Sonoma Clean Power

Enhanced Geothermal Systems (EGS) in Sonoma Clean Power's GeoZone

As the public power producer for nearly all residents and businesses across Sonoma and Mendocino Counties, Sonoma Clean Power formed the Geothermal Opportunity Zone (GeoZone) to **build 600 MW of new reliable renewable energy** to pair with local solar and energy storage. The goal is to affordably meet our region's energy needs with 100% renewable energy every hour of the year.

Why more geothermal?

Despite rapid growth in renewable energy, California has been unable to retire most of its dirtiest natural gas power plants. We still need them to keep the lights on when the sun isn't shining, wind isn't blowing, and batteries are empty—at night and through much of the winter. Geothermal provides the around-the-clock reliable power needed to support solar, wind, hydropower and battery storage and eliminate our dependence on fossil fuel sources.

Eventually, California is aiming to construct offshore wind to help fill some of these same needs, but it would be risky to depend on the optimistic timeline to construct it and costs will need to fall significantly for it to become affordable. Similarly, depending on scaling up batteries to a level that provides multi-day energy storage is neither affordable nor a good use of scarce lithium metal.

Our region is already home to a world-class geothermal resource (the Geysers), but the existing output isn't enough to support the clean energy transition. Expanding local geothermal capacity allows our communities to play a vital role in cleaning up California's electric grid and ensure that our region gets our share of the high-quality jobs and tax revenues.

New more affordable technology

A new technique called "Enhanced Geothermal Systems", or "EGS", enables geothermal energy production in more locations beyond existing geothermal fields, and allows greater flexibility in siting projects in better locations. The use of geologic and drilling expertise from the oil and gas industry is key to making this type of renewable energy a reality and weaning off of those fossil fuels.

An overview of EGS

This fact sheet introduces the basics of EGS and does NOT answer any specific questions about GeoZone projects. As specific projects are proposed in the GeoZone, much more detailed information will be supplied from the project developers.

Underground heat near the Earth's surface exists throughout most of the Western U.S. However, it is not common to find the type of rock formations that enable heat to be extracted with conventional methods.

EGS creates pathways for fluid to move underground similar to the natural pathways found in traditional geothermal fields by creating fractures in deep hard rock far below the earth's

surface. Water is then pumped through the fractures, heated by the rock, and used to drive an electric turbine at the surface.

Although EGS is a new technology, it is rapidly maturing. This is largely due to improvements in horizontal drilling and hydraulic fracturing technologies from the oil and gas industry.

In 2023, the U.S. Department of Energy's Frontier Observatory for Research in Geothermal Energy (FORGE) project proved the technology's potential for scaling up advanced geothermal technology—both practically and financially.

Environmental risks from hydraulic fracturing

California's electric power system heavily depends on fracking for natural gas today because a majority of the resources that can run 24-hours per day are natural gas-fired power plants. This unpleasant fact even applies to most utilities' so-called "100% renewable" power service because of the way California allows power providers to oversupply solar and wind and then rely on natural gas for reliability at night and through the winter.

The negative impacts of the natural gas industry are also disproportionately on poorer communities and on Latino, Black and Indigenous neighborhoods.

The U.S. Department of Energy has identified a number of ways that shifting from using natural gas fracking technology to better deploying it in the geothermal industry can have environmental and social benefits.

Sonoma Clean Power also fully understands that fracking has a bad reputation, and that – even with improvements – the public has a right to know a lot more about how it would be used differently for projects in the GeoZone.

First, all GeoZone projects will be evaluated through a California Environmental Quality Act (CEQA) process and undergo a detailed environmental analysis. In addition, SCP commits to the timely sharing of any information or data we gather on potential environmental risks and benefits.

The principal concern associated with oil and gas fracking is its potential to contaminate groundwater.

To provide clarity on the environmental risks of hydraulic fracturing for EGS relative to oil and gas development, the U.S. Department of Energy[1] shared the following important distinctions:

Fluid Composition

The Department of Energy's report notes that EGS is a chemically distinct process with fluids that can contain fewer additives than those used for oil and gas. Also, the hydraulic fractures for EGS do not occur in rocks bearing hydrocarbons, hence removing the risk of hydrocarbon contamination of shallow freshwater.

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[1] US Department of Energy. *Pathways to Commercial Liftoff: Next-Generation Geothermal Power*, 2024. https://liftoff.energy.gov/wp-content/uploads/2024/03/LIFTOFF_DOE_NextGen_Geothermal_v14.pdf

Well Casing

EGS wells are fully encased with steel, from the bottom all the way up to the surface. The wells are also completely sealed, which is not always the case for oil and gas wells.

Reservoir Depth and Type

EGS fractures are made in deep hard rock disconnected hydrologically from groundwater, whereas oil and gas development can occur in shallower sedimentary rock, closer to groundwater.

Fluid Circulation

Whereas fractured oil and gas wells must dispose of excess fluids to operate, EGS fluids are recirculated and completely self-contained with no exposure to the atmosphere or drinking water.

Will EGS increase seismicity felt in nearby communities?

Any movement of fluid through the subsurface, including the existing Geysers operation and EGS, can change rock stress and temperatures that risk causing small earthquakes or “inducing seismicity”.

Induced seismicity risk can be mitigated through balancing underground fluid withdrawal and injection—which is inherent to the self-contained design of EGS and differs from oil and gas development.

The risk can also be managed through seismic monitoring, identifying natural and project-specific hazards, and developing a risk-based mitigation plan. The Department of Energy report notes that their FORGE project has followed this approach and has not experienced any community felt seismicity.

How is EGS being used in the GeoZone?

One of SCP’s GeoZone partners, Chevron New Energies, is planning a pilot EGS project. Chevron New Energies was selected as one of three partners from a competitive solicitation SCP completed in 2022, which evaluated industry proposals to apply new technology and capital to expand local geothermal capacity with commercial scalability.

As part of their cooperation agreement with SCP, Chevron New Energies will develop up to 20 MW in a demonstration project before deciding whether to proceed with a larger system.

In early 2024, Chevron New Energies’ GeoZone project was selected to negotiate a grant award from the Department of Energy’s Geothermal Technology Office which would help fund early demonstration activities.

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