

Mr. Richard Spitler  
Calistoga City Hall  
City Manager

Richard,

Enclosed are copies of our Grant Proposal for the Council, the State required resolution (completed using the template from the Grant application packet), the grant application packet, and the pre-application forms.

It is my understanding that we need two items from the city: 1) a resolution completed before Feb. 22 that states the City's willingness to partner with CCGC on conducting such as study. Please see the enclosed completed State template. And 2) City permission to use at some of its wells in the study. The main well we are interested in is the CALIS 1 by the Police Station. It is the large 17" yellow riser pipe in front of the Community Center.

I am also making a packet for Dan and will deliver it to him. Dan has been a part of our past discussions and presentations and stated he was willing to work with us on the study. Realizing that Dan certainly doesn't have the time or energy to conduct any of the work but I would keep him informed and need his guidance in how we test the City's well(s).

Larry Kromann, Ed.D.  
President  
Calistoga Community Geothermal Corp.  
EIN # C 3260673

## Geothermal Study Proposal

### Statement of Need

Calistoga's association with geothermal water is older than our Nation. Long before the Western migration of adventurous families from the Mid-West Plains and newly developed East Coast, indigenous Native Americans used the hot waters of the Upper Napa Valley for a variety of uses. One adventurous entrepreneur, Mr. Sam Brannan, began a new usage of the steaming waters by the creation of a healthful resort and spa where visitors, and seekers of rest and relaxation came seeking the benefits of the mineral hot waters.

The tourists are not the only ones who have sought the benefits of Calistoga's special water. In 1986, the California Energy Commission conducted a study of over 140 geothermal wells in the Calistoga area. The study made the following conclusions: (1) Calistoga's has a low to moderate temperature geothermal heat convection resource; (2) the presence of sodium-chloride type water in the geothermal system suggests a hot water reservoir of volcanic origin, recharged by deep-circulating mixed water. (3) The superheated water ascends along an inferred fault/fracture system beneath the Napa Valley basin, branching into a broad, irregular plume as it approaches the surface, and partially mixing with near-surface aquifers and is between 800 ft. and 100 ft. thick, and within 120 ft. of the surface, and (4) Maximum temperatures of 125-136 degrees C. have been recorded at two sites within the geothermal plume. (Murray, 1986)

Following the investigation by the State, the City of Calistoga applied for a State study grant to discern the feasibility of creating a "direct heat district" so that businesses in the down town area could use the geothermal water for heating and A/C. The Oregon Institute of Technology (OIT) was selected as the expert organization to conduct the study and a State grant of \$500,000 was secured. However, as the study was being conducted the local businesses lost interest in the project and it was abandoned with the unspent funds being returned to the State. The state of the nation's energy economics with fossil fuels being quite cheap, the lack of reliable geothermal technology, and lack of trust in the accuracy of geothermal geology appeared to be the main causes of the unfinished study.

It is now 2011 and much has changed regarding Calistoga and the geothermal energy industry. The State of California, as well as the Nation, is facing the fact that additional sources of energy are needed. The economics of renewable energy are now a high priority. Calistoga still is allowing over 50% of its hot water asset to go unused down valley. Geothermal technology has been greatly enhanced to the point that it is possible for even low to moderate hot water (140°-300°F.) to be used in creating electrical energy at a cost of 50% less than fossil fuels. In fact, newer technology even makes it possible to utilize the heat from the geothermal water without bringing the water to the surface thus avoiding many environmental and economic issues.

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In 2009, the Calistoga Community Geothermal Corporation (CCGC) was formed as a community non-profit (501 C 3 status in process) organization to promote and develop the unused geothermal water for the production of electrical energy that could be sold to existing Northern California muni-utilities. The non-profit funds could then be used to assist the community with some of its infrastructure needs such as water and waste water. There are also some secondary benefits that the community could find useful such as enhancing Calistoga's tourist image as a leader in the uses of its main attraction-Geothermal Water. Additional secondary uses include the establishment of small "direct heat districts" for heating and A/C newly built resorts and multiple family housing developments as well as aqua-farms that could grow fish and/or specialty vegetables/herbs for the area's high end restaurants. These are just a few of the secondary side benefits that can be created.

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On January 18, 2011, the California Dept. of Energy announced that they were soliciting grant applications from governmental entities, for-profit power producers, universities, hospitals, and non-profit organizations connected with geothermal energy projects who needed funding for geothermal research, remediation, assessment, etc. Members of the Corporation had previously conducted data research on Calistoga's geothermal potential with members of the State's geological team as well as attended many of the Energy Department's workshops and participated in fact finding discussions with Department of Energy personnel.

At its inception, members of the CCGC conducted "round table" discussions and presentations on Calistoga's geothermal potential with the community through the Calistoga Chamber of Commerce. Geothermal development experts were invited to meet with local geothermal users so that the community could obtain a broader understanding of new geothermal technology and best practices of the industry. The Oregon Institute of Technology (OIT) was contacted which was followed with a visit by CCGC President, Larry Kromann, to the OIT campus in Klamath Falls, OR. Collaborative discussions began in 2008 with OIT and Geothermal Development Associates (GDA) of Reno, NV for the purpose of finding solutions to Calistoga's core geothermal issues. At the core of all of these discussions, data research, and collaborations has been the desire to find an appropriate method to define the exact nature and extent of Calistoga's geothermal reservoir as well as discover a satisfactory delivery system for the production of electrical power that could preserve and protect the community's greatest asset.

Because of the CCGC's history and the availability of this new grant, it is therefore proposed that CCGC partner with the City of Calistoga for the application of this grant to restart the assessment of Calistoga's geothermal reservoir. The assessment study

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would use existing wells that show the greatest promise and were also part of the earlier studies, for the purpose of establishing realistic flow rates, stability of temperature and quantity of reservoir water. Second, OIT would develop a prototype "down hole heat exchanger" (DHE) with sufficient capacity to operate a binary closed loop electrical power generator leading to a goal of a 3-5 MW power plant. Third, the Geothermal Development Associates (GDA) would conduct a newer geophysical technique, called a magnetotellurics survey (MIT), on a portion of Calistoga's geothermal reservoir to better assess the exact geological nature and depth of the reservoir. This new technology can provide data regarding the precise presence of sufficient water, fractured rock zones, and at depths up to 6000 ft. In addition to the MIT study, GDA would also collate the results of the water chemistry studies conducted by the State's previous studies and add them to the results of the MIT to produce a more defined picture of Calistoga's geothermal reservoir. Obtaining this type of data should greatly help our community better understand how to best utilize and preserve the reserve. Calistoga needs to make full use of this gift, and yet, be a good steward of the gift.

Preliminary planning indicates that a grant of \$425,000 or less will be sought with the California Department of Energy. The Energy Department would provide 80% of the funds, and local foundations would be contacted to provide the remaining 20%. The solicitation of the grant is a two phase process. Phase 1 is a preliminary application that provides the State time to review the application regarding the merits of the project and potential compliance with the grants purposes. Phase 1 also gives the City of Calistoga time to continue any discussions that may be necessary regarding the need and desirability of such a study by the community. If, from the community discussion, it is deemed to not be appropriate, the application process can cease without any negative impact. The deadline for phase 2, the complete application, is April 6. And of course, the Department of Energy could reject the pre-application request which precludes the need of a final application. The City of Calistoga is asked to be the conduit for obtaining the grant, as the grant application process requires all non-profits applicants to partner with an eligible local jurisdiction, or eligible private for-profit entity. All negotiations, planning, and work will be conducted by the CCGC, and all funds will be raised by the CCGC. The timeline for this project is a maximum of 36 months. All wells, with one exception, will be on private land with CCGC obtaining written permission from the land owner for inclusion in the study. The one well that is not private is the City's CALIS 1 well located between the Police Station and the Sharpsteen Museum. This unique well is geologically well suited for this study plus it has a 17" diameter casing with good depth at 569 ft. It is also very accessible. The CCGC will obtain all permits, as well as provide the assurance of regulatory compliance. CCGC will also provide the City with appropriate updates, and notices of progress/activity during the study.

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In speaking with a representative of one of Napa Valley's charitable foundations, the comment was made that "this proposed project is very timely and quite exciting for our valley." With the Nation seeking more renewable energy and the State of California setting a mandate that a minimum of 20% of all its electrical production coming from renewable sources, it does appear that now is a good time to restart the process of obtaining accurate vital information regarding our unique gift.

### References Regarding Calistoga Geothermal Study History

(Available upon request)

David L Modisette, Chief; Development Division; Kent S. Murray, Ph.D. Author, Research and Development Office. Calistoga Geothermal Resource Assessment, October 1986.

Taylor, G.C., Bacon, C.F., Chapman, R.D., Chase, G.W., and Majmunder, H.H. 1981 (in press), Drilling addendum to resource assessment of low and moderate temperature geothermal waters in Calistoga, Napa County, California-Report of the second year, 1979-80 of the U.S. Department of Energy-California State-Coupled Program for reservoir assessment and confirmation: California Division of Mines and Geology, Report for U.S. Department of Energy, Contract No. DE-FG03-79ET37035, approximately 70 p., 1 plate

Youngs, L.G., Bacon, C.F., Chapman, R.D., Chase G.W. Higgins, C.T., Majmunder, H.H., and Taylor, G.C., 1980 Resource assessment of low and moderate temperature geothermal waters in Calistoga, Napa County, California-Report of the second year, reservoir assessment and confirmation: California Division of Mines and Geology. Report for U.S. Department of Energy, Contract No. DE-FGO3-79ET37035, 168 P., 13p plates