOE) GeoPowering the West (GPW) Program. The meeting was held at the University of California at Davis' Alumni Center in Davis, California. The purpose of the meeting was to bring together geothermal stakeholders to focus on the current status of the geothermal industry in California, review successes achieved and roadblocks faced, and to conduct interactive sessions to outline the Collaborative's role for increasing geothermal production and reducing energy costs in the state.

The objectives of the meeting were carried out through presentations to meeting participants and a facilitated discussion session at the end of the event. The following sections summarize these presentations and discussions. Nearly 90 people attended the Summit. The meeting agenda is provided as Appendix A, the attendee roster 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. (*Note to editor: this link needs to be verified*)

2 PRESENTATION SUMMARIES

The meeting commenced at 9:00 AM with Karl Gawell, Executive Director of the Geothermal Energy Association (GEA) and the California Geothermal Energy Collaborative, welcoming the participants to the 2006 California Geothermal Summit and thanked the group for their efforts in moving the Collaborative forward over the past year. He introduced Elaine Sison-Lebrilla, CEC's Manager of Energy Research Programs, who provided welcoming remarks. In her remarks she highlighted the shift in California's Renewable Portfolio Standard (RPS) policy from the mandated 20% by 2017 to the Governor's recommended levels of 20% by 2010 and 33% by 2020, and said that geothermal must play a significant role for these goals to be achieved. Ms. Sison-Lebrilla followed her remarks by introducing the conference's keynote speaker, Dr. Martha Krebs, Director of the Energy Research and Development Division of the CEC.

Dr. Krebs provided a presentation entitled, "*Geothermal Energy for California's Energy Future*" in which she described California's overall energy picture, policy guidance, and the role of geothermal in meeting the state's future energy requirements. She began her presentation with a summary of California's energy situation and stated that California has big energy issues. It generates, imports and uses massive amounts of energy and ranks high nationwide in energy consumption of every type. She provided an overview of current electricity production by resource, citing that California produces 16% of its natural gas, 42% of its petroleum and 77% of its electricity requirements. She then compared existing electricity resources to forecasted electricity requirements through 2016 and said that increasing electricity demand is primarily driven by increasing population levels, while per capita energy consumption has remained constant for the last 30 years. Dr. Krebs also provided a summary of another policy objective -- reduction of greenhouse gases. She commented that greenhouse gas emissions are driving both environmental and energy policy, and that while the transportation sector is the main contributor of greenhouse gas emissions, reductions in this area will be hard to achieve. As a result, it is likely that electricity production will increasingly become a target for greenhouse gas reductions.

Next, Dr. Krebs discussed California's Public Interest Energy Research (PIER) program stating that a main objective of the program is to support the loading order of electricity resources based on an understanding of the generation needs in the state. This loading order starts with increasing energy efficiency and demand response activities, replacing older fossil fuel generation with clean renewables, promoting new clean fossil fuel resources and addressing infrastructure and environmental issues. Next, Dr. Krebs detailed the California Energy Policy Framework focusing on the 2005 Integrated Energy Policy Report and the Energy Action Plan II and highlighted the chapter headings. She discussed the chapters relevant to geothermal and concluded that the geothermal program has a lot to contribute in supporting the objectives of the plan. She also discussed the

policy objective of an increased RPS targeting 20% renewables by 2010 and 33% by 2020, and noted the role of geothermal in meeting these objectives -- stating that in order to meet the gap in the RPS requirements that geothermal must play a large role. She also discussed the role other resources will have to play, noting that the new RPS guidance means "big solar" including solar heating and cooling, residential photovoltaics and industrial solar applications. She also said that the greenhouse gas reduction targets would have impacts on electricity production, but it still unclear how this objective will be carried out. And, not surprisingly, all of these policy objectives and goals come with technical challenges. Touching on some of these challenges she commented that 2,000 MW of geothermal capacity will be needed from the Imperial Valley, new transmission lines will be needed to get this power out to the load centers, and additional transmission infrastructure will be needed to connect the north and south of the state. In addition, there is also a need to address opportunities for distributed geothermal generation. With respect to the California Energy Action Plan's climate change objectives, she highlighted the fact that geothermal technologies directly displace CO₂ producing technologies, and noted that geothermal power production at Four Mile Hill, Salton Sea Unit 6 and Mammoth Pacific alone would reduce CO₂ emissions by more than 32 million tons.

Dr. Krebs concluded her presentation by discussing what the CEC was doing to support all types and facets of geothermal research and development and commented that coordination among and within all of these programs is essential to the success of geothermal in California. First, she discussed the Geothermal Resources Development Account (GRDA) which supports resource development, planning, and mitigation; GRDA currently has 17 funded projects totaling \$8.1M and has recently awarded another \$3.1M in new projects. Then she discussed the California Geothermal Energy Collaborative which supports the development of an integrated and comprehensive geothermal R&D effort in the state to:

- Enhance the management and development of geothermal in California;
- Provide a forum for industry, government, academic, and environmental community interactions to identify R&D needs;
- Update geothermal resource assessments, initiate a geothermal facilities reporting system, and facilitate periodic communication of transmission developments; and
- Conduct outreach and communication efforts to user communities for direct use and GSHP applications.

In addition, she highlighted the new Direct Use/Ground Source Heat Pump Network (supported by the DOE's GeoPowering the West Program) whose objectives are to:

- Expand the application of direct use and ground source heat pump technologies in all building sectors to maximize economic and environmental benefits;
- Identify actions that California state agencies and the user community could pursue in 2006/7; and
- Establish an information repository and expert resource network for direct use and ground source heat pump applications.

In summation, Dr. Krebs stated that geothermal is an important part of California's energy future, will help meet the RPS goals, as well as the loading order objectives for renewables and distribution, and support the Governor's Ten Point Plan and Western Governors Association Resolution. In addition it will:

- Help meet Energy Action Plan goals in promoting distribution close to load centers and avoid transmission congestions,
- Provide environmental benefits and achieve positive life cycle impacts,
- Reduce greenhouse gas emissions and mitigate global climate change effects, and
- Diversify energy use in California.

The following summarizes the questions asked of Dr. Krebs and her responses:

Q. The first question was a comment suggesting that someone needs to advise the Governor to use the word "geothermal" whenever he mentions renewable energy. He says "wind" and "solar" but never "geothermal", and if he did it would really help us in getting the word out.

Q. Which RPS goal is really the one being targeted -- the 20% by 2017 or the 20% by 2010?

A. The accelerated RPS is the goal -- 20% by 2010.

Q. Does the RPS apply to municipal utilities?

A. No, although it has been recommended it has not been approved. Legislation is currently in the works to include municipalities, and discussions are ongoing to include them in the future.

Following the keynote presentation of Dr. Krebs, Karl Gawell provided a presentation on the past, present and future of the California Geothermal Energy Collaborative, including a proposed strategy for increasing geothermal use in California. Mr. Gawell began his remarks by providing a brief history of energy policy in the US from the Nixon administration and its objectives of "Project Independence", to the Carter administration's goal of eliminating dependence on foreign oil imports, and then later to an energy policy that called for hydrogen fueled vehicles on the road by the 1990s -- concluding that we continue to debate the same issues decade after decade. However, we are now making progress, and in California the CGEC is moving the geothermal industry forward. The CGEC conducted its first meeting in 2004 to organize and establish a working framework, then in 2005 the organization set its direction at the second annual meeting, and today at the third annual meeting we are here to report on progress, solicit input, and refine and set new goals. He then asked the participants, "What is our challenge going forward?" and stated that it is to "fill in the blanks" in Dr. Krebs's presentation and clarified that we need to add bullet points on geothermal progress under more areas outlined in the 2005 Integrated Energy Policy Report and the Energy Action Plan.

Mr. Gawell then spoke more on the background of the CGEC detailing the organizational framework and participants, and then detailed the progress to date highlighting the reports, workshops and resource materials developed to date. In addition, he stressed the importance of the CGEC in being responsive to input from its members and that there are number of ways to provide your input, including this Summit meeting, additional workshops, evaluations forms at the workshops, emails to Judy Fischette (Administrative Manager of the CGEC), or through talking with any member of the steering committee. This feedback and input will determine where the organization goes next year. Next, Mr. Gawell focused on the future of the CGEC commenting that now that we're organized, and have established subcommittees the question is, "Where do we go from here?" He also commented that, from a national perspective, our country is in a situation where we are experiencing continuous outflows of money to foreign countries, with China owning a majority of our national debt, and we are now seeing a conservative backlash in Washington DC over this balance of payments crisis. He stated that we need to take advantage of this sentiment to grow our industry, and proceeded to lay out a series of new goals for the California geothermal industry and its stakeholders.

Mr. Gawell opened his discussion on "new goals" by quoting Diana Scharf Hunt -- "Goals are dreams with deadlines." The first goal is an overarching goal of expanding the use of geothermal energy in California in both direct use and electric power applications. Next, Mr. Gawell discussed the strategy for achieving this initial goal set. In pursuing growth in direct use (DU) applications he stated that currently DU applications are not adequately recognized as part of California's energy future, and then laid out a number of high priority applications including district heating for homes, businesses and schools; commercial uses for industry and agriculture; as a clean energy source for new fuel production (i.e., ethanol and hydrogen); and geothermal heat pumps. Next, he unveiled a proposed initiative for "branding" of DU applications called "Green-G". As part of the branding concept he highlighted a logo that could be placed in businesses that identify the facility as a user of geothermal energy. As an example of what could be achieved through a geothermal branding initiative, a comparison was made to that of the Energy Star brand, which sold over \$1.5 Billion in products

in 2005. Mr. Gawell then suggested that California should set a goal of 10-fold increase in direct use projects, including ground source heat pumps.

Next, Mr. Gawell focused on goals for geothermal electric power development in the state. Prefacing his statement of goals he said that geothermal is so different than other renewable energy resources, and that the industry focuses on the potential of "reserves" which is a small fraction of the technical potential, and that there is a huge difference between "reserves" and "resource". As an industry, we need to decide on the technical potential of the resource and promote that as the number of megawatts that is achievable. So the question is, "What is Achievable?"-- and Mr. Gawell proposed that "the technical potential for geothermal energy in California and nearby areas exceeds the state's total electricity demand today, and the total electricity demand expected in the coming decades." Quantitatively there are a number of projects existing that document this potential, including 2,375 MW in the near-term and 4,703 in the longer-term and 7,945 MW over the next 20 years; as well as a technical potential estimate of 9500 MW by 2025 which equates to 27% of the gross state power requirements. Add these estimates to those of neighboring states and the totals are over 14,500 MW of technical potential over the next 20 years. And, these numbers are easily justifiable, and in fact, are quite reasonable based on previous estimates of much higher potential.

Following his discussion on goals, Mr. Gawell provided his "geothermal power vision" which included:

- A goal of 25% of gross system power from geothermal resources by 2025;
- Cleaning up the grid and avoid building new nuclear power plants by utilizing available geothermal resources;
- Using geothermal to decrease ethanol production costs to support a vision of producing clean fuels in clean ways.

Mr. Gawell concluded his remarks by challenging industry to think big. The nation is facing serious energy problems, and the geothermal industry needs to step up and say that we can "play in this game" and be a part of the solution. California can lead the way by making things happen in the state and set an example of what can be done. He concluded his remarks by quoting former baseball/football star Bo Jackson --"Set your goals high, and don't stop 'till you get there".

After a short break, Jason Orta of the CEC's Renewable Energy Program provided a presentation entitled, "Geothermal and California's Energy Program". Mr. Orta began his presentation with an overview of the history of renewable energy legislation in California from 1998 through 2006 summarizing AB1890, SB90, SB1038, SB 1078 (accelerating the RPS goals of 20% by 2017 to 20% by 2010), SB 67, AB 200 and AB 135. Looking forward, he discussed SB 1250 which recommends funds to be collected for the 2007-2012 period. Next, he discussed "California's Energy Action Plan", which introduces the concept of a "loading order" policy calling for increased use of energy efficiency and load response, and meeting new generation requirements with renewable energy first. Mr. Orta then summarized California's gross system power resources in 2005.

Next, Mr. Orta discussed the CEC's Renewable Energy Program which allocates ~\$135 Million/Year (1998-2006) with goals of:

- Maximizing the influence of market incentives;
- Maintaining the benefits and diversity of the renewables industry;
- Facilitating a self-sustaining renewables market; and
- Encouraging the development of new and emerging renewable industries, including central station and distributed generation applications

The \$135M per year in program funding has been allocated to new renewable facilities and RPS (51.5%), emerging renewables/rebates (26.5%), existing renewables facilities (20%), and consumer education and the WREGIS tracking system (2%). He then discussed each of these allocation areas in detail. With respect to the

Existing Renewables Facilities Program he noted that the incentive payments are tied to the market price of power, and that existing geothermal is considered economic without these incentive payments. In discussing the New Renewables Facilities Program he stated that the incentive payments were capped at 1.5 cents per kWh and that two geothermal facilities have funding award agreements under this program, but have not been built (Telephone Flat and Fourmile Hill). Highlighting the Consumer Education Program he outlined its goals of 1) raising consumer awareness about renewables and their benefits 2) increasing purchases of emerging technologies, 3) developing renewable energy education partnerships and 4) tracking and verifying renewable energy procurement (WREGIS). He then discussed WREGIS (the Western Renewable Energy Generation Information System) in detail noting that it was a voluntary and independent registry that creates and tracks RECs (or WREGIS certificates), and that it is expected to be operational in mid-2007.

Next, Mr. Orta focused on the California RPS stating its qualitative goals of increasing the diversity, reliability, public health and environmental benefits of California's energy mix. Quantitatively, the goals have been increased from 20% by 2017 to 20% by 2010, with Governor Schwarzenegger increasing the long-term goal to 33% by 2020. Next, he delineated the historical and projected renewable energy sales in California from 1983-2010 and also discussed the progress of the three investor owned utilities in pursuing the goal of 20% by 2010. In working towards achieving these RPS goals, he discussed the collaborative effort between the CEC and CPUC in implementing the program and the distinct roles and responsibilities of each. He also discussed the status of RPS certification noting that 476 facilities have been certified as eligible for the RPS and 48 of these facilities are geothermal based. In discussing the eligibility of geothermal resources for the RPS, he stated that:

- Facilities Pre-September 26, 1996 are eligible for the RPS only to establish or adjust a retail seller's RPS baseline and are not eligible for SEPs (supplemental energy payments);
- Facilities constructed between September 26, 1996 and January 1, 2002 are eligible to meet both baseline and IPT (incremental procurement target) for the RPS, but are not eligible for SEPs;
- Facilities brought on-line post-January 1, 2002 are eligible to meet both baseline and IPT for the RPS, and are eligible for SEPs; and
- Incremental geothermal facilities, i.e., generation from capital improvements to existing facilities, may be used to meet both baseline and IPT, but are not eligible for SEPs.

Mr. Orta then discussed what qualifies as incremental geothermal, including a summary of what qualifies as eligible expenditures for this project category, as well as a breakdown of certified incremental geothermal facilities. Mr. Orta then focused on the progress of the geothermal industry and the IOUs in obtaining certification of all types and vintages of geothermal facilities in the state to meet RPS goals.

The final element of his presentation was a discussion on the 2006 Renewable Energy Investment Plan, including a summary of recommended allocations of funds, and noted that while 51.5% was requested of new renewables that only 38% was allocated for the program. He also noted two key recommendations contained in the plan, including 1) the current law allows funds to be transferred into the New Account, but funds may not be transferred out -- and that the CEC recommends a change to allow for maximum flexibility; and 2) program eligibility criteria, distribution methods, and reallocation of funds continue to be developed through guidelines. He concluded his presentation by summarizing a number of references and resources for further information on California's renewable energy programs.

Following Jason Orta's presentation, Mr. John White, Executive Director of the Center for Energy Efficiency and Renewable Technologies provided prepared remarks on climate change and the RPS. Mr. White began his presentation by commenting that some of the speakers make it sound like we are doing things in California, when in fact, they are really telling us how badly we are doing. As an example, he cited the steep slope on the curve needed to get to 20% by 2010 and asked, "Who is kidding who?" He stated that we need to face reality, and not the reality of the Energy Information Administration (EIA); according to the EIA natural

gas prices will fluctuate between \$8 and \$11 - and then fall to \$6 when LNG (liquefied natural gas) comes in and domestic natural gas production increases. He stated that this EIA information is not the real world, and that in the real world renewable energy is cheaper. Mr. White suggested that one of the first things that needs to be done is to increase the Production Tax Credit (PTC) for 5 years so that we can build out the necessary capacity of renewables. The California IOUs are stating that they have 1700 MW of renewable capacity under contracts for the future, but Mr. White countered that he has no idea what this is based on or where its going to come from. He also mentioned that Sempra wants to build a transmission line across a National Park to move renewable capacity to where it is needed. In addition, he noted that renewables are the only source of energy not indexed to natural gas.

Looking forward, Mr. White stated that we need to address the "words-to-megaWatts" ratio in California. In addressing the state's education programs under the renewable energy programs, he said that we shouldn't be spending money on education when the public doesn't need education -- as they already know they want to buy energy from renewable resources. Instead, the task at hand is to try to augment the RPS by making renewable energy procurement the centerpiece of utility planning. One strategy to accomplish this would be to adjust utility integrated resource planning processes away from annual incremental procurement requirements towards a longer-term procurement goal of 20% by 2010. In addition, we need to coordinate renewable energy procurement with transmission accessibility. In summing up these initial points, Mr. White stated that while we are forecasting decreases in natural gas prices in the future, in the real world we are seeing increases in prices today, and in large part this is due to the fact that we are not buying renewable energy. Securing the PTC extension will go a long way to changing the mindset towards renewable sources of energy as it becomes increasingly competitive.

Next, Mr. White turned his remarks towards addressing climate change issues and stated that the climate change imperative is becoming a meaningful constraint to conventional power procurement. He cited the example of Sempra having to walk away from a proposed coal plant in Idaho due to regional and local environmental concerns. He also discussed the proposed Frontier transmission line which is being designed to carry power from "clean coal" plants with some renewable energy thrown in to serve California's growing energy needs. Mr. White stated that California is calling for more energy efficiency, and we should be looking at efficiency and renewables, and that we should not be underwriting conventional coal generation plants. He also said that the California ratepayers are the silent partners for many of these conventional coal plants, and they aren't getting such a good deal under the existing "take or pay" contract mechanisms. As a result of this situation, it is apparent that you can't do climate change and the Frontier Line at the same time. The current result is that California will not sign any long-term contracts (i.e., 4 years) for any generation project that is not at least as clean as a natural gas combined-cycle plant, and any and all resulting CO₂ emissions must be sequestered. He continued by saying that this CPUC policy is one thing, but that standardizing it through legislation will change the landscape of utility procurement and bring renewable energy to the forefront. With renewable energy as the base of all resource options, we need to coordinate work on transmission planning to bring renewables to the load centers. He cited the 2,000 MW of geothermal from the Salton Sea into San Diego and others as examples of transmission planning priorities, and said that we need to build these regions up in a coordinated fashion and put less emphasis on annual incremental procurements by the utilities in the state. He went on to say that if you look at the Frontier line as a metaphor, rather than as a project, then we as the renewable energy industry can lead the way on transmission planning projects and utility procurements.

Mr. White concluded his comments by stating that we need to make things work right in light of rising natural gas prices and proposed coal purchases. The northern Nevada geothermal industry is a vital part of the solution, working in concert with the California geothermal producers. The geothermal solution will be good for the ratepayers, create billions of dollars of investment and create jobs in the state. There is no reason that we should not take center stage on this issue and tell the story of the economic boom that could be unleashed in the state through the development of geothermal and other renewable energy resources.

Q. I am in agreement with the multi-year procurement and transmission planning approach, and I would suggest that a third leg is needed for geothermal development: we need more resource assessment and drilling.

A. We need to look at renewable energy on the same scale as coal; doing procurement and transmission planning together to bring renewable energy to the forefront as opposed to being a resource that fills in the holes.

Q. The RPS is working well compared to states without one. However, investor-owned utilities need to be able to benefit their shareholders through long-term power purchase agreements just like they do with rate basing their own power plants.

A. California is trying to make the RPS work, and if it leads to procurement then that's great, if not, it needs to be supplemented with additional procurement strategies to allow some type of benefit to shareholders.

Q. The geothermal industry should prepare a summary document of why nothing has happened with geothermal power in the last 15 years.

A. While that is true, we are poised for significant growth, and then momentum will be created industry-wide.

After Lunch, a panel discussion entitled, " Geothermal Resources Report" was held. The first speaker on the panel was Mr. Marshall Reid of the US Geological Survey speaking on the agency's national geothermal survey and its impact on California. Mr. Reid opened his remarks by stating that the USGS's mandate on the geothermal assessment is to look at electrical resource potential, but that this is a bit of a misnomer in that they are looking at high temperature resources that can also be used in direct use applications. The last national geothermal assessment was completed in 1978, and much of the same methodology will be utilized for the new assessment; since the data is so old they are under pressure to do a new assessment. He then presented a slide containing a schematic of a geothermal power plant and discussed its components, and noted that when the first projects were completed in the 70s that no one designed for re-injection -- which in turn reduced the productivity of the resource. Looking at the industry today, he stated that there is more than 2,500 MW of installed capacity currently in use, and also noted that not all megaWatts are equal. Due to the high capacity factor of geothermal power plants, more megawatt-hours are generated per megawatt of geothermal than other types of generation.

Next, Mr. Reid focused on the 1978 USGS geothermal resource assessment citing that 23,000 MW (200,000 GWh) was identified as available over the next 30 years, as well as ~100,000 MW (~800,000 GWh) estimated in undiscovered resources. One of the impediments to this development potential is the lack of exploration activity. During the 70s more exploration was being done by oil companies in the geothermal business, and a big reason behind this activity was that oil companies are risk tolerant. Today, no oil companies are in the geothermal business, and exploration activity is now minimal. Next, Mr. Reid discussed the new national geothermal assessment called for by the Energy Policy Act of 2005. He began by highlighting the role of the states in cooperating with the USGS in conducting the assessment, as well as the MOU between the DOE and USGS to collaborate in the completion of the study. Mr. Reid defined the study as a classification of the availability of geothermal energy according to the degree of technical/economic feasibility and degree of geologic assurance. He noted that there are several types of classifications addressed by the effort including 1) "resource", which is the useful, accessible portion of the resource base, and 2) "reserve", which is that part of the resource that is both identified and economic. He also stated that a comprehensive resource assessment includes both identified and undiscovered geothermal resources, and anticipates the impact of future technological development. The assessment will be completed over a three-year period, and was funded at \$500,000 in FY 06. The effort includes support from DOE and includes numerous other collaborators including the BLM, USFS, state and local agencies, universities and industry to take advantage of complementary expertise. The assessment is also looking at lower temperature resources (212-302 F) that can

take advantage of binary and enhanced geothermal systems in anticipation of future technological advances. Mr. Reid concluded his presentation with a summary of the assessment's activities including 1) development of a new national geothermal database, 2) investigation of geothermal resources in high priority areas 3) development of predictive models for extent of undiscovered resources and impact of new technologies, 4) ongoing USGS-DOE collaboration under an MOU, and 5) development of new techniques for resource assessment.

The next speaker on the panel was Sean Haggerty of the Bureau of Land Management who provided an update on geothermal leasing on Federal lands under EPAct 2005. Mr. Haggerty started his presentation by stating that the EPAct changed the Geothermal Steam Act significantly and that he would address these changes in his remarks. First, however, he provided an overview of the Geothermal Regulation Team comprised of various agency experts that worked collaboratively in determining how to implement the BLM requirements under the EPAct. Then, Mr. Haggerty addressed each of the sections of the EPAct related to BLM's responsibilities related to geothermal leasing. He started with Section 222 which details the competitive lease sale requirements, and went through the sequence of activities required to obtain a competitive lease, as follows: 1) lands are nominated, 2) available lands are offered for sale, and 3) the lease is awarded to the highest qualified bidder. Then he discussed non-competitive leasing which can occur when lands put up for sale do not receive a bid; these lands are available for 2 years after first put up for sale. Next, he discussed the pending lease applications, which is another option for having a lease issued by the BLM.

Next, Mr. Haggerty discussed the provisions of Section 223, which address geothermal development for direct use activities. He noted that the changes related to direct use were designed to stimulate and foster the use of geothermal for these applications. He noted that the Secretary of the Interior may identify lands exclusively for direct use, and land sizes may be smaller (i.e., 10 acres) than typical leases for power production applications and cover only the land that is needed to utilize the resource for the DU project. He also stated that the leases may be non-competitive. He addressed the direct use fee structure noting that the Secretary of the Interior will set a fee schedule for DU leases rather than the royalty payment requirement in the past in an effort to reduce DU fees, which historically have been too high. Mr. Haggerty then detailed the MOU signed by the BLM Director and the US Forest Service that delineates the administrative procedures for processing lease applications, stipulates a 5-year leasing program within USFS lands, and calls for reducing the backlog of lease applications pending on August 8, 2005 by 90% within 5 years.

Additionally, Mr. Haggerty detailed Section 231 which addresses the annual work requirements associated with geothermal leases noting that the primary term of a lease is 10 years, with an initial extension of 5 years, and the availability of an additional extension of 5 years. He also said that after the 10th year of the lease, the lessee must satisfy minimum work requirements each year, and that the lessee must establish a geothermal potential -- and if established confirm existence of producible geothermal resource. However, the Secretary may establish payments in lieu of minimum work requirements. In addition, for leases overlying a mining claim the lessee is exempt from the annual work requirements if a plan of operations has been approved.

In discussing Section 233 of the EPAct, Mr. Haggerty delineated the rents for the various types of lease options including 1) noncompetitive lease rent of \$1.00/acre for years 1 through 10 and \$5.00/acre after year 10, and 2) competitive lease rents of \$2.00/acre in year 1, \$3.00/acre in years 2 through 10, and \$5.00/acre after year 10. He also delineated the maximum lease sizes per Section 235, which is 5,120 acres and noted the acreage limitation of 51,200 acres per state (although lands subject to a cooperative agreement are exempt from this limitation). In concluding his remarks, he briefly covered some additional amendments contained in the EPAct highlighting that 25% of the royalties collected are to be returned to the counties, and that Federal revenues collected will be returned to DOI for 5 years to fund program activities (including EIS' and the USGS assessment). He concluded by provided a summary of the draft schedule for finalizing the rules set forth in the EPAct.

The final speaker on the geothermal resources panel was Ms. Paula Blaydes of Blaydes and Associates, who detailed the California Geothermal Permitting Guide completed on behalf of the California Geothermal Energy Collaborative. She began her presentation by asking, "Why a geothermal permitting guide now?" and presented several reasons for its development including: 1) it had never been done before, 2) many new geothermal projects are expected to be developed in California, and 3) this guide will assist these new facilities in the permitting process. She stated that the purpose of the guide is to provide a road map of the regulatory and permitting process which is extremely complicated in California. She also said that there is no way to develop a comprehensive guide that covers every aspect of geothermal, so some initial assumptions had to be made to guide the process. One of these assumptions is that the land and mineral rights have already been secured for the potential project. Next, Ms. Blaydes provided an overview of the permitting guide sections and subsequently discussed each of the critical sections in detail. The first section of the guidebook she discussed was the "Getting Started" chapter where she focused her remarks on the CEQA/NEPA process, which de facto designates the CEC as the lead agency in the environmental review process; she also discussed the similarities and differences between the CEQA and NEPA processes. The next chapter she reviewed was on "Exploration" which touches on the annual well fees, bonding requirements and a host of other permitting and regulatory requirements in the exploration phase related to land, air, water and health. Then, she reviewed the next section on "Resource and Well Field Development" which delineates all the agencies involved in the permitting process, the permitting requirements, and the regulatory acts that guide the permitting process in this phase of geothermal project development.

In continuing to walk through the sections of the guidebook, Ms. Blaydes also discussed the chapter on "Production and End Uses" where she described the regulatory requirements for power production and direct use projects and the agencies and regulations governing geothermal production in these applications. The final section she discussed was on "Well Abandonment, Facilities Closure, and Site Reclamation" noting that well abandonment fell under the jurisdiction of the DOGGR, and that site reclamation and restoration was a negotiable process based upon environmental impacts and best remediation efforts. She concluded her presentation by stating that permitting is not a black and white process, but is many shades of grey. The Permitting Guide is designed to assist project developers in wading through this maze of regulations. The guide is now in final form, will be completed soon, and will be made available on the web for downloads.

The following summarizes the questions asked of the panelists and their responses:

Q. For Ms. Blaydes, did the BLM public hearing held last November help in preparing the guidebook?

A. Ms. Blaydes responded that she did not attend, and that she was already well into the report development stage at the time; the guide doesn't address leasing since it assumes that the land rights have been secured.

Q. For Mr. Haggerty, do you think exploration will increase or decrease as a result of non-competitive leasing requiring full public disclosure of private resource information?

A. We would hope that the process stimulates additional exploration activities.

Q. For Ms. Blaydes, will small DU projects be on the same list as power projects?

A. No, they will be separate and addressed in the regulations separately.

Q. For Ms. Blaydes, is it feasible for an entity to streamline the permitting process?

A. Perhaps at the Federal level some things could be streamlined and filter down to the state level, but no dramatic streamlining is likely at this time.

Following a short break, Bill Glassly of the CEC kicked off a panel on direct use applications with some introductory remarks, saying that direct use has historically been the under recognized application of

geothermal, and hopefully we are changing that. He also announced the formation of the California Direct Use Network that will work to support increased direct use development in the state.

The first speaker on the panel was Ms. Liz Battocletti of Bob Lawrence & Associates who provided a presentation entitled, "Measuring the Economic, Environmental, and Social Benefits of Nine Geothermal Heating System and Power Generation Projects." Ms. Battocletti's presentation summarized the results of a CEC Geothermal Program sponsored and GeoPowering the West Support supported study to document the results of six geothermal heating systems and three geothermal power plants constructed in California since 1981. The purposes of this study were to:

1. Measure how specific projects have benefited from funding received from the CEC Geothermal Resources Development Account (GRDA) and the Public Interest Energy Research (PIER) Program;
2. Determine how the CEC Geothermal Program's technical and financial assistance -- and the projects it has supported -- contributes to California's economic, social, and environmental well-being; and
3. Examine the possibility of replicating the CEC funding program in other states.

After describing the locations of the nine projects that were primarily in rural school and medical facility applications, Ms Battocletti first addressed the assessment of the six geothermal heating systems (direct heating, no ground source heat pumps). After describing the economic analysis methodology she presented the economic benefits of the project highlighting the fact that these projects saved ~\$11.1 million in energy costs from 1981 through 2005, and noted that the numbers do not tell the complete story. She also detailed a comparative analysis of energy usage and costs with and without the geothermal heating system and showed that with the use of the geothermal system that the six facilities used:

- An additional 12 million kWh of electricity;
- 1 million less gallons of propane;
- 10 million less gallons of fuel oil;
- An additional 77 million cubic feet of natural gas; resulting in
- An energy cost savings of ~ \$11.1 million.

Next, Ms. Battocletti delineated the environmental benefits of the six geothermal heating systems noting that 148,243 tons of carbon dioxide and 4 tons of nitrous oxide (greenhouse gases) were offset over the study period by eliminating the burning of 1 million gallons of propane and 10 million gallons of fuel oil. In addition, these projects also avoided air emissions of 264 tons of nitrogen oxides, 1,097 pounds of sulfur dioxide, 1,836 pounds of particulate matter, and 630 tons of carbon monoxide. Turning her attention to the societal benefits of the project, she noted that while they are difficult to quantify, the following benefits were identified in the predominately economically depressed areas the systems were deployed:

- Being able to share a swimming pool with the community and neighboring school districts year-round;
- Increasing comfort levels in a school during the cold winter;
- Allowing the largest employer in a community to stay and provide employment and health care to a community, especially critical in a rural area;
- Allowing a health care and school district to network and share a renewable resource that touches an entire region;
- Enabling a school district to divert funds from utility costs to education; and
- Providing a healthier work environment.

Ms. Battocletti then discussed the results of the assessment of three power generation projects including the Four Mile Hill Exploration Well, the Mammoth Pacific Power Plants I & II, and Salton Sea Unit 6. After discussing the CEC funding and matching funds amounts of the first two projects, she described potential economic benefits of these projects, including:

- The creation of 3,175 jobs;
- \$366 million in direct, indirect, and induced payroll;
- \$353 million in Federal, state, and local income, payroll, and property taxes;

- \$146 million in royalties; and
- A total economic benefit of \$866 million or \$29 million per year.

Regarding the real and potential environmental benefits of these projects, Ms. Battocletti highlighted that Mammoth Pacific has received several awards for its environmental stewardship, and that over a 30 year period the three geothermal power plants would offset the emissions generated by similar-sized coal-fired and combined-cycle natural gas plants. In turn, this would offset airborne emissions of:

- 32 million tons of carbon dioxide;
- 1,143 tons of nitrogen dioxide;
- 62,644 tons of sulfur dioxide; and
- 14,668 tons of particulate matter.

In summarizing what these numbers mean, she stated that these emission offsets are equal to taking 6 million passenger cars off the road for a year, or not burning 3 billion gallons of gasoline, or not burning 67 million barrels of oil. Ms. Battocletti concluded her presentation by stating that over the past 20 years, the six geothermal heating systems addressed in this study have significantly contributed to the economic, environmental, and social well being of their regions as well as California as a whole, and that geothermal power plants have an enormous role to play in the State's economic, environmental, and social well-being.

The next presentation on the panel was by Ms. Alyssa Kagel of the Geothermal Energy Association. Ms. Kagel discussed a project she has been working on to document information on direct use projects in California. Ms. Kagel opened her remarks by stating the reasons for compiling a new update on California direct use projects. The reasons for the update are primarily to assist potential users, current users, and policy makers, as well as to eventually expand the database to a national level. She also cited a number of issues with compiling the information noting it was difficult to obtain since 1) many sites are small and difficult to identify, 2) facilities change ownership regularly, 3) updating the information takes a commitment of time, money and outreach, and 4) the focus in the geothermal community has been on electrical power production. Next, she detailed the sources of data relied upon for the study and described some of the problems with the initial data set citing that it was outdated, contained significant holes, and some of the data was unclear. In order to rectify this data and update the information, Ms. Kagel described the development of a survey to gather this information as quickly and easily as possible, as well as discussed some of the issues with the survey process noting that sector information was uneven, facility staff were not always knowledgeable about the project, businesses change hands frequently and/or discontinue geothermal operations.

After providing this background, Ms. Kagel discussed the results of the survey effort to collect information on direct use projects in California. First, she described the types of projects existing with the various sectors including industrial, space and district heating, aquaculture, and spas/pools/resorts. Following the description of projects she enumerated the number of projects within each classification, as follows:

- Industrial (1);
- Heating (14 space, 3 district);
- Aquaculture (11); and
- Spa/Resort (74).

She also commented that one greenhouse is under development in Canby, California, as well as a spa, two space heating and two district heating projects, and a cogeneration project.

Next, Ms. Kagel discussed the qualitative feedback from the direct use project owners as part of the survey. Some of the challenges reported by DU operators included:

- Inadequate attention to the business side of development;
- Prohibitive development costs;
- Lack of knowledge about how to expand or begin development of a geothermal resource;
- Required compliance with multiple agencies; and

- Lack of government support.

She also presented a number of the benefits cited by DU operators, which included:

- Cost savings;
- Little maintenance required;
- Environmentally friendly; and
- Income generating in certain sectors.

The final topic of her presentation was on a proposed "branding" initiative for geothermal direct use facilities entitled "Green-G". The Green-G certification will serve to highlight facilities that utilize geothermal energy in direct use applications, and will ease the administrative and cost burden of certification compared to other green power certification initiatives in the marketplace today. Ms. Kagel noted that the Green-G initiative is design to both encourage and regulate direct use projects, with less outreach, and will require annual renewal. She concluded her remarks by saying that in moving forward with direct use projects that we need to collaborate with various organizations, continue to update information in the DU database, and make this information publicly available.

The final speaker on the DU panel was Mr. John Lund, Director of the Geo-Heat Center at the Oregon Institute of Technology. Mr. Lund provided a detailed summary of the applications for direct utilization of geothermal heat, and noted that there is a potential of 200 quads of energy available in the US from geothermal resources, and that the US currently consumes about 100 quads of energy. He stated the advantages of direct use geothermal projects, highlighting that:

- Direct use applications can use low to intermediate temperature resources (<300°F);
- These resources are more wide-spread (80 countries);
- Direct heat use requires no conversion and is highly efficient;
- DU applications can use conventional water-well drilling equipment;
- DU applications use conventional, off-the-shelf equipment; and
- DU projects have minimum start-up times.

He also cited the range of sizes appropriate for direct use applications are from small "mom and pop" operations (individual homes, greenhouses, or aquaculture ponds) to large scale operations such as those employed in Reykjavik, Iceland that provide ~83 MW of equivalent energy in district heating applications. In discussing district heating applications, he provided an overview of the equipment requirements, noting that it is often necessary to isolate geothermal fluid with a heat exchanger to 1) prevent corrosion or scaling 2) prevent oxygen from entering system, and 3) eliminate dissolved gases and minerals (i.e., boron, arsenic, hydrogen sulfide, etc.) which may be harmful to plants and animals. He then described a schematic of a typical district heating system design and detailed the differences between a plate heat exchanger (allows for counter flow of potable water with geothermal water) and a downhole heat exchanger (requires 140°F geothermal resource).

Next, Mr. Lund continued through each of the potential applications of direct use starting with swimming, bathing, and balneology and provided descriptions and photos of these applications from around the world. Moving on to space conditioning technologies he highlighted applications for forced air heat, radiant heat, sidewalk snowmelt, and roadway snowmelt. He also focused on district heating applications, again providing summaries of the technology options and projects around the world and in the US. Next, he detailed the numerous applications of direct use in the agribusiness and industrial sectors, and the advantages provided by the geothermal resources. Applications he identified included:

- Greenhouse heating: flowers, vegetables, tree seedlings;
- Food, grain and timber drying;
- Animal pen heating and cleaning;

- Soil warming;
- Crop irrigation;
- Mushroom raising;
- Soil and mulch sterilization;
- Aquaculture: catfish, tilapia, eels, tropicals; and
- Mineral extraction: zinc, gold, silver, silica.

He showed photos of a number of these applications and noted that one of the benefits of greenhouse and aquaculture projects is that with geothermal it is very easy to control the temperatures of the growing environment, and the ability to maintain optimum temperatures results in increased growth rates of the commodities being raised.

Mr. Lund also discussed the use of geothermal in refrigeration applications highlighting the applicability of lithium bromide and ammonia absorption technologies for various end uses needs, noting that lithium bromide is the most common as it uses water as the refrigerant and provides chilled water for space and process cooling above the freezing level. Ammonia absorption, on the other hand, is typically used for refrigeration below freezing with large capacity requirements and requires geothermal temperatures above 250°F. The final application Mr. Lund discussed was geothermal heat pumps. He stated that over 1 million heat pumps have been installed in the US, and the current rate of installation is about 70,000 per year. He described the four predominant technology types, highlighting schematics of vertical, horizontal, two well, and direct systems.

After his discussion on the DU technologies and applications, Mr. Lund provided his view on new trends in the industry, and highlighted combined heat and power systems. He defined combined heat and power systems as low temperature geothermal resources that are used for binary power production and then cascaded for direct use, and noted that temperatures as low as 200°F are being used. He also stated that cascaded projects make more efficient use of the resource and improves overall project economics. He concluded his presentation with a list of future developments or project opportunities within the direct use industry, namely:

- Collocated resources and use (i.e., within 5 miles of a “community”-- over 400 in the US);
- Sites with high heat and cooling load density (i.e., > 96 MWt/mile² (328 million Btu/hr peak load);
- Food and grain dehydration, especially in tropical climates where spoilage is common -- and to extend the work season;
- Greenhouses in colder climates;
- Aquaculture to optimize growth-- even in warm climates;
- Ground coupled and ground water heat pumps for both heating and cooling; and
- Combined heat and power projects -- cascading

At the conclusion of his presentation the following question was asked:

Q. The Icelanders are being approached for hydrogen production, has anyone done it?

A. No, most of it is electrolysis.

Following the panel on direct use, Dave Olson, Consultant and Ed Lutz of the Imperial Irrigation District gave a report on the transmission needs and developments in California and the west. Mr. Lutz began the report by discussing the Imperial Valley Study Group, which is comprised of all ten transmission owners in the region, as well as the CEC and industry representatives to explore how to export 2,200 MW of geothermal power to San Diego County. The outcome of the Study Group is an agreement between IID and SDG&E to build a transmission line. In addition, LADWP has now proposed a direct connection between IID and LADWP, which would be about 100 miles long. He also noted that they are facing a number of environmental issues citing that there is a lot of opposition to building transmission infrastructure, namely from the agricultural and aviation industries. He also discussed the fact that IID is looking at upgrading its existing

transmission system, as the region is being impacted by new growth and migration into the area. IID is trying to meet the challenges associated with the transmission system and support the development of the geothermal resource in the region, and is encouraged by the presentations provided today, as well as the engagement of the BLM and DOE and others, and the enthusiasm of everyone here at the conference. He also stated that the development of the transmission corridor is going to be a major challenge, and it will be another 16 months before a clear picture emerges on which route will be taken. The existing proposal is to go from Imperial Valley to San Diego, but there is strong opposition from environmentalists due to the line crossing over a national park area. Alternatives are under consideration and actively being developed, although a 500 kV link going west is necessary. The LADWP line is in a state of flux right now, and alternative routes are also under consideration to bring power from the Imperial Valley to the Los Angeles load centers. He closed his report by stating that the approach of the IID geothermal development efforts is to look at a one single combined project in terms of generation and transmission together.

Next, Dave Olson discussed a number of additional transmission projects being considered and/or planned in the west and their impact on renewable energy development. The first effort he discussed was the CAISO Southern Regional Transmission Planning Process (CSRTP), which is a new, proactive, statewide planning process that is studying the combined impacts of projects for the years 2010 and 2015 to develop an optimal regional transmission plan. Transmission projects that are included in the study are the Sunpath (2,200 MW of geothermal; 900 MW of concentrating solar power), the Tehachapi (6,000 MW of wind) and the Lake Elsinore Advanced Pumped Storage Project (LEAPS). The study also evaluates system reliability and economics and is scheduled for board approval in Q3 2006.

Mr. Olson then detailed the Frontier Line, which has been proposed by the Governors of California, Wyoming, Utah and Nevada and is being driven by the need for more interstate transmission capacity. The California greenhouse gas policy goals are shaping the project, and are leading the way to more renewables being utilized for this project - including geothermal from northern Nevada and wind from the Tehachapis. The feasibility study for this project is on the fast track and scheduled for completion by December of 2006. The next transmission project Mr. Olson highlighted was the TransWest Express, which will bring power from Wyoming to Arizona, and has the potential to be combined with the Frontier Line, as well as potentially provides access to geothermal from New Mexico. The feasibility study for this project is also scheduled for completion in December of 2006. Another transmission project he discussed was the Sierra Pacific - Eastern Nevada Intertie Project (EN-ti) that would connect northern and southern Nevada together for the first time. This line would carry 1,500 MW of SPR coal and potential IPP coal; the proposed line could also be extended to Idaho and combined with the Frontier Line, as well as provide access to Nevada geothermal. The final transmission planning effort he discussed was the overall Western Interconnection Transmission System, which is being studied and planned for and examines detailed transmission expansions in the west through 2015, and includes a "high renewable energy scenario". He also noted that the transmission policy recommendations by CDEAC would have major impacts on transmission access to renewable energy projects in the west.

The final topic Mr. Olson spoke on focused on the concept of "renewables first" transmission planning. He stated that it is possible to put together large renewables projects to support development of transmission infrastructure without having coal to pay for it. We need to focus on transmission lines that are sited, designed, built, and operated for renewable energy projects. He concluded that we have an opportunity to re-orient our way of thinking, and that we must think big. We need to think beyond the short-term projects coming on-line and think about a longer-term strategy with renewables as the core and a "renewables first" transmission strategy.

The final panel session of the day was entitled, "Geothermal Tribal Projects Update" and featured Mr. Roger Hill, of Sandia National Labs and the Technical Director of GPW, and Mr. Lawrence Harlan of the Ft.

Bidwell Reservation. Mr. Hill spoke first, and opened his presentation by stating that tribes have great natural resources, and limited infrastructure. Then, he presented a map of tribal lands in the US, indicating the vast number of tribal entities across the nation. He then discussed the connection between tribes and geothermal energy noting that: 1) there is increased attention being provided to the tribes by the geothermal community; 2) geothermal energy provides economic opportunities, empowerment, and more energy choices for tribes, 3) tribes can provide a significant contribution to the nation's domestic power supplies; and 4) there is a significant opportunity for rural economic development through direct-use applications of geothermal resources by tribes. Next, Mr. Hill presented a slide containing a lengthy list of tribes with known or suspected geothermal resources. After this, he provided a number of photos of his site visits to various tribal lands throughout the west as part of geothermal investigations. He highlighted the fact that the Jemez Pueblo in New Mexico was taking inventory of what they have in terms of a geothermal resource, and what they want to do with it. He also discussed the Yakima Pueblo, which had to shut down its greenhouses when the diesel fuel bills reached \$3 million per year, and noted that they (along with other tribes) were looking at geothermal heated greenhouses as an economic development opportunity. He also highlights resources and ongoing investigations with the Walker River Tribe, Paiute Tribe, the Wind River Reservation in Wyoming (geothermal heated swimming pool), the Fort Bidwell Tribe and resources in Surprise Valley.

Next Mr. Hill cited the criteria for geothermal development:

- Need a good geothermal resource;
- Must have access to loads or grid;
- The land must be developable; and
- Must have a buyer.

Mr. Hill concluded his remarks with his vision for the future of the geothermal industry, which includes:

- Ready access to land;
- Thoroughly mapped and developed resources; and
- Cost competitive technology.

The final speaker on the panel was Mr. Lawrence Harlan, who provided a presentation entitled, "Picking the Next Winner". He began his remarks by asking the audience, "What's better than picking a winner?" He answered his question by stating, "picking the next winner", and said that the Fort Bidwell Indian Community is the next winner in geothermal. To date, three wells have been drilled and explorations undertaken on the potential uses of the resource which include space heating and power production for on-site use as well as for export to the neighboring town. He stated that Ft. Bidwell will drill one more well this summer with GRED III and GRDA grant funding. He also said that they are going out on a limb and taking risks. They are in the process of characterizing the resource based on the wells drilled to date, and compiling data on the flow rates of the various wells. In addition, he commented that the tribe will retain control of the projects and all rights to the resource, and that while the tribe understands the benefits of partnerships, they will always retain control of the resource. He concluded his remarks by saying that the Ft. Bidwell Indian Community will develop and continue to develop geothermal projects in the west --- and will be the next winner in geothermal.

The following questions were asked of Mr. Harlan:

Q. Could you give us a tribal view of the spirituality and cultural aspects of geothermal development on tribal lands?

A. We like it, but I understand that other tribes feel differently. From our perspective it clean, has many uses, and is affordable.

Q. Would you consider exporting power from the reservation?

A. Yes, if we produced more than we needed - then yes.

3 CLOSING SESSION -- SUMMIT WRAP UP AND DISCUSSION OF THE COLLABORATIVE'S FUTURE PRIORITIES

Karl Gawell moderated the final session of the day, which was a discussion forum on the future direction of the California Geothermal Energy Collaborative. He challenged the attendees to think about the following three topics and to comment on them:

1. What should the CGEC do to advance geothermal energy?
2. How do we organize?
3. Who should be our collaborators?

The following bullet items summarize the responses, comments, and questions and answers discussed in this final session:

- The investor-owned utilities in Nevada are entering into power purchase agreements for renewable energy that benefit the shareholders; we need to figure out how to do that in California.
- We need more exposure from the press to get the word out. Geothermal is never in the press like solar and wind; and solar and wind would never be considered for being zeroed out of the DOE budget.
- Regarding the "Green-G" initiative, we need to promote this branding of geothermal energy and take it to the California utilities, many of which use a lot of geothermal. Another person commented that Guy Nelson is the lead for the geothermal utility working group and that we should work through him to take it to the utilities.
- We need to inspire utilities to spend money on promotion and paid advertising. We are small and have limited dollars, and we need to attract some dollars to promote geothermal as a resource. "Earned advertising" (i.e., PR's and news articles) only goes so far - we need money.
 - In response to this comment, a suggestion was made to pull together all the businesses in the industry and obtain \$30,000 from each one to fund monthly press releases to educate the public on geothermal energy. We haven't even started to publicize ourselves right yet.
- The Administration doesn't even mention geothermal. The DOE is proposing to zero out the budget for the Geothermal Program. We have a political agenda that is working against us. The question is, "Is there a political angle that we need to work?" It's not about spending money since we can't outspend the competition.
 - Karl Gawell responded that the geothermal community is being picked on because of partisan politics. Part of this is about getting Senator Harry Reid who is a big proponent of geothermal energy. We, as an industry, need to paint a positive picture. Washington responds to big dollars and big corporations. We need to better organize and better promote ourselves.
 - Another person commented that we need to make it work on the ground and can't focus all of our efforts on trying to influence Washington DC or trying to get on their radar.
 - Another commented that what geothermal needs is a PAC to influence the politicians.
- On a new topic, an audience member commented that we need to address the problems with geothermal in California, and highlighted that we need to focus on the issues with the RPS, permitting, and BLM leasing.
- The problem in California is that there are too many people with too many agendas trying to stop the geothermal development process (i.e., public interest groups). There are also too many regulatory hoops to jump through resulting in delays or abandonment of projects.
 - In response to this statement, another person responded that the RPS provides an incentive for geothermal development, and that work is being done on transmission planning. Most of all, we need customers to overcome the roadblocks in front of us.

- One participant asked the question, "How did the wind industry get a national programmatic EIS done for wind projects across the country, when geothermal can't get one done for a single project?"
 - One person responded that a programmatic EIS does not cover individual projects, and it is not a justification for proceeding with an individual project.
 - Another person responded that we need to get a power purchase agreement in place that is beneficial to the utilities and their shareholders. Until we do, geothermal will be seen as competition to the utilities since it is a base load resource. Wind is not a problem for utilities since it doesn't keep the lights on and so they still rely on their existing conventional base load resources.
- If the state governors adopt the WGA CDEAC Report and support its goals, then they will have to develop task forces to implement the strategies; then, the changes we need in the RPS and the permitting processes can be brought about through changes in legislation.
- We need to focus on how to get to market (i.e., transmission), identifying resource locations and working to get financing for those resources.
- Another audience member commented that while he understands the transmission issues, he doesn't understand why geothermal is disadvantaged in the RPS. He also asked, "What is the need for geothermal technology support in DC, and what has changed that we need money?"
- The final comment before adjournment of the conference was from an audience member who said that we need to get better outreach efforts from the CEC and the Collaborative noting that the CGEC wants to work with GPW, GRC, GEA, CERT and others -- we will be stronger through collaboration and working together.

The meeting was adjourned at 5:30 PM, and a reception was held from 5:30-7:30 PM. The reception was sponsored by the Geothermal Resources Council, Geysers Geothermal Association, and the Geothermal Energy Association.

Appendix A: Meeting Agenda



UC Davis Alumni and Visitor's Center, Davis, CA

2006 California Geothermal Summit

May 23, 2006

Geothermal Benchmark – Status of the California Industry

The 2006 Geothermal Summit will focus on the current status of the geothermal industry in California. Presenters will provide reports on the successes achieved and roadblocks faced by the industry over the past year. Two in-depth panels will be held. One panel will look at governmental program incentives offered for geothermal development in relationship to other renewables. The other panel will focus on direct use operations in the state and the importance of supporting this niche market. The Summit attendees will end the day with a discussion on future goals and actions necessary to increase geothermal energy production and reduce energy costs in the state of California.



CGEC Workshop

California's RPS Program – Geothermal Viewpoint

May 24, 2006

California's governmental agencies, utilities and the industry leaders agree that providing more geothermal power at reasonable prices would benefit California ratepayers. This workshop will examine how the RPS Program is functioning and what can participants suggest to improve it. Each party brings its own viewpoint to the table, and through interactive discussions, attendees can develop shared ideas for streamlining California's RPS program for geothermal power development.

Sponsored by the California Geothermal Energy Collaborative

Summit Conference Agenda: May 23

8:30 a.m. - Check-in

9:00 a.m. - Welcome and Keynote Speaker

Welcome: Elaine Sison-Lebrilla, California Energy Commission

Keynote: Dr. Martha Krebs, Director of the Energy Research & Development Division, California Energy Commission

9:30 a.m. - Status Report on California's Geothermal Collaborative

Karl Gawell, Executive Director, Geothermal Energy Association (GEA)

10-10:15 a.m. - Break

10:15 a.m. - Program & State Incentives for Renewables Panel

How does geothermal fit into current state renewable programs and incentives and what steps need to be taken to ensure geothermal energy is included in proposed renewable programs? The presenters will review the status of California's existing renewable programs and summarize upcoming renewable programs under consideration.

Jason Orta, CEC Renewable Energy Program; John White, Center for Energy Efficiency and Renewable Technologies.



11:30 -1:00 p.m. - Lunch Provided at the Alumni Center

1:00 p.m. - Geothermal Resources Report

Progress reports will be given on the USGS national geothermal survey and its impact on California, the updated BLM federal regulations, and the new CGEC California Geothermal Permitting Guide including the latest regulations.

Colin Williams and Marshall Reed, USGS; Sean Hagerty, BLM; Paula Blaydes, Blaydes & Associates

2:00 p.m. Direct Use Panel

The status of geothermal direct use operations will include information about the economic, environmental and social benefits of six direct use projects, an overview of international direct use applications that could be adapted for California operations, and an update on existing California direct use facilities. A representative will present a case study on the San Bernardino heating system.

Liz Battocletti, Bob Lawrence & Associates, Inc.; John Lund, Oregon Institute of Technology Geo-Heat Center; Alyssa Kagel, Geothermal Energy Association

3:00 p.m. Transmission Report

A CGEC report will provide an update on California transmission activities and their impact on future geothermal projects.

Dave Olsen, Consultant

3:30 - 3:45 p.m. - Break

3:45 p.m. Geothermal Tribal Projects Update

This session outlines the latest on geothermal development on tribal lands, an upcoming Northern California tribal workshop and other events planned to support geothermal activities in conjunction with the California tribes.

Roger Hill, Sandia National Laboratory and Lawrence Harlan, Ft. Bidwell Reservation

4:15 p.m. Summit Wrap-up and Discussion of the Collaborative's Future Priorities

Karl Gawell, Geothermal Energy Association & Elaine Sison Lebrilla, California Energy Commission

5:30 Adjourn

2006 Summit Reception and Asian Buffet

5:30 - 7:30 p.m. at the UCD Alumni Center

Hosted by:

Geothermal Resources Council
Geysers Geothermal Association
Geothermal Energy Association

Appendix B: Attendee List

<u>Last Name</u>	<u>First Name</u>	<u>Affiliation</u>	<u>Address</u>	<u>City</u>	<u>ST</u>	<u>ZIP</u>	<u>Email</u>	<u>Phone</u>	<u>Fax</u>
Batham	Mike	SMUD	6201 S Street	Sacramento	CA	95817	mbatham@smud.org	916-732-6261	916-732-6423
Battocletti	Liz	Bob Lawrence & Associates, Inc.	345 S. Patrick Street	Alexandria	VA	22314	lbatto@att.net	703-836-3654	703-836-6086
Bennett	Janna	J Bennett Enterprises	524 Third Street	Broderick	CA	95605	JBennett5214@charter.net	916-760-7239	
Beyer	John Henry	California Energy Commission PIER	1516 Ninth Street, MS-43	Sacramento	CA	95814	jbeyer@energy.state.ca.us	916-654-4609	916-653-6010
Bigger	Sarah	Boise State University	1910 University Drive	Boise	ID	83725	SarahBigger@boisestate.edu	208-426-1009	208-426-4061
Blair	Robert	Southern California Edison, Renewables	22444 Walnut Grove Ave.	Rosemead	CA	91770	robert.blair@sce.com	626-302-9563	
Blaydes	Paula	Blaydes & Associates	1275 Fourth St., # 214	Santa Rosa	CA	95404	blaydes@brce.com	707-537-8727	707-539-7171
Bourg	Joe	Millennium Energy LLC	26596 Columbine Glen Ave	Golden	CO	80401	millng@earthlink.net	303-526-2972	303-526-0331
Brehm	Greg	California Energy Commission	388 Gardner Ct	Folsom	CA	95630	epochalfrog@comcast.net	916 432 0693	
Brophy	Paul	EGS Inc.	725 Farmers Lane, Suite 8	Santa Rosa	CA	95405	pbrophy@envgeo.com	707-544-0955	707-544-4602
Bruton	Carol	Lawrence Livermore National Laboratory	P.O. Box 808, L-221	Livermore	CA	94550	bruton1@llnl.gov	925-423-1936	925-422-7438
Carey	Dwight	Environmental Management Associates, Inc.	588 Explorer Street	Brea	CA	92821	dlcarey@emacorp.com	714-529-3695	714-529-8543
Carter	Anna	Geothermal Support Services	87 Verde Circle	Rohnert Park	CA	94928	annacatr@aol.com	707-585-2111	707-585-2111
Churhill	Susannah	California Public Utilities Commission	505 Van Ness Avenue	San Francisco	CA	94102	sc1@cpuc.ca.gov	415-703-2557	415-703-2200
Clutter	Ted	Geothermal Resources Council	2001 Second St. Ste. 5	Davis	CA	95618	tclutter@geothermal.org	530-758-2370	530-758-2839
Combs	Jim	Geo Hills Associates, LLC	2445 East Lakeridge Shores	Reno	NV	89509	jimjeany@ix.netcom.com	775-827-1960	775-827-1960
Cortopassi	Ted	HSEF	P. O. Box 660	Mammoth Lakes	CA	93546	tcortopassi@mammothhospital.com	760-924-4149	760-924-4052
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Appendix B: Attendee List (cont.)

<u>Last Name</u>	<u>First Name</u>	<u>Affiliation</u>	<u>Address</u>	<u>City</u>	<u>ST</u>	<u>ZIP</u>	<u>Email</u>	<u>Phone</u>	<u>Fax</u>
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Appendix C: Evaluation Results Summary
2006 California Geothermal Summit
May23, 2006

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

- The Workshop increased your knowledge of geothermal energy's current status__7.8__
- The setting was a good conference environment __8.8__
- The date (month and day) was convenient__8.5__
- Handouts were helpful__8.3__

Panel & Report Sessions - rate from 1 (poor) to 10 (excellent):

Session One – Status Report on CA. Geothermal Energy Collaborative

- Presentation helpful__8.4__
- Presenters knowledgeable __9.2__

Session Two – Program & State Incentives for Renewables Panel

- Presentation helpful__7.5__
- Presenters knowledgeable __8.6__

Session Three – Geothermal Resources Report

- Presentation helpful__6.8__
- Presenters knowledgeable __8.1__

Session Four – Direct Use Panel

- Presentation helpful__7.0__
- Presenters knowledgeable __8.2__

Session Five – Transmission Report

- Presentation helpful__7.6__
- Presenters knowledgeable __8.4__

Session Six – Tribal Projects Update Report

- Presentation helpful__7.4__
- Presenters knowledgeable __8.2__

Session Seven – Summit Wrap-up and Discussion

- Presentation helpful__7.8__
- Presenters knowledgeable __8.1__

What did you find the most helpful at the Summit and what improvements would you suggest or what additional material would you have liked to see covered?

1. Transmission summary was extremely useful.
2. Legislative and regulatory updates and leasing issue discussion helpful – Would like to see financing, tax credits and RECs covered more.

3. Need case studies published comparing 1000 MW Geothermal (95% production) to 1000 MW Solar (20% production) to 1000 MW Wind (30% production).
4. You handed out a Geo Map with many small geothermal locations that do not require major transmission. There needs to be a discussion on how do you get developers to build there while major transmission is built. IOU's need to come and give info on base and peaking needs. This will tell developers what they need and sends a signal to State on resource mix. A round table with utilities and developers to discuss problems and issues.
5. Have after lunch break earlier. Find ways to recycle the cans and not waste that food. The direct-use and transmission and tribal presentations were most useful and interesting. The permit guide will be useful. A session on exploration (techniques, funding from private as well as public sources) would be good.
6. Transmission part and John White's comments on how to make RPS work were moments of the day. Also enjoyed (again) John Lund's Direct Use Presentation – other direct use presentations were not a compelling.
7. Q&A was very useful. Key issues were not always in presentation.
8. Wrap-up
9. Networking
10. (Would like) More discussion with “facilitated” panels – less being “talked at.”
11. New unconventional geothermal exploration ideas, i.e. going outside KGRA's and using ultra-deep drilling to access upper mantle heat in areas of relatively thin crust, combined with induced fracturing and injection.
12. Text was hard to read on slides. Could have used more screen.
13. Better microphones
14. Suggest pre-checking the podium microphone system. Keynote speaker was difficult to hear apparently because the microphone was off or on low power setting.
15. Encourage speakers to use the microphone.
16. Projector screen too small – many presentations too small to read – otherwise very good. The best speakers were Gawell, White, Lund and Olsen. Direct use and transmission were best. What's happening with R&D? Are geothermal technologies improving? What are the barriers and why not more MW in place?
17. Transmission/interconnection issues
18. It was excellent that you included direct use applications. Their contribution to California's economic and environmental status has been undervalued to date. Also, Karl Gawell's presentation and exhortation to think outside the box was exceptional.
19. Most helpful was the level of expertise present. There were people highly knowledgeable in all aspects. The presence of the BLM was valuable. The main improvement I could suggest would be longer periods for discussion at each individual topic. It was a very good meeting and very well orchestrated.
20. The use of PowerPoint presentations was most helpful so that I could follow along with the topic matter of the presenters. The colorful presentation on direct use around the world was very interesting, but a little long and off the mark of California for this workshop (shorten slide show please). Would have added more time on the discussion of operation direct use operations here in California...the success stories...include the use of the thermal waters for aquaculture (#of farms, tones of fish produced, product value, energy savings, etc.).

Additional input from the permitting agencies would be useful from the standpoint of seeking common ground among the various agencies (County, State, Federal) to facilitate the exploration and development of the geothermal resources in California. While each agency may be clear on

its own roles, other agencies may not, and may benefit to know if there is some commonality. This could offer a forum to help reduce duplication and cost to the operator, while still achieving the goal of compliance.

Also, I would like to see a discussion on funding opportunities to support the operation of the Calpine Geothermal Visitor Center in Middletown. While I certainly understand Calpine's need to conserve funds and minimize expenditures, I believe the geothermal industry, as a whole, as well as the rest involved in the geothermal resource leasing and permitting, are missing out on an excellent public outreach medium. Seems to me that the lack of public outreach, and therefore, the lack of public (and State/Federal legislature) understanding of geothermal benefits to society is a key topic at every meeting, workshop, forum, etc. related to geothermal. If this is the case, it also seems to me that we, as agencies, and the geothermal industry, GRC, GGA, GEA, IGA, etc. should do everything within our financial power to fund the center to keep it open to the public. Without outreach facilities like the Calpine Geothermal Visitor Center in Middletown, I would say that all we are doing is just generating hot air when we talk about outreach...

21. Session one – Excellent points on need to set goals

Session two – Very good – could have helped to have some info on CO² sequestration

Session three – Panel could have been shortened to about 5 minutes each because most of the info was based on forward looks

Session four – Excellent presentation by all even though the panel went to long

Session five - Good info but no time for Q's

Session six – Both speakers did very well for being on near the end

Session seven – Good energy and great way to wrap up the meeting - Some of the participants drifted off course, but that happens in an open mike situation.

Martha Krebs gave a very good welcome and keynote, including PIER program discussion. John White did a very good job without slides!! The setting and food was great. Good opportunity to network. Room acoustics were good, but perhaps it would be good to encourage the speakers to use the mike or have a lavalier mike. Suggest a registration list in the packet. It was a great idea to include the Susanville workshop registration in the packet!! Great job, Judy and Karl!