A ***2020*** 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.

We are a non-profit 501 c6 all-volunteer organization 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 high, satellite view—

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 frequency and strength in the southeast with record wildfires in the west. (Just this month, southern California was again visited by wind-driven wildfire amid continuing drought). 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 Maldivian president signing a climate change document at the world's first underwater cabinet meeting. This Indian Ocean nation of atoll-based islands stand an average 7 feet 10 inches above sea level.

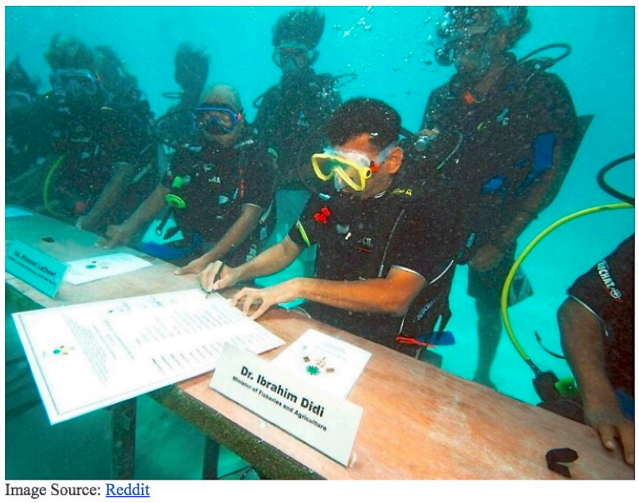
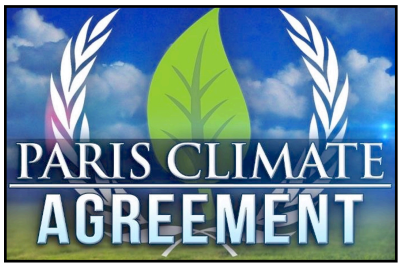


Image Source: Reddit

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 this 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 our recent presidential election, and returning to the Paris Accords of 2015 seems a certainty with a new incoming federal administration. An embrace of what's known as the Green New Deal is

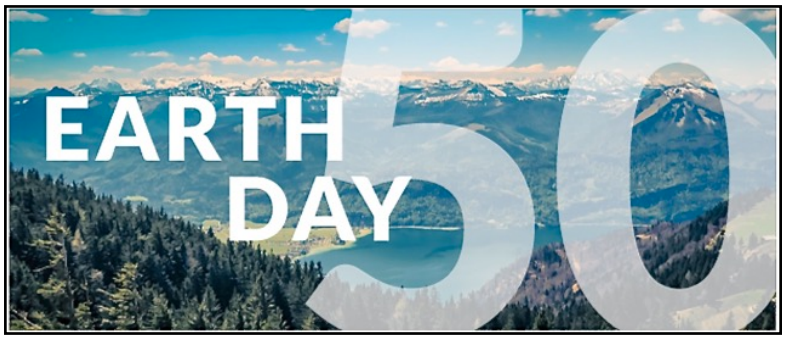


another matter and may take a temporary or permanent back seat to the COVID-19 Pandemic, a crushed economy, and other issues that will surely surface in the coming year.

California has been a frequent target of the federal government over the past four years for its environmental-based regulatory ambitions. Recently, the caution by Washington was, *"You will no longer be allowed to set auto mileage and pollution standards more stringent than the federal government's."* It was nearly simultaneous with another threat that said, *"Your San Joaquin Valley has some of the highest air pollution in the nation—so we will penalize you by withholding federal highway maintenance funds."* (That was a Catch-22 if you missed it!)

Aside from these federal squabbles that may soon disappear, California continues its regulatory plans via SB 100 for renewable electricity goals and de-carbonization aimed at transportation and occupied building space—our two highest sources of atmospheric carbon. A growing number of municipal jurisdictions have begun banning the use of gas (methane) in new buildings, the first of 27 in Berkeley, of course. California is not alone. New York and Massachusetts are taking bold steps toward de-carbonization, and some of those are far more geo heat pump-centered. In New York, there are state-funded incentives for the installation of geo heat pumps that will be helpful, since 2021 is the last scheduled year for federal geo system tax credits.

This year marked a half-century since our nation first recognized an environmental imperative that was termed "Earth Day." Generally, the progress toward environmental improvement has been great, even considering a clear effort toward reversal by what is now an outgoing federal administration.



The closer view—
Via a transition that lasted over a year, the International Ground Source Heat Pump Association (IGSHPA) departed Oklahoma State University and is becoming a subsidiary entity of The Geothermal Exchange Organization (GEO). A new Board of Directors is led by **Chairwoman Kortney Lull** of Midwest Geothermal, a member firm of CaliforniaGeo operating out of Grand Rapids, Michigan.

At CaliforniaGeo, our own Board has spent most of 2020 fabricating, reviewing, and adopting our first **Strategic Plan**. It has been my good fortune to work closely with our lifetime and **founding member Lisa Meline** in its development. She has been pivotal in helping to activate four of its seven goals since the plan's July approval. After a 3-year pause, we are again providing webinar-based training to broaden the scope of the industry. We remain an AIA Continuing Education Provider and will work toward development of a curriculum centered on the Bi-National Standard ANSI/CSA/IGSHPA-448 for residential and commercial geo systems.

Though its ultimate success is unknown, *The Geo Exchange* is an entity we created by gathering state and provincial geo leaders via Zoom. We attempt to cover challenges facing our organizations' leaders. Both U.S. coasts and Canada are represented for this sharing of problems and to consider solutions for each of our approaches. (Running a non-profit advocacy and member service organization has some complications.)

CaliforniaGeo's plan to start a series of public Town Hall meetings has begun. We hope to offer quarterly or bi-monthly sessions on a variety of topics for audiences of varied technical background. We will promote them through our bulk mailing program *Constant Contact*®, and will 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 objective is to plant more seeds capable of growing overall public interest and demand for renewable heating and cooling technology.

Statistics—
Our website now features **77** **Blog posts**. It holds **132** **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. Issues connected to climate change have become more mainstream in the last 18 months and this pace will probably increase.

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 continue to get emails and phone calls through our website's **Contact Us** page, and the guidelines for our consultations has been refined in the

Top Pages

1. Underground geo heat exchanger types (GHEX) - CaliforniaGeoCaliforniaGeo - 235 Views
2. GROUND SOURCE HEAT PUMP DESIGN COURSE FOR BUILDING PROFESSIONALS - CaliforniaGeoCaliforniaGeo - 143 Views
3. Find CaliforniaGeo Members in our Directory - CaliforniaGeoCaliforniaGeo - 52 Views
4. geothermal heat pump installations in CaliforniaCaliforniaGeo - 46 Views
5. Blog posts from CaliforniaGeo on everything energyCaliforniaGeo | California Geothermal Heat Pump Association - 37 Views

past year. 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.

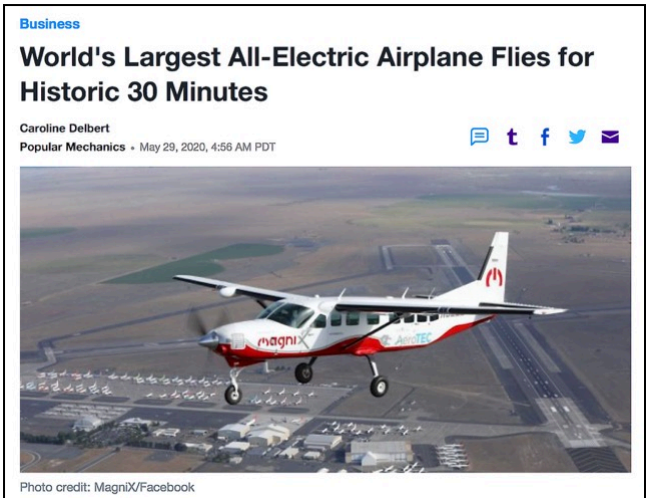
We are pleased that our website visitation continues to grow. It is serving as an educational tool for many who are searching out green technology. Google Analytics has consistently ranked our membership directory as one of the top three landing spots for outsiders visiting our website.

Thanks to a 2017 start-up contribution from member **Enertech Global, LLC**, we continued using our personalized bulk mailing system (Constant Contact) sending **158** separate promotional messages in support of the GeoExchange® industry. That contact list is now closing in on 500 targets, segmented into seven sub-list categories and we are reaching people throughout the U.S. and Canada.

CaliforniaGeo grew in 2020 to **27** full memberships and **14** 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.

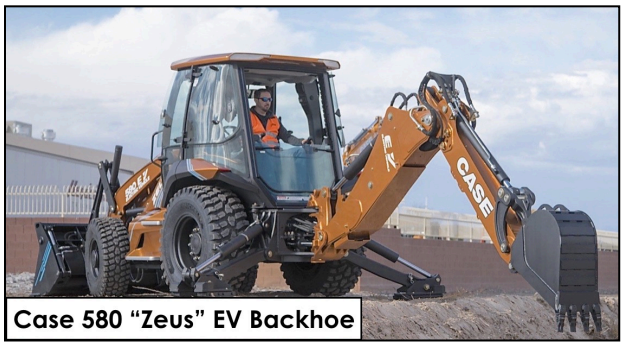

Business

World's Largest All-Electric Airplane Flies for Historic 30 Minutes

Caroline Delbert
Popular Mechanics • May 29, 2020, 4:56 AM PDT

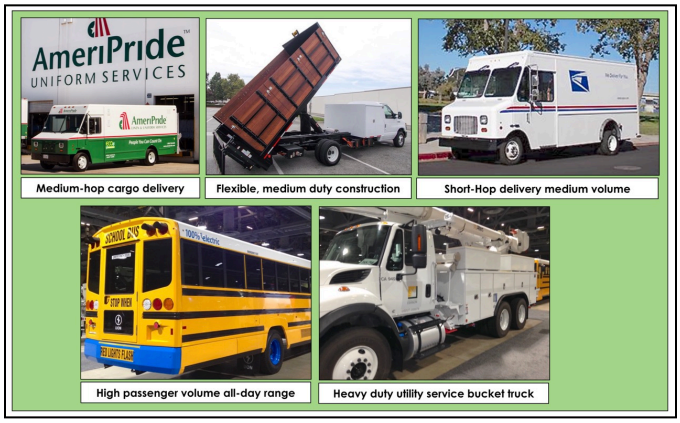
Photo credit: MagniX/Facebook

Electric, prop-driven aircraft are in certification trials to take over short-haul, low volume routes and specialty flights, and European manufacturer AirBus has begun work on a liquid hydrogen-fueled fanjet but currently, all hydrogen combustion comes with NOx emissions.



Case 580 "Zeus" EV Backhoe

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.

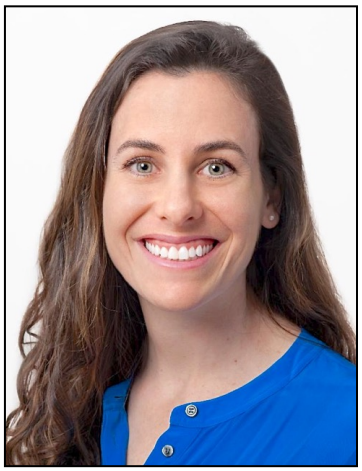


Another category of commercial transport technology has gone electric. Short haul and delivery vehicles will produce far less fleet emissions as more of this technology is deployed. There are also two Class8 heavy highway freight trucks by Tesla and Nikola, one powered by battery and the other by fuel cells using Hydrogen without any emissions. In addition, two corporate partners known for their past diesel products (Cummins and Navistar) are joining the movement to produce Hydrogen at scale and to provide access to it at fuel-cell refueling stations. Of course, water is the source of that gas and greater supplies of renewable electricity will be the energy source that will

electrolyze it. These steps toward kinetic electric equipment and renewable fuels have been taken because of a clear policy signal for decarbonization by government, even though fossil and nuclear energy providers are still receiving greater tax incentives than renewable industries have been (and are).

Green-based funding continues to expand, less on ideology and more now on reduced economic risk. The financial industry has recognized a greater dependability in renewable energy sources. This is easy when the energy is free and the time to construct infrastructure is far less than conventional alternatives. We've come a long way since PACE (Property Assessed Clean Energy) and Energy Efficient Mortgages. Financial support for renewable systems represents a technology (in itself) that complements the expansion of all the others, including our own geothermal heat pump industry. Our future is brighter because of this.

This month, the Department of Energy has recognized Dandelion Energy's co-founder **Kathy Hannun** with its Entrepreneurship Award in conjunction with Stanford University, M.I.T. and Texas A&M. In a short three years, her company has become the largest installer of residential geo heat pump systems in the U.S. This spin-off from Google X, with a $35 million infusion from venture capitalists, is proof that green seed capital is becoming mainstream. Several of us from the industry provided technological input to Google X via 2017 interviews and IGSHPA provided training to a core of Xers to further their preparation. Start-ups of this kind are definitely a kind of technology that benefits the expansion of geo in all regions.



It might be easy to conclude that our geo heat pump equipment has lagged other industries in technological enhancement. However, while our equipment continues to make modest efficiency gains, 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.

Expansion can be seen in the greater variety of geo systems in larger buildings and building complexes using shared loop systems. This reduces *capital costs* while opening the potential for lowered *operating costs* by varied use and occupancy schedules. This enhances our technology's reputation for the lowest LCC (Life Cycle Cost) in the HVAC realm.

That's our summary for 2020 from CaliforniaGeo.

Bill Martin, President

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