

IN THE BEGINNING—

After multiple meetings and a January, 2012 organizing meeting, founding members of what would become CaliforniaGeo set their future course to expand GeoExchange® technology in California. Phillip Henry was elected President, Daniel Bernstein was elected Secretary, and Beth Morelli was elected Treasurer. Initial Board members were these officers plus Mark Morelli, Dennis Murphy and Board Chair Lisa Meline.

This team recognized a need to bring efficient, mature (but largely unrecognized) GeoExchange® technology to a state with policies favoring energy efficiency, but not supporting geo heat pumps to help achieve it. To promote strategy, the team engaged a sponsoring legislator and a lobbyist to craft and support its signature achievement, passage of Assembly Bill 2339, signed on 9-27-12. A [Fact Sheet](#) summary statement reads:

"AB 2339 requires the California Energy Commission (CEC) to identify and address existing barriers to the deployment of geothermal heat pumps and geothermal ground loop technologies."

CaliforniaGeo assumed that barriers identified by Patrick Hughes in his [2008 review for Oak Ridge National Laboratory](#) could be removed by implementation of AB 2339. A portion of Hughes' Abstract reveals the difficulty:

"...Buildings present one of the best opportunities to economically reduce energy consumption and limit greenhouse gas emissions. Geothermal heat pumps (GHPs), sometimes called ground-source heat pumps, have been proven capable of producing large reductions in energy use and peak demand in buildings. However, GHPs have received little attention at the policy level as an important component of a national strategy. Have policymakers mistakenly overlooked GHPs, or are GHPs simply unable to make a major contribution to the national goals for various reasons?"

It might be assumed that [Project Negatherm](#), a study by CaliforniaGeo founder Dennis Murphy, conducted for the CEC in 2011, might help knock down barriers as well. From its Abstract:

"The large-scale adoption of sustainable ground source heat pumps within California would greatly help to reduce energy demand, greenhouse gases and ease pressure on both the natural gas infrastructure and the electrical grid..."

The Project Negatherm Report defines and breaks down the stumbling blocks to drilling ground-source heat pump boreholes by investigating specific regulatory, technological, and financial hurdles across California..."

SINCE THEN—

Progress since the passage of AB 2339 has been slow. While drillers and installers were making only slow progress on installations, CaliforniaGeo representatives became involved in the “working group” that met in CEC-sponsored workshops prior to the publication of the [2013 IEPR](#) (Integrated Energy Policy Report). Page 56 (of 342) was sub-headed “*Geothermal Heat Pump and Ground Loop Technologies.*” A [2015 IPER](#) did not mention geo heat pumps anywhere in its 253 pages, although its introduction opened with “*Addressing Climate Change Is the Foundation of California’s Energy Policy.*”

A CEC 2014 *Geothermal Heat Pump and Ground Loop Technologies* [staff paper](#) provides a brief overview of these technologies and their barriers to wider use in California. It details the barriers identified by the geothermal industry that prevent wider utilization, as well as problems with future Title-24 compliance rules. It also features industry suggestions and CEC responses to those.

After consultation with industry and the public, the California Department of Water Resources (DWR) published 1999 draft “well” standards for what *they* termed GHEWs (geothermal heat exchange “wells”). DWR’s draft standards have not been formally adopted, allowing 58 individual counties (over 16 years) to interpret and enforce them according to the Water Code. We prefer reference to a closed borehole, as in GHEX (geothermal heat exchanger) by the specific standard adopted by USA, Canada, and the American Ground Water Association (as CSA C448). DWR’s label as water wells has caused discrepancies in cost and installation procedures, statewide.

When passage of AB 2339 focused attention on the tardy adoption of the draft standards, DWR renewed discussions with stakeholders (including industry) but ignored CaliforniaGeo’s objection to new requirements DWR had reached unilaterally. DWR’s 2014 intention was to demand 2” conducting pipe edge-to-borehole grout spacing, despite industry’s vehement demand for proof of this necessity. Long-term drought and state water battles seem to have prevented DWR’s adoption of these regulations for the moment.

Contrary to the spirit of AB 2339, the barriers to GHPs in California have increased. CaliforniaGeo has enough financial resources to operate, but not enough to contract for development of draft software for GHP acceptance via an Alternative Compliance Method for Title-24, or to take on the DWR’s preferred rules prior to their adoption that threaten the use of vertical borehole heat exchangers (unlike the rest of the world).

A passive response to these regulatory challenges has been recommended by one driller and one installer on the CaliforniaGeo Board. Each is navigating their work through building officials on a county-by-county basis. Thus far, this is proving

adequate, while taking on state regulatory Goliaths would be a choice that threatens a halt to improved building official understanding of our technology and could hasten the onset of more onerous regulations by DWR. That could threaten or eliminate the option of a vertical GGBHEs, statewide, compromising the trust now growing between building officials and GHP installers.

Every new installation of a GHP is another pathway for positive promotion of our technology with homeowners, many of whom would like to be “greener.” There are an increasing number of installations in all types of buildings and many are getting public promotion (The Honda Smart House in Davis, for example). This widens the geo heat pump footprint in California. As CaliforniaGeo produced a day-long Zero Net Energy seminar and two webinars on the state’s (then four year drought). In 2015, CaliforniaGeo produced a day-long Zero Net Energy seminar and two webinars in connection with the state’s drought. We had great, relevant content, yet there was very little public or professional interest in the presentations, which was the case for similar organizations presenting in California, despite significant promotion.

As a later section of this history will note, there are some hopeful outcomes that could produce a modest increase in the rate of GHP installations.

RECENTLY—

California events not tied to GHPs have helped drive a greener attitude among the public. Examples are the 2010 San Bruno methane explosion of a gas main line in a residential neighborhood (with loss of life), the Aliso Canyon four-month methane leak (north Los Angeles) in 2014-15 that displaced thousands, and Pacific Gas & Electric’s announcement not to seek re-licensing for its Diablo Canyon nuclear reactors 1 and 2 in 2024-25.

The retrofit failure and 2014 shut-down of SONGS (the San Onofre Nuclear Generating Station) created an immediate 5,000-MW capacity deficit, but a large share of its replacement is coming from renewable electricity and grid battery storage. Media and climate deniers have told the public for years that renewable generation’s intermittency cannot serve this role. Domestic solar PV is still growing rapidly, and grid storage of renewable DC power tied to industrial strength inverters is making progress to level electric peaks and valleys, fully incorporating renewable electricity into the grid.

The public is now more engaged on energy issues. Methane is increasingly seen as a greenhouse gas contributor and a “bridge to nowhere,” to quote Cornell University’s Dr. Robert Howarth. CARB (The California Air Resources Board) is still bent on promoting GHG (greenhouse gas) reduction. Regulations of the air pollution districts they supervise are increasingly designed to remove methane and its combustion byproducts from the atmosphere. Statutory deadlines for GHG reduction may therefore play a role in accelerating GHP use.

Still, there is a disconnect between the state's policies and its preferred solutions. The RPS (Renewable Portfolio Standard) for increasingly renewable electricity causes the Energy Commission staff to note that geothermal heat pump technologies do not generate electricity and therefore are not eligible to generate credits for electric utilities under RPS rules. But GHPs directly support CARB's GHGs emissions reductions and the reduction of electric utilities' summer grid peaks (an improvement over conventional air conditioning). GHPs are good for the atmosphere AND the grid, two things that are emphasized in state policy but haven't resulted in GHP deployment at the pace of other states.

CURRENTLY— As of this writing (end of 2016)

CaliforniaGeo recognizes that in addition to promoting educational seminars and webinars, the organization's public footprint should promote a website for public use where GHP technology and green benefits can be showcased.

A major retrofit of its website was completed in February 2016, and an increasing amount of content is being posted, weekly. The website supports financial transactions for membership and renewals, as well as for the purchase of attendance at future learning events.

When visitation traffic improves, we will recruit sponsors for sections of the website. Gaining new memberships has been slow, but a new category for Affiliates (non-industry people) has been created at very modest pricing in order to boost awareness and grow participation with CaliforniaGeo's agenda.

We have worked with IGSHPA (the International Ground Source Heat Pump Association) to finalize a team effort to promote training in California, and we maintain regular contact with members of IGSHPA's leadership toward unifying our message and working to improve GHP penetration into the California market.

In the past year we've met and engaged with the Bay Area Air Quality Management District to ensure that GHP benefits to reduce GHGs are embedded in their climate plans. We've interacted with the San Francisco Office of Environment in support of their plans for a large-scale deployment of zero net energy public housing, and we have presented for ENGeo's California office in support of their expansion of engineering services for GeoExchange® deployment in this state.

We stood with the Geo Exchange Organization in their national effort to extend the GHP tax credits beyond 12-31-16 by sending out communications destined to reach key legislators (both state and federal) from California. We have also opened communication with several of our sister state organizations such as New York and Illinois to learn what works in their geo promotion campaigns.

We have been working intermittently with Building Standards Office representatives from the CEC to clarify and amplify awareness that a narrow path for GHP compliance under Title-24 2016 regulations exists, how to qualify a project, and we are hopeful that when these instructions are ready, we will partner with CEC in producing a webinar for CABEC (the California Building Energy Consultants) to spotlight this process.

As identified in a CEC stakeholder meeting in 2015, consistent performance of GHP ground loops and their mechanical equipment for consumer protection purposes and verification of GHP efficiency for electrical utilities is a primary concern for the agency. In service to that end, we are participating in the Technical Advisory Committee for an EPIC (Electricity Program Investment Charge) grant to the Western Cooling Efficiency Center in Davis, CA, to test and review the thermal performance of shallow bore, helical coil geo heat exchangers for residential housing. Hopefully, a similar grant could provide an opportunity to do the same for more conventional GGBHEs. EM&V (Evaluation, Measurement, and Verification) for GHP installations is also a strong concern of the CEC's Building Standards Office, and we will be reviewing the new U.S./Canadian installation standard and IGSHPA's new Certified Inspector Training curriculum in pursuit of an inspection regimen involving HERS (Home Energy Rating System) that could minimize expenses on smaller jobs.

SUMMARY—

California needs more GeoExchange® to meet its existing policy goals that are embedded in statute and widely known out-of-state. CaliforniaGeo's purpose is to act as a catalyst in making this happen.

As it does happen, a growing army of mechanical contractors to install GHP systems will be necessary. The most likely source seems to be existing mechanical contractors who desire to expand their portfolio of services. To gain the blessing of regulators and the building inspector community, a quality assurance system will be necessary that will require additional training and certification, and/or job shadowing for mechanicals to decide whether to make the jump to expand into GeoExchange®. We will attempt to collaborate with the appropriate agencies and associations to assist in this effort.

Meantime, we need the help of everyone we can attract to join our effort to green this state, clearing the air, and moving toward more renewable heating and cooling. The memberships we gain can make a difference in this organization's ability to expand public awareness and education, thus providing an increased demand for this important HVAC technology. Please [join](#) CaliforniaGeo!

Thank you.

—Bill Martin, President, California Geothermal Heat Pump Association