Unlocking California's Geothermal Potential: A Strategic Opportunity for Clean, Firm Power

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CLEAN AIR TASK FORCE

Geothermal Energy in California

California is a global leader in climate and clean energy policy. The state has set important clean energy goals[1] and made considerable progress,[2] but must dramatically accelerate its clean energy buildout to meet its long-term targets. Electricity demand is projected to rise substantially through midcentury,[3] driven by electrification of transportation and buildings, an increasing number of extreme weather events induced by climate change, and the potential surge in energy-intensive industries such as data centers.

A diverse portfolio of clean energy resources will be essential to maintaining an affordable and reliable power system while cutting emissions. Academic studies[4] and state modeling[5] indicate that complementing variable renewables like solar and wind with clean, firm power – resources that provide high-capacity factor, on-demand electricity regardless of weather and without carbon emissions – will reduce overall system costs and improve grid reliability.

Next-generation geothermal energy, which uses the earth's naturally occurring heat to produce power, is well-positioned to play an important role in California's clean energy mix. It offers zero-carbon, always-available electricity that supports reliability and reduces dependence on fossil fuels during periods when solar and wind are unavailable. Importantly, geothermal energy is not just theoretically valuable—its growth is already an integral part of California's energy future.[6]

CATF conducted interviews with key geothermal stakeholders in California to understand their outlook on next-generation geothermal growth in the state and to identify the most significant challenges facing the industry. The following recommendations are informed by those interviews and by CATF's ongoing work advancing policy to support next-generation geothermal energy.

Evolving Geothermal Technology

Geothermal has been a part of California's energy portfolio for decades. The Geysers, in Sonoma and Lake Counties, is the world's largest producing geothermal field,[7] and significant resources exist in Imperial County, including the Salton Sea Geothermal Field.

These areas contain preexisting pockets of hot underground water, allowing for projects to harness the energy through conventional (hydrothermal) geothermal technologies that utilize steam and hot water to generate electricity.

1 SB 100 and Carbon Neutrality Executive Order B-55-18

2 In 2022, 61% of the state's electric retail sales were generated by renewable and zero-carbon resources.

3 The 2022 Scoping Plan for Achieving Carbon Neutrality estimates that electricity demand could rise by 76% by 2045 compared to 2022 levels.

4 Long, Jane C.S., Ejeong Baik, Jesse D. Jenkins, Clea Kolster, Kiran Chawla, Arne Olson, Armond Cohen, Michael Colvin, Sally M. Benson, Robert B. Jackson, David G. Victor, and Steven P. Hamburg. "Clean Firm Power is the Key to California's Carbon-Free Energy Future." Issues in Science and Technology (March 24, 2021).

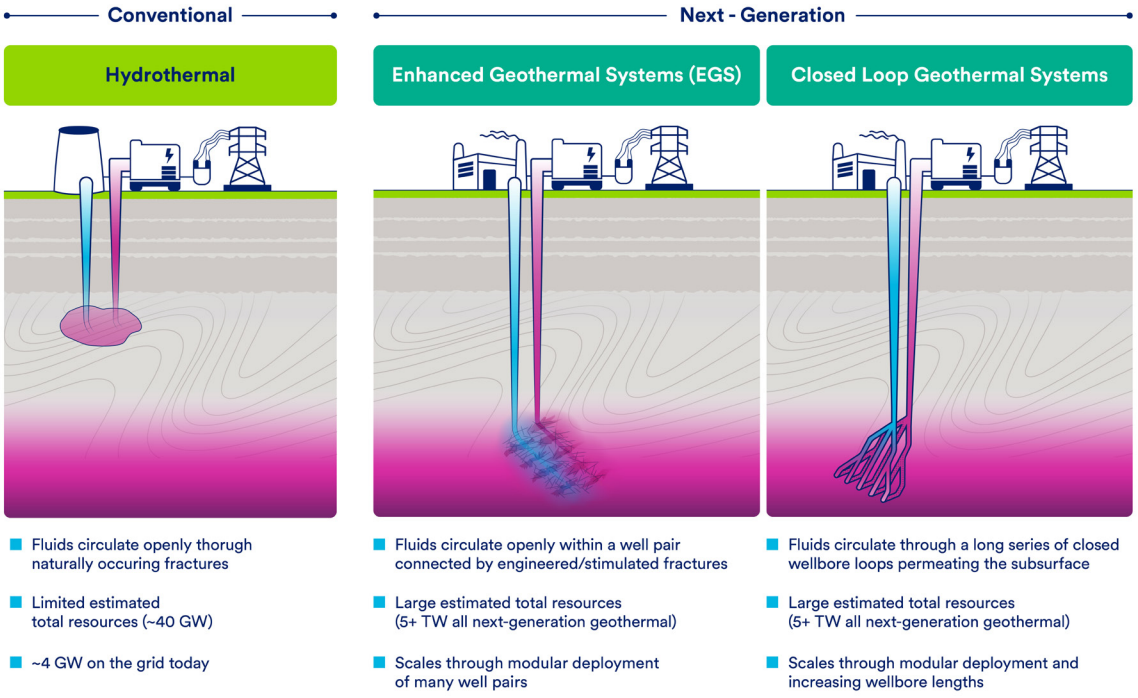
5 2021 SB 100 Joint Agency Report pages 12-13

6 The California Public Utilities Commission (CPUC) issued a 2021 Mid-Term Reliability decision requiring load-serving entities to procure 11.5GW of new clean energy resources, including at least 1 GW of clean firm energy, which was almost entirely met by geothermal. And under Assembly Bill 1373 (2023), the CPUC has determined that there is a need for the Department of Water Resources to procure up to 1 GW of geothermal by 2035 as part of its centralized procurement of long lead-time resources.

7 The Geysers, https://geysers.com/geothermal.

Recent innovations have enabled the emergence and growth of next-generation geothermal. Rather than harnessing pre-existing pockets of hot underground water, next-generation geothermal involves circulating water from aboveground through the subsurface, gathering heat from the rock that is then turned into electricity, and then re-circulating the fluid through the system as a part of a continuous cycle.[8] This new form of geothermal energy can be harnessed in far more locations than traditional geothermal because it only requires access to underground heat – eliminating the need for naturally occurring pockets of hot water. This breakthrough expands the potential for clean, reliable energy almost anywhere on Earth. According to the International Energy Agency, next-generation geothermal techniques could elevate the global market share of geothermal from <1% to more than 8% by 2050.[9]

Figure 1: Next-generation geothermal power



Source: U.S. Department of Energy "Pathways to Commercial Liftoff: Next-Generation Geothermal Power"

California is the number one producer of geothermal energy of all U.S. states,[10] and has enormous untapped geothermal potential. Clean Air Task Force's (CATF) first-of-a-kind modeling[11] estimates that utilizing just 1% of California's resource potential of superhot rock geothermal, the highest-temperature subset of next-generation geothermal, has the potential to generate about 380 GW of electricity – 13 times California's 2023 electricity consumption.[12]

8 Water in next-generation geothermal systems can be circulated through small cracks in the rock (enhanced geothermal systems [EGS]) or through a circuit of subsurface pipes (closed-loop geothermal systems).

9 IEA, https://www.iea.org/reports/the-future-of-geothermal-energy.

10 Pg. ii; California Energy Commission, California Department of Conservation, California Geologic Energy Management Division (CalGEM), "Assessing California's Population of Low-Temperature Geothermal Wells for Plugging and Abandonment," September 2023, https://www.energy.ca.gov/sites/default/files/2023-09/CEC-300-2023-006.pdf

11 CATF, https://www.catf.us/superhot-rock/heat-mapping

12 U.S. Energy Information Administration, https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_fuel/html/fuel_use_es.html&sid=US.

Figure 2: The potential of 1% of California's superhot rock geothermal resource (GW)

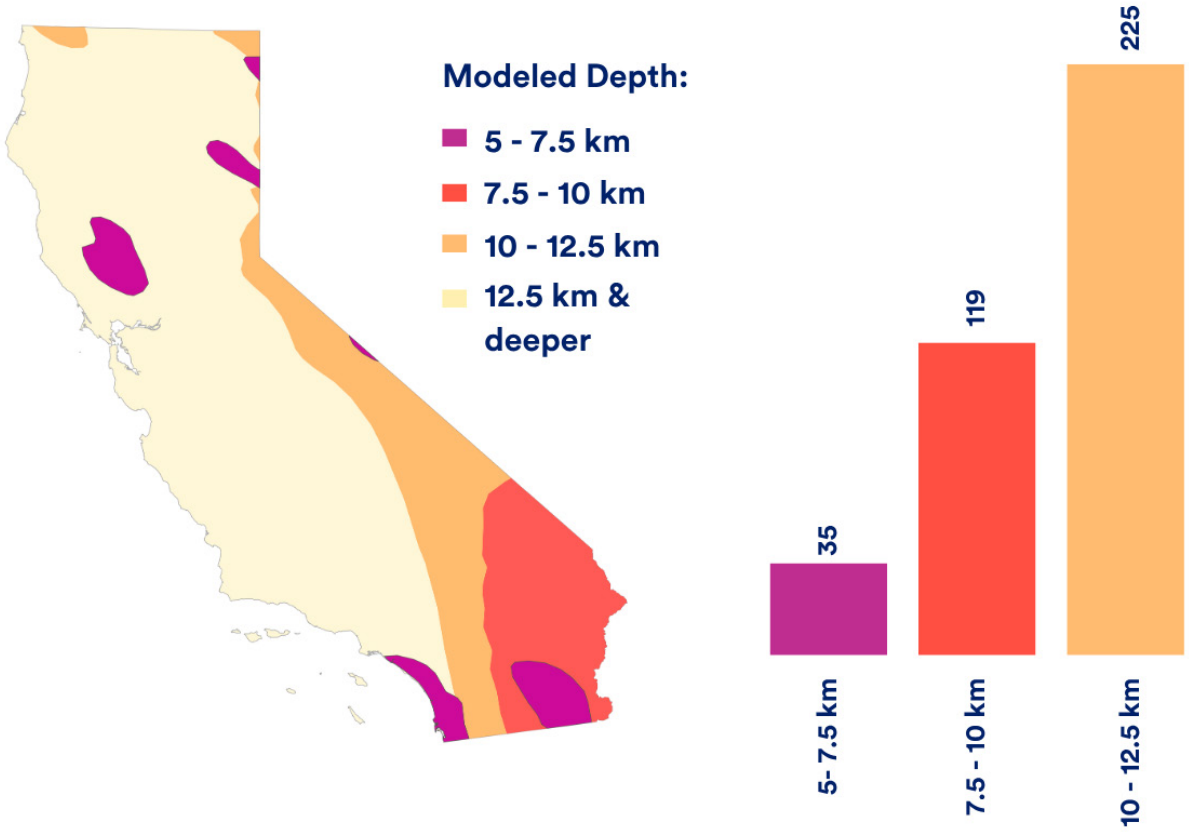


Figure 2 shows the locations of California's SHR potential. Utilizing just 1% of the state's potential could generate the number of gigawatts indicated in the bar chart on the right.

While California has taken some important policy actions[13] that have driven investment in the industry[14,15] the state is not currently attracting sustained investment from many next-generation geothermal developers, and in-state projects continue to face major development hurdles.[16] Uncertainty and delays are present at nearly every step of project development. This environment poses risks for geothermal developers, particularly next-generation geothermal companies. Many of these are early-stage companies with limited capital, and geothermal is an exceptionally capital-intensive industry. Prolonged, uncertain timelines make it harder to attract financing, particularly in today's high-cost capital environment, where inflation and supply chain constraints already weigh heavily on project viability. As a result, some developers are focusing on projects in neighboring states with more predictable timelines, and those states are outpacing California in deploying next-generation geothermal at scale.[17]

13 See footnote 6 detailing recent procurement orders.

14 Sonoma Clean Power, a CCA based in Sonoma and Mendocino counties, is leading an initiative called the GeoZone which aims to develop 600MW of next-generation geothermal energy, https://sonomacleanpower.org/geozone

15 XGS Energy, based in Palo Alto, is working to develop its first commercial-scale project in California, https://energycapitalhtx.com/xgs-energy-axel-cto

16 Berkshire Hathaway recently suspended its work on three new geothermal plants, citing "delays and regulatory shifts" and the need for "clearer pathways to interconnection," while companies participating in Sonoma Clean Power's GeoZone have indicated uncertainty about when they will be able to move forward.

17 Major projects selling geothermal power to California, like Fervo Energy's 500-MW Cape Station plant in Utah, highlight how other states are already outpacing California in facilitating next-generation geothermal expansion and gaining economic benefits from these projects.

California's combination of abundant resources, innovation capacity, and strong policy targets put it in a favorable position to unlock transformative growth in geothermal energy – provided development hurdles can be overcome.

California should continue to develop its conventional geothermal resources while simultaneously advancing the potential of its next-generation geothermal sector. **If fully utilized, geothermal energy could be a critical player in California's energy mix with the potential to meet long-term needs for cost-competitive, carbon-free, always-available renewable energy.** Furthermore, as California advances its clean energy goals, next-generation geothermal can provide an onramp for experienced oil and gas workers to bring their expertise to the state's clean firm power sector – supporting good-paying jobs in communities with a legacy of energy development.

The following sections of this report lay out opportunity areas and recommendations to help California can fulfill its next-generation geothermal potential.

Opportunity Areas and Recommendations

Opportunity Area: Set the Vision – Statewide Strategic Plan for Geothermal Resources

Despite California's strong clean energy ambitions and targeted procurement mandates, the state has not developed a **coordinated, long-term strategy** for geothermal energy. California has not yet assessed the full scale of its geothermal resource potential or established planning goals and target locations to guide development. This absence of long-term planning creates uncertainty for developers, who must make large upfront investments without knowing whether their projects align with the state's future energy strategy or whether needed transmission will be available. While the Integrated Resource Planning (IRP) process, led by the CPUC, provides a valuable framework for nearer-term procurement, its 10-year planning horizon and biennial updates can misalign with long-lead-time resources like geothermal, which can take five to ten years to bring online.[18] The IRP is updated every two years and its assumptions, resource allocations, and geographic priorities could shift from cycle to cycle. This creates uncertainty for developers evaluating whether their projects will remain aligned with state planning priorities over the full course of development. It also limits the ability of these projects to be consistently considered in the CAISO Transmission Planning Process, which relies on IRP inputs. Without stable and early inclusion, geothermal projects may miss transmission upgrade opportunities, face higher interconnection costs, and struggle to secure power purchase agreements. These issues are particularly acute for smaller developers with limited capital to absorb delays or stranded development risk.

California can draw lessons from other models, such as the state's *Offshore Wind Energy Strategic Plan* or the Department of Energy's

18 In a CPUC Decision 24-08-064, Fervo noted that the average geothermal development timeline is closer to seven years, https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M539/K202/539202613.PDF

report, *Pathways to Commercial Liftoff: Next-Generation Geothermal*, which show how a strategic, cross-agency plan can identify key resource zones, streamline permitting, and align funding and infrastructure planning. A statewide geothermal development plan – grounded in a full resource assessment and supported by longer-term planning horizons – would help identify where geothermal is most viable, guide transmission investments, and create market certainty. Clear targets and early signals could lower project risk, accelerate financing, ensure the highest and best use of transmission lines,[19] and help unlock the full value of geothermal as a clean, firm resource critical to California's long-term reliability and decarbonization goals.[20]

Recommendation

Develop and adopt a statewide strategic plan for geothermal energy that identifies high-potential development zones[21] for next-generation geothermal (including enhanced geothermal systems (EGS) and closed-loop heat extraction techniques[22] at temperatures inclusive of superhot), outlines permitting and regulatory reform priorities, addresses transmission and interconnection needs, and proposes actions to reduce financing and market entry barriers.

Opportunity Area: Permitting and Environmental Review

Permitting geothermal projects in California remains a lengthy and complex process that poses a major barrier to deployment.[23] Developers must engage with numerous state and local agencies, many of which lack familiarity with next-generation geothermal technologies and often face staffing constraints – factors that contribute to delays and uncertainty.[24] The The California Energy Commission's (CEC) "SB 423 Emerging Renewable and Firm Zero-Carbon Resources Report" concluded that the California Environmental Quality Act (CEQA) review process is "inconsistent and time consuming which may lead to permitting and project development delays."[25] CATF found these project timeline delays can total several years. For projects located on federal land, developers must also undergo review under the National Environmental Policy Act (NEPA), and limited coordination between CEQA and NEPA processes adds further complexity. Because geothermal development unfolds in phases – exploration, well development, and ultimately power generation – environmental review requirements can be triggered multiple times over the course of a single project.

19 Modeling commissioned by CATF and the Environmental Defense Fund found that new transmission lines will be used to their highest capacity when deployed to deliver firm output.

20 Boston Consulting Group's July 2024 report "Unlocking California's Climate Ambition" highlights that aligning existing integrated resource planning efforts with state climate goals can provide visibility and certainty. This is crucial to understand the infrastructure needed long-term and enables accurate estimates of load growth which can help plan for long lead-time resources.

21 In the 1970s, USGS identified Known Geothermal Resource Areas (KRGAs) across the country, including in California. KGRAs are areas known to contain conventional geothermal. However, next-generation geothermal will be viable in many additional areas of the state, and there has not been a statewide analysis to identify high-potential geothermal development zones for next-generation geothermal specifically.

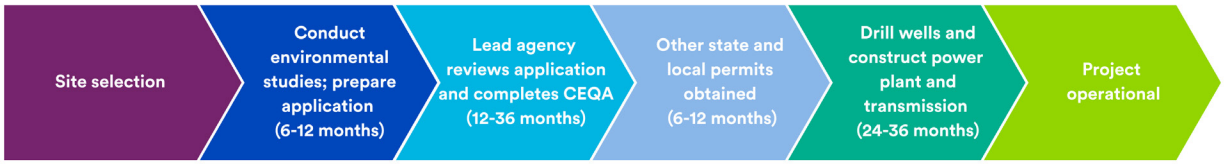
22 See footnote 8 above.

23 When geothermal project development is delayed due to permitting, capital invested in early exploration – including high-cost drilling – can sit idle for extended periods. These delays increase financing costs as interest accrues, driving up the project's total cost and levelized cost of electricity. Because exploration wells can cost up to multiple millions of dollars in some cases, any holdup in permitting the next phase of development strands significant capital and creates heightened risk for investors.

24 NREL, https://www.nrel.gov/docs/fy23osti/83133.pdf.

25 CEC, https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-ESR-01.

Figure 3: The timeline from completion of the conceptual design to project operation is illustrated in the graphic below. The timeline from site selection and conceptual design to project operation is 4 to 8 years. The timeline would be extended in the case of legal challenge, extensive public comments, or interconnection delays on a project.



Recommendations

- Implement permitting streamlining recommendations included in the CEC's "SB 423 Emerging Renewable and Firm Zero-Carbon Resources Report,"[26] which includes developing a holistic, integrated environmental review process and improving interagency coordination through Memoranda of Understanding between permitting entities around roles and responsibilities, which can reduce duplication and project timelines.[27]
- Consider expanding the CEC's AB 205 Opt-in Certification Program[28] for geothermal power plants less than 50 MW, which comprise the majority of geothermal projects.[29] This would provide developers with an option for streamlined state-level permitting, which has the potential to provide more certainty regarding permitting processing timelines.
- Consider developing a permitting guidebook for the geothermal industry, similar to the Electric Vehicle Charging Station Permitting Guidebook.[30,31] A guidebook can clearly outline the permitting process, including a clear step-by-step guide and identification of appropriate state and local entities that developers must coordinate with. The permitting process for geothermal projects is complex, and creating a guidebook can allow for standardization and greater certainty for project developers and regulators.

26 CEC, https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-ESR-01.

27 The CEC's SB 423 report cites an NREL report which states that MOUs can "delineate different roles that federal, state, and local agencies have for projects that involve joint agency participation for environmental review and analysis pursuant to NEPA and CEQA. MOUs may reduce confusion and outline specific agency roles and permitting requirements, which could increase transparency and help streamline the regulatory permitting process."

28 The 2022 AB 205 Opt-In Certification Program authorizes the CEC to oversee streamlined permitting for certain clean and renewable energy facilities, including geothermal projects 50MW or greater. It allows the CEC to serve as the lead agency for CEQA, conducting a comprehensive environmental review equivalent to an EIR. The process is designed to reach a certification decision within 270 days of accepting a complete application. Once certified, the CEC's decision replaces most state, local, and regional permits.

29 Assembly Committee on Utilities and Energy analysis of AB 531 dated April 1, 2025.

30 RMI, https://rmi.org/easing-the-permitting-process-for-clean-industrial-projects-in-california/.

31 The Electric Vehicle Charging Station Permitting Guidebook, developed by California's Governor's Office of Business and Economic Development (GO-Biz), serves as a comprehensive resource aimed at streamlining the deployment of electric vehicle (EV) charging infrastructure across the state.

Opportunity Area: Modernize Regulations

Unlike conventional geothermal projects, next-generation geothermal relies on engineered reservoirs and advanced drilling techniques. However, California's geothermal well regulations, written decades ago for conventional projects, have not kept pace with these innovations, or with other innovations in the field.[32] This regulatory mismatch creates uncertainty for next-generation developers navigating rules that were not designed for their technology. For example, current regulations still require outdated subsidence monitoring techniques that have long been replaced by modern GPS and satellite-based methods. Similarly, advanced drilling technologies and well-completion methods used in next-generation geothermal are not reflected in existing well standards, which were designed for conventional geothermal systems. To fully unlock geothermal potential, California needs updated regulatory frameworks that reflect these advancements and provide clear guidance for next-generation projects.

CalGEM's *Statewide Geothermal Regulations Discussion Draft*, released in 2022, proposes updates to California's geothermal well regulations aimed at aligning them with modern industry practices and technologies. Commencing a formal rulemaking process is an important next step towards operationalizing the proposal.

Recommendation

Update California's geothermal well regulations to accommodate technological innovations and advancements in next-generation geothermal technology.

Opportunity Area: Interconnection and Deliverability

Interconnection refers to the process a power project must go through to physically and operationally connect to the grid. While California has taken important steps in recent years to reduce barriers for long lead-time resources like geothermal,[33] uncertainty in the interconnection process is still common[34] and is especially harmful to geothermal development due to its high up-front costs.[35] Upgrade costs can reach multiple millions of dollars and may spike unexpectedly if other projects in the same interconnection cluster exit the queue.[36] Furthermore, projects that want to count toward Resource Adequacy (RA)[37] need

32 In its Geothermal Regulations Frequently Asked Questions document, CalGEM notes that many of California's existing geothermal regulations were put in place in the 1970s and have not been updated in 45 years.

33 In early 2025, the CPUC recommended to CAISO that it reserve transmission deliverability for resources such as geothermal, offshore wind, and long-duration storage in areas identified through its planning process. This means that transmission capacity will now be set aside in advance for high-priority clean energy resources, helping projects avoid delays and upgrade costs once they reach the interconnection stage.

34 For example, in February 2025, the developer of a planned geothermal project in the Salton Sea Geothermal Field cited lack of clear interconnection pathways as a reason to suspend the permitting process.

35 Most geothermal investment occurs before transmission access is confirmed – including site exploration, well drilling, and power plant construction. If a developer invests tens of millions of dollars only to discover that transmission access is unavailable, that capital is stranded. Even if access is ultimately secured, the uncertainty in timing increases interest payments and financing costs, further raising project expenses.

36 One developer reported that their interconnection cost increased by 14 times – from $500,000 to $7 million – after another project withdrew from the queue.

37 Resource adequacy requires electricity providers to demonstrate sufficient capacity to meet forecasted peak demand, plus a reserve margin, in order to ensure grid reliability.

deliverability status,[38] but this deliverability capacity can be given to earlier projects in the queue that may not have the same attributes as a clean, firm power resource. Since geothermal operates 24/7, it provides unique RA value for both summer and projected winter peaks. Uncertain access to RA status undermines geothermal energy's key value proposition.

Recommendation

Consider evaluating whether the current framework for deliverability, which is based on summer peak conditions, appropriately reflects the year-round capacity value of clean firm resources such as geothermal. The existing structure may limit the ability of these resources to contribute to system reliability in areas where summer transmission constraints exist but where capacity could be valuable during other seasons.

Opportunity Area: Funding and Procurement Mandates

Funding

Next-generation geothermal technologies are still early in their development and face high upfront costs, limiting their ability to attract the financing needed to scale. Grant funding can help de-risk these technologies by supporting demonstrations or first-of-a-kind projects that lead to commercialization and offset risks commonly associated with first-movers in an unexplored geologic region who must characterize the subsurface.

California's geothermal grant programs[39] are important, but developers reported that the grants are relatively small and are not sufficient to enable new next-generation geothermal projects.[40] Other grant programs like EPIC allow for larger award amounts, but funding allocations depend on shifting state priorities each investment cycle, and geothermal projects are typically considered within broad, competitive funding categories. Clarifying how geothermal fits into state energy priorities and planning could help direct more consistent support, especially for next-generation technologies.

At the same time, long lead-time, capital-intensive clean energy projects like geothermal may benefit from broader financing tools to support early-phase project development. As noted by several developers, long development timelines and uncertainty in permitting or interconnection mean that even modest delays can significantly affect project viability. Public financing has the potential to drive down capital costs and can take key risks out of the project development process.[41] California's existing grant programs do not currently provide debt financing or loan guarantees, leaving a gap in the financial tools available to developers.

A clean energy infrastructure financing fund could help fill a critical gap in early-phase or "pre-development" financing – covering

38 Deliverability indicates the project can reliably deliver power to load under peak conditions, which often requires additional local transmission capacity. CAISO allocates "Transmission Plan Deliverability" in its studies, but if the local grid is constrained, a project might only get Energy-Only status (meaning it can sell energy but not capacity for RA).

39 Geothermal grants primarily come from two CEC programs, the Geothermal Grant and Loan Program and the Electric Program Investment Charge Program (EPIC).

40 A 100 MW next-generation geothermal project might cost on the order of $600M. By contrast, the average grant size for the Geothermal Grant and Loan Program was $360,751 (calculated based on the total number of projects and total funds awarded as of February 20, 2025).

41 A recent study commissioned by CATF and Net-Zero California examined the potential of public financing to save costs for capital intensive projects, with a focus on new transmission lines, and found potential for substantial ratepayer savings of up to $3 billion per year, to the extent this infrastructure is financed and developed through a public-private partnership.

activities like permitting, exploratory drilling, and interconnection studies that are high-risk and costly but essential to unlocking private capital. As key development milestones are met – such as environmental approvals or interconnection agreements – the state could transition projects to private lenders, recouping its investment and redeploying public funds. This milestone-based handoff model could reduce project risk and unlock lower-cost private capital that might not have been accessible otherwise.

Recommendations

- Explore aligning state funding opportunities with any federal funding opportunities.[42]
- Consider updates to state grant programs to offer larger, more impactful award amounts[43] and to provide greater consistency and predictability for geothermal applicants.
- Consider establishing a state clean energy infrastructure financing fund – potentially capitalized by funding sources like GGRF – to offer low-cost loans, credit enhancements, or other financial tools to support long lead-time, capital-intensive projects like geothermal and other critical infrastructure projects. A revolving fund structure would allow the state to recycle capital as loans are repaid, increasing the impact of each GGRF dollar and allowing the state to attract private capital by helping de-risk projects.[44]

Procurement Mandates

California's recent public procurement mandates[45] have sent positive demand-side market signals for geothermal development in and near California. However, as they would result in a maximum of 2 GW of energy that can also be met from out-of-state projects, these mandates should be viewed as only a starting point to scaling in-state geothermal resources.

Recommendations

- Consider whether additional procurement efforts for clean, firm resources like geothermal energy are needed to meet SB 100 goals through 2045, and ensure any subsequent procurement efforts align target dates with actual development project timelines for each resource.
- Successfully implement Department of Water Resources' central procurement entity[46] to fully realize its benefits, including providing clarity around solicitation timelines and providing dedicated funding to staff the entity.

42 For example, Department of Energy's Enhanced Geothermal Systems Pilot Demonstrations program offered $84M.

43 For example, an exploration well can cost approximately $25M. Interviewees suggested offering fewer awards but at greater amounts; $10M was cited as an impactful grant amount.

44 For more information, see Net-Zero California's "A Clean Energy Infrastructure Plan for the GGRF." Other existing models that could be expanded upon include revolving fund loan programs at the California Infrastructure and Economic Development Bank.

45 These are CPUC's 2021 Mid-Term Reliability decision requiring load-serving entities to procure at least 1 GW of clean firm energy and the CPUC's determination under Assembly Bill 1373 (2023) that there is a need for the Department of Water Resources to procure up to 1 GW of geothermal as part of its centralized procurement of long lead-time resources.

46 AB 1373 (Garcia) authorizes the Department of Water Resources to serve as a central procurement entity to procure energy resources (including geothermal).

Conclusion

California has some of the most promising geothermal resources in the world, but policy and planning barriers continue to hold the state back. Developers face permitting delays, transmission uncertainty, and limited funding – all of which increase costs and risk. If California wants to remain a leader in clean energy and capture the benefits of firm, zero-carbon power, it must take coordinated action. With the right policy support, geothermal can help deliver reliable, affordable, and carbon-free electricity.

Appendix: Environmental Review and Permitting Requirements for Geothermal Development in California

Table 1 summarizes the various State environmental regulations and approvals that would apply to next-generation geothermal projects in California. This summary does not include federal or local permits and approvals (e.g., National Environmental Policy Act, federal Endangered Species Act, City or County-specific requirements, local air district permits, etc.). The regulations included are not specific to any technology or stage of development, but are intended to be comprehensive for land development actions that could apply to next-generation geothermal development (e.g., well drilling, workovers, power plant construction, transmission interconnection).

Table 1

Regulation	Agency	Applicability	Timing
California Environmental Quality Act (CEQA) Public Resources Code 21000-21189 and CEQA Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3, Section 15000-15387	The Lead Agency responsible for preparing the CEQA document is the "agency with the greatest responsibility for supervising or approving the project as a whole." (CEQA Guidelines Section 15051).	CEQA requires environmental review of discretionary projects within the State of California. Environmental review is completed with an Environmental Impact Report or Mitigated Negative Declaration unless the project qualifies for a statutory or categorical exemption.	Environmental Impact Report – approximately 12 to 24 months after application deemed complete Mitigated Negative Declaration – approximately 6 to 12 months after application deemed complete Categorical or Statutory Exemption – 30 days
Warren Alquist Act California Code of Regulations, Title 20, Division 2	California Energy Commission (CEC)	Licensing process applies to thermal power plants rated 50 MW or greater.	18-month certification process for geothermal projects after application deemed complete; 12-month certification process if project complies with Public Resources Code Section 25540.2(a).[47] The CEC process is a streamlined process.[48]
California Public Resources Code, Division 3, Sections 3700 – 3776.	California Geologic Energy Management Division (CalGEM)	Permits required for well drilling, workovers and injection; regulates operation, maintenance, and permanent closure of geothermal production and injection wells.	30 days after application complete; CEQA must be complete and a notice of determination filed prior to permit issuance.[49]

47 California Code of Regulations, Title 20, Division 2, Section 1803, Alternative Certification Processes for Geothermal Power Plants.

48 The California Energy Commission licensing process includes preparation of a staff-report - a CEQA equivalent document. The certification process incorporates other state regulatory requirements and air district requirements (Title 20, Division 2, Sections 1744 and 1744.5).

49 The Notice of Determination is filed after project approval pursuant to California Code of Regulations, Title 14, Section 15094 and sets a 30-day statute of limitations for challenge on the approval under CEQA.

Regulation	Agency	Applicability	Timing
California Fish and Game Code, Section 1603	California Department of Fish and Wildlife (CDFW)	A Lake or Steambed Alteration Agreement is required for activities that impact the flow, bed, channel, or bank of a river, stream, or lake or riparian dependent vegetation (e.g., access road or transmission line crossing of a stream or drainage). The process requires submittal of a notification to CDFW.[50]	Draft Agreement 60 days after CDFW determines notification is complete; CEQA must be complete and a notice of determination filed prior to permit issuance.
California Fish and Game Code, Section 2081(b); California Code of Regulations, Title 14, Section 783.2-783.8	CDFW	An incidental take permit is required prior to activities that would result in "take" of a California Endangered Species Act-listed species. Mitigation may be purchased from a CDFW approved conservation or mitigation bank, if available or permittee proposed habitat management land.	30 days after application complete; CEQA must be complete and a notice of determination filed prior to permit issuance.
Porter Cologne Water Quality Control Act, Water Code Division 7	California Regional Water Quality Control Board[51]	Permits are required prior to any discharge of material to a waters of the state. The permit process for discharge of fill materials is defined in State Wetland Definition and Procedures for Discharge of Dredge or Fill Material to Waters of the State (State Water Board Resolution No. 2021-0012).[52]	30 days after application complete; CEQA must be complete and a notice of determination filed prior to permit issuance.
National Pollutant Discharge Elimination System (NPDES)	State Water Resources Control Board	Construction Stormwater General Permit (Order 2022-0057-DWQ) regulates ground disturbing activities 1 acre or larger and Industrial General Permit (Order 2014-0057-DWQ) which regulates stormwater discharges associated with industrial activities.	Notice of Intent filed 7 days prior to construction.[53]

50 Information on CDFW permit application is available via EPIMS portal https://epims.wildlife.ca.gov/index.do

51 Permitting is implemented by the applicable regional water quality control board for the project area https://www.waterboards.ca.gov/waterboards_map.html

52 https://www.waterboards.ca.gov/water_issues/programs/cwa401/wrapp.html

53 https://www.waterboards.ca.gov/water_issues/programs/stormwater/smarts/