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Additional submitted attachment is included below.



August 19, 2025

California Energy Commission
Docket No. 25-IEPR-04
715 P Street
Sacramento, California 95814

RE: XGS Energy Comments on IEPR Commissioner Workshop on Firm Zero-Carbon Resources and Hydrogen

XGS Energy appreciates the opportunity to submit these comments to the California Energy Commission (CEC) on the Integrated Energy Policy Report (IEPR) Commissioner Workshop on Firm Zero-Carbon Resources and Hydrogen held July 29, 2025.

XGS Energy urges the CEC to explicitly recognize advanced closed-loop geothermal as a firm zero-carbon resource in the SB 423 Report, the 2025 IEPR, and related planning efforts. Including this proven, scalable technology in state analysis will expand California's options for meeting reliability needs and decarbonization targets with in-state resources.

The July 29, 2025 workshop and the SB 423 Report highlight geothermal as an important firm zero-carbon resource but discuss only two technology types: traditional geothermal and enhanced geothermal systems (EGS). By not including advanced closed-loop geothermal, the CEC risks overlooking a key solution that can accelerate deployment of clean, firm capacity in diverse locations across the state.

About XGS

XGS Energy's advanced geothermal system is a new closed-loop geothermal technology that is distinct from hydrothermal geothermal and enhanced geothermal systems. XGS geothermal has significant development opportunities in the state of California, both by increasing the geothermal outputs of traditional geothermal fields and by unlocking geothermal potential in new locations that have not been suitable for traditional geothermal development. These new resources can provide clean, firm power for California.

XGS Energy's advanced geothermal technology also offers California distinct benefits:

- Water independence. The XGS system continuously recycles water in a closed loop, with negligible consumptive water loss over time. This is particularly important for the water-stressed communities of California and the western US.

- Simplified construction and operations. The XGS system does not require fracking, does not produce or require management of any geothermal brine, and does not produce any emissions. This simplified design streamlines the development of geothermal projects from zoning, permitting, and community impact perspectives, considering key historical concerns with and barriers to geothermal development.
- Scalable. XGS technology is highly scalable, with projects expected to range in size from 5 MW to projects larger than 200 MW. In some regions, phased development with XGS technology is expected to unlock over a gigawatt of new clean firm energy. This range in scale creates more flexibility to locate in load constrained pockets and more flexibility in executing Power Purchase Agreements with Load Serving Entities.

These key benefits will help enable additional geothermal deployment in more locations, at a scale aligned with California’s energy objectives and in many cases at an accelerated pace.

The SB 423 Report should include Advanced Geothermal as a Firm Zero-Carbon Resource

In the SB 423 Report and the July 29th workshop, the CEC discussed geothermal as an important firm zero-carbon resource that the state needs to meet reliability and clean energy goals. However, the report and workshop only discuss two types of geothermal: traditional geothermal and enhanced geothermal. Enhanced geothermal is a specific next-generation geothermal technology that creates a new underground geologic fracture network, typically through hydraulic fracturing; water then flows through that new fracture network to extract heat from the rock and is returned to the surface to generate electricity. By using this label, the CEC may be unintentionally signaling that California is looking to rely on a specific geothermal type that excludes other geothermal technologies such as XGS’s closed-loop system.

XGS recommends that the CEC use “next-generation geothermal” as an umbrella term for new technologies encompassing both enhanced geothermal systems and advanced closed-loop geothermal. XGS recommends the next-generation geothermal definition below, which is derived with some adjustments for clarity from the Department of Energy’s (DOE) Report “Pathways to Commercial Liftoff: Next-Generation Geothermal Power”:¹

Next-generation geothermal technologies use drilling, completion, and/or hydraulic fracturing advances to enable heat extraction from hot rock that is naturally impermeable, expanding the geothermal resource potential past naturally occurring, permeable underground reservoirs. Two prominent categories of next-generation geothermal being developed today are closed loop and enhanced geothermal systems.

¹ U.S. Department of Energy (DOE), *Pathways to Commercial Liftoff: Next-Generation Geothermal Power*, <https://cdn.catf.us/wp-content/uploads/2025/06/09154348/doe-liftoff-nextgen-geothermal.pdf>

The California Public Utilities Commission (CPUC) has used this definition of next-generation geothermal when setting central procurement targets for geothermal technologies.² The CPUC has also discussed how both EGS and advanced closed-loop can contribute to California's energy needs. For clarity and consistency across state planning venues, XGS believes it will be useful for various State agencies to have the same definitions for the same buckets of technology.

The SB 423 Report and future CEC discussions of next generation geothermal should also list and discuss advanced closed-loop geothermal as a specific technology type that can be deployed in California. XGS Energy recommends that the CEC utilize the "Pathways to Commercial Liftoff: Next-Generation Geothermal Power" as a source for describing this technology. Generally, closed-loop geothermal:

- Circulates fluids through a series of closed wellbore loops permeating the subsurface;
- Leverages a single drilled pathway, and therefore do not require hydraulic fracturing to create fluid pathways, reducing potential risks to environment and human health associated with hydraulic fracturing fluids; and
- Scales through modular deployment.³

However, the CEC should also be cognizant that advanced closed-loop geothermal systems take many forms and are best described as a technology category. For example, there are significant variations in well geometry and well completion approaches that impact project economics, risk, and scalability. In this way, the state should consider advanced closed-loop geothermal, and even next-gen geothermal more broadly, for the attributes it delivers. Similar to long-duration energy storage, there are many technology types but also very unique product variations that have different benefits and tradeoffs. While XGS recommends the Pathways to Commercial Liftoff Report as a useful public resource to describe the closed-loop geothermal technology category, it notably does not include an analysis specific to XGS' advanced closed loop technology.

Overall, advanced, closed-loop geothermal offers an important opportunity to expand geothermal potential in California and contribute to the firm, zero-carbon needs discussed in the workshop. California should seek to utilize all potential geothermal tools in its toolkit to meet state goals.

Conclusion

Recognizing advanced closed-loop geothermal as a firm zero-carbon resource will expand California's firm zero-carbon supply options, enabling deployment of reliable power across more

² CPUC Decision 24-08-064, issued August 29, 2024 at p.42-45:

<https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M539/K202/539202613.PDF>

³ Ibid at p.10-12.



locations and on accelerated timelines. XGS Energy urges the CEC to adopt the recommended definitions and explicitly include advanced closed-loop geothermal in the SB 423 Report, 2025 IEPR, and future planning guidance.

Sincerely,

/s/ Caity Smith

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