A ***2021*** Annual Report for ***CaliforniaGeo***

CALIFORNIA GEO
California Geothermal Heat Pump Association

What are we about?

This report attempts to capture the activity of our Association over the past year against a snapshot of where the nation stands on the energy front. We present this year's highlights for review by our **supporting members**, our affiliates, and our industry, comprised of both IGSHPA® (the **International Ground Source Heat Pump Association**) and GEO® (the **Geothermal Exchange Organization**). Both support our efforts as we support theirs.

We are a non-profit 501 c6 all-volunteer trade association with a **history**; working for progress to bring more greenhouse gas-free geo heat pump heating, cooling, and hot water production to California. Our Board of Directors **meets bi-monthly** via our online Zoom platform and all members are welcome to attend.

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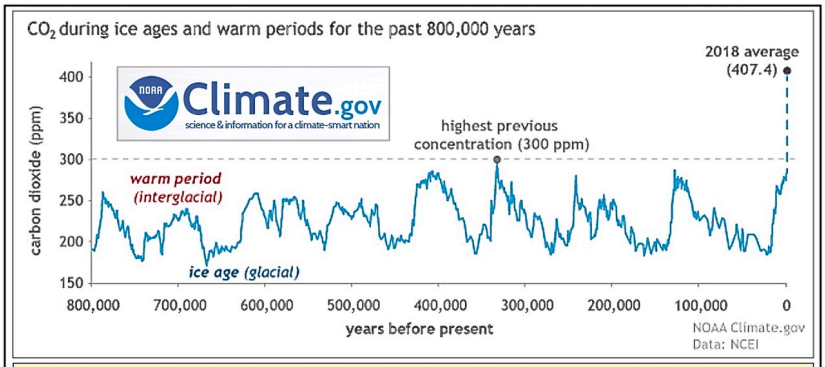
The Overview—

This year, citizens all over the planet continued to suffer from increased storm severity, damage, and recovery costs. The United States has not been spared and has seen increased hurricane/tornado frequency and strength in the southeast with record drought and wildfires in the west. Earth's continental ice caps continue melting and calving, adding to sea level rise. Antarctica continues to shed ice islands into the sea that are *hundreds* of square miles in size. The Thwaites Ice Shelf is expected to separate into the ocean soon, and it's the size of Florida.



EPICA paleoclimatology data shows CO2 from air bubbles within deep ice cores in places like Greenland and Antarctica, over time. This data is expressed as a variable line of atmospheric CO2 back 800,000 years from the present. Our recent explosion of it since the Industrial Age is unmistakable.

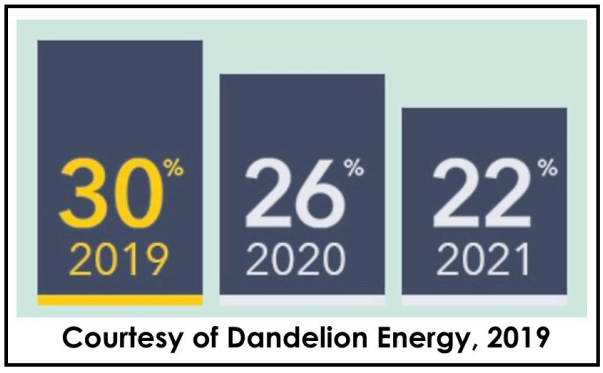
Compared to last year, more citizens in the U.S. have accepted the existence of climate change brought on by global warming, enhanced by the highest atmospheric level of CO_2 in the last 800,000 years. That makes heightened CO2 a product of the Industrial Revolution. Higher living standards have depended on extracted, non-renewable energy that's burned. This issue was part of the campaign in the U.S. 2020 presidential election, and returning to the Paris Accords of 2015 was the first act of the new Biden administration. An embrace of what's known as the Green New Deal is another matter and may take a temporary or permanent back seat to the COVID-19 Pandemic, a deadlocked Congress, and other issues that will surely surface in the coming year.

Locally, In California—

For the fourth consecutive year, Pacific Gas & Electric, an investor-owned utility, has been connected to our state's large and destructive wildfires. The biggest began in the bottom of the Feather River Canyon and headed east toward Nevada. It nearly made it. Its 963,000 acre scar translates to 1,500 square miles. Suppression costs will be over a billion dollars and property loss and damages have yet to be tallied (to say nothing of the environmental repair, only some of which will be attempted).

California has earned its climate change badge for 2021, as has the entire west coast which broke records in Portland, Oregon (116°). Lytton, British Columbia at 122° broke the Las Vegas, NV all-time record. Our reservoirs are empty, our soils are record dry, and so is our vegetation. That's why our fires are burning in ways far outside previous norms. And with many burning at the same time, suppression resources are thinner than ever.

California continues its regulatory plans for renewable electricity and de-carbonization, aimed at transportation and occupied building space—our two highest contributors. Municipal jurisdictions banning the use of gas (methane) in new buildings now totals 40. California is not alone. New York and Massachusetts are taking bold steps toward de-carbonization, and they are far more geo heat pump-centered than we are. In New York, there are state-funded incentives for the installation of geo heat pumps that are helpful. At the moment, 2021 is the last scheduled year for federal geo system tax credits (unless the Build Back Better package is passed by the U.S. Senate).



Courtesy of Dandelion Energy, 2019

What We've Been Doing—

At CaliforniaGeo, we spent most of 2021 implementing a part of our 2020 **Strategic Plan**. It has been my good fortune to work closely with our lifetime and founding member Lisa Meline in that effort. We have now delivered two AIA-approved professional development courses called *"A Geothermal Heat Pump Design Course for Building Professionals."*

We will remain an *AIA Continuing Education Provider* and will work toward development of a future curriculum centered on the Bi-National Standard ANSI/ CSA/IGSHPA-448 for residential and commercial geo systems. We believe this reference is the best way to get building officials, architects, and mechanical engineers comfortable with geo applications.

The Geo Exchange is an entity we created by gathering state and provincial geo leaders via Zoom, bi-monthly. This is helping us to develop regular interaction with our association colleagues in the U.S. and Canada. Though we originally began covering common topics of organizational management, we recently came together for the first time in an advocacy role to oppose California's upcoming regulation changes to its water code that could seriously impact geo heat exchange drilling.

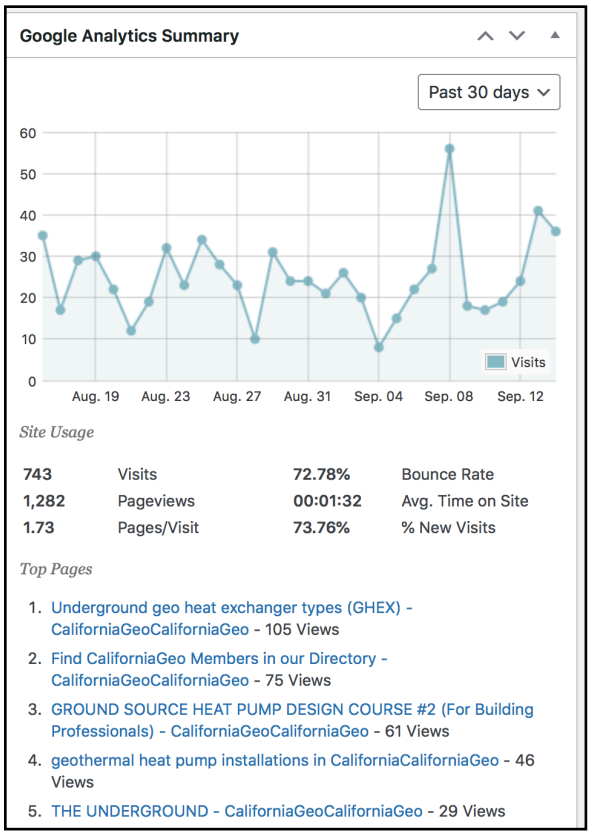
There is concern that if established here, bad regulation could spread elsewhere. As a result of this effort, multiple parties are forming an AdHoc Committee to orchestrate what looks likely to be a months long push-back.

In June of this year CaliforniaGeo started a bi-monthly series of technical sessions we call ***THE UNDERGROUND***. We offer a variety of topics for audiences of varied technical background and promote them through our bulk mailing program *Constant Contact®.* We'll attempt a mix of topics from a general-interest-to-expert level on efficiency, HVAC applications for geo heat pumps, decarbonization policy and regulation, etc. The four sessions this year were: a university geo retrofit, a session on geo failures and how to prevent them, zero net energy performance of a senior citizen geo-supplied complex, and the work of thermal utilities to knock down geo's inevitable first cost penalty.

Statistics—

Our website now features **83** **Blog posts**. It holds **134** **News Posts**, split among four categories (some with commentary). These features by major news organizations parallel our efforts to expand member knowledge and public awareness. We also produced a **Document Library** feature on our website with downloadable content split into seven sub-sections.

The subject of underground heat exchangers continues to rank as our website's top spot visited and our membership directory is never far behind. Board Chair Susan Nichol and I get emails and phone calls through our website's **Contact Us** page, and we continue to respond to a variety of inquiries. We inform, educate, and advise those with geo interest—passing them off to our professional members who specialize in filling such needs. Too many of those requests continue from southern California, where we have too few professionals who can help.



We are pleased that our website visitation continues to grow. It is serving as an educational tool for many who are searching out green technology. Google Analytics has consistently ranked our membership directory as one of the top three landing spots for outsiders visiting our website.

We continue using our personalized bulk mailing system (Constant Contact) having sent **209** separate promotional messages in support of the GeoExchange® industry. That contact list is now close to 500 targets, segmented into seven sub-list categories and we are reaching people throughout the U.S. and Canada.

2021 saw CaliforniaGeo grow to **32** full memberships and **22** affiliates, our highest tally ever. Full members are listed in our website's **Membership Directory**, and Affiliates are featured **HERE**. Access to membership is at this **JOIN LINK**.

Technology—

The arc of history has always been re-directed by a variety of forces. We are seeing an increase in many green enterprises that are driving costs down by scaling production upward. Today, wind turbines, solar panels and grid-scale battery storage continue to drop in price. All-electric vehicles (EVs) are becoming more common, and our infrastructure is branching out to meet them with additional charging stations.

Multiple electric, prop-driven aircraft are in certification trials to take over short-haul, low volume routes and specialty flights. All of this helps us decarbonize.

Not to be outdone, the commercial earthwork equipment manufacturer Case® has developed a fully electric backhoe called the "Zeus" that can work all day, quietly, without emissions. This provides a boost for the principle of EV equipment replacing diesel-powered machinery that has affected health care costs in addition to generating greenhouse gases.

Case 580 "Zeus" EV Backhoe

Another category of commercial transport technology has gone electric. Short haul and delivery vehicles will produce far less fleet emissions as more of this technology is deployed. There are also two Class 8 heavy highway freight trucks by Tesla and Nikola, one powered by battery and the other by fuel cells using Hydrogen without any emissions. In addition, we saw the first all-electric refrigerated trucks in southern California, which is an air shed that needs more electric transportation.

Volvo Trucks' Customer Albertsons Achieves Nation's First Commercial 100% Zero-Emission Refrigerated Grocery Delivery with a Class 8 Truck

By Volvo Trucks North America May 28, 2021

Technology (evolution of GHPs)—
New advances in remote data reporting by geo heat pump equipment is becoming helpful to please customers and regulators (some of whom doubt the efficiency of our equipment when considering variations in UG heat exchangers). The ability of the equipment to generate instant COPs in heating and EERs in cooling provides a continuous data record that proves the point. Such real-time data can also help installers and those officially "commissioning" a system.

Our equipment continues to make modest efficiency gains, and a growing segment of our advancement is centered around the *application* of this technology. Therefore, *design* is becoming more important, and this heightens the need for *training*—a mechanism that can illustrate both the risks and best practices to tap renewable thermal sources underground.

That's our summary for 2021 from CaliforniaGeo.

Bill Martin, President

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