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Filer:	Raquel Kravitz
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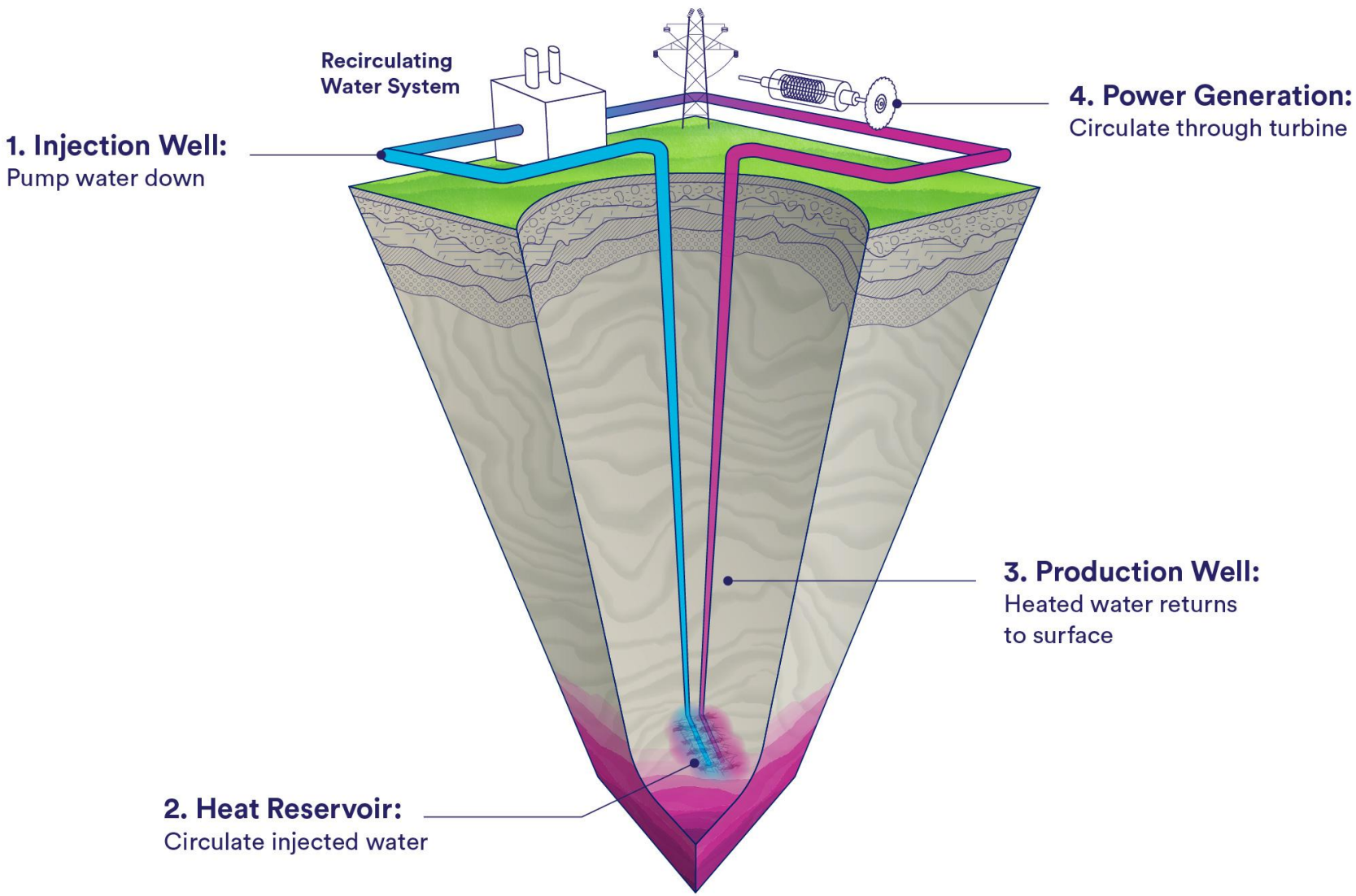
Next-Generation Geothermal Power in California's Energy Future

IEPR Workshop on Geothermal Resources

Wilson Ricks | Clean Air Task Force | June 2026

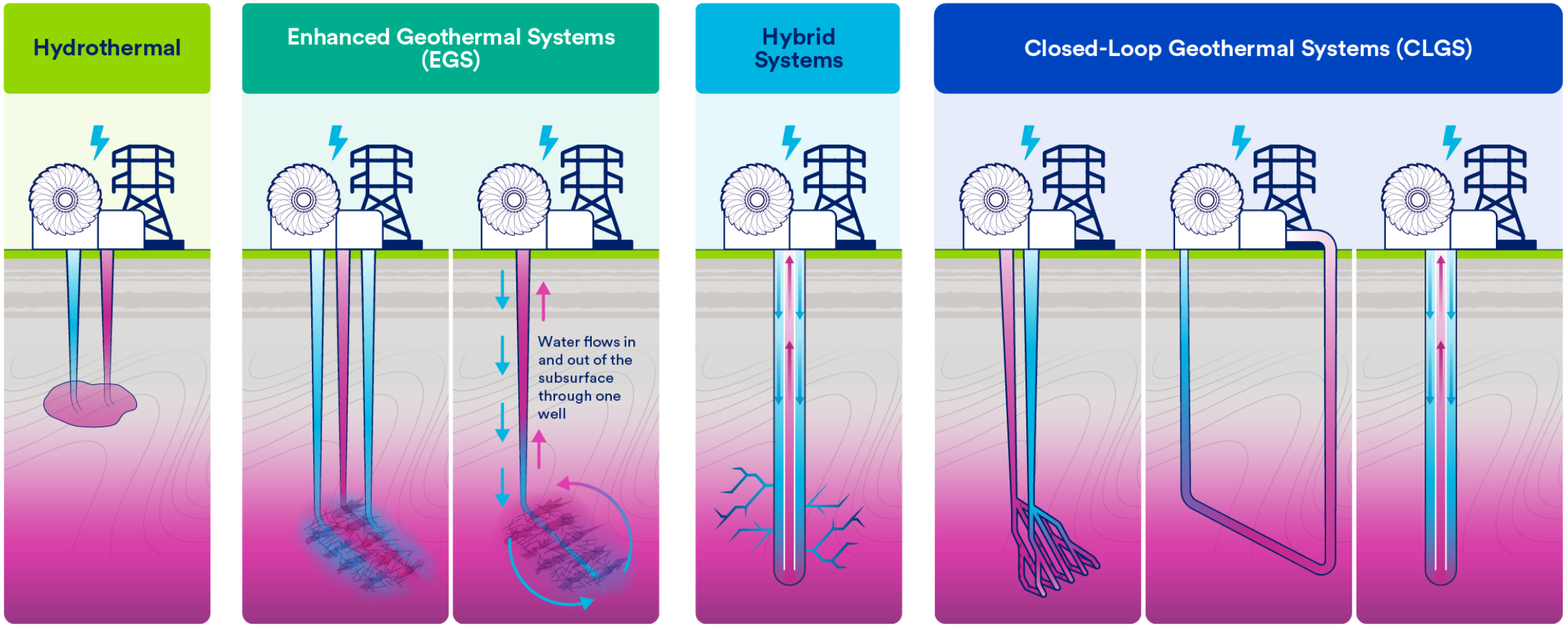
CLEAN AIR TASK FORCE

Geothermal Electricity Generation

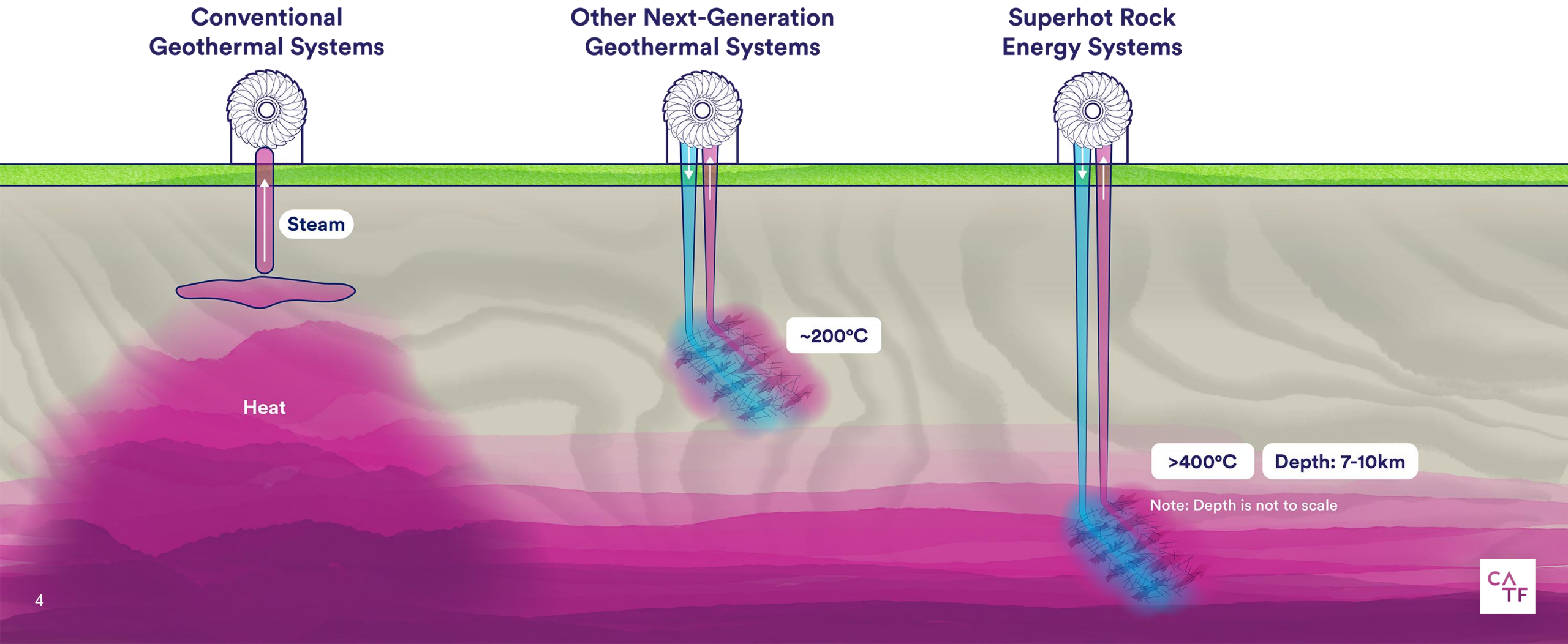


Geothermal Electricity Technologies

CONVENTIONAL — NEXT - GENERATION



The Hotter, the Better



— Why Next-Gen Geothermal?

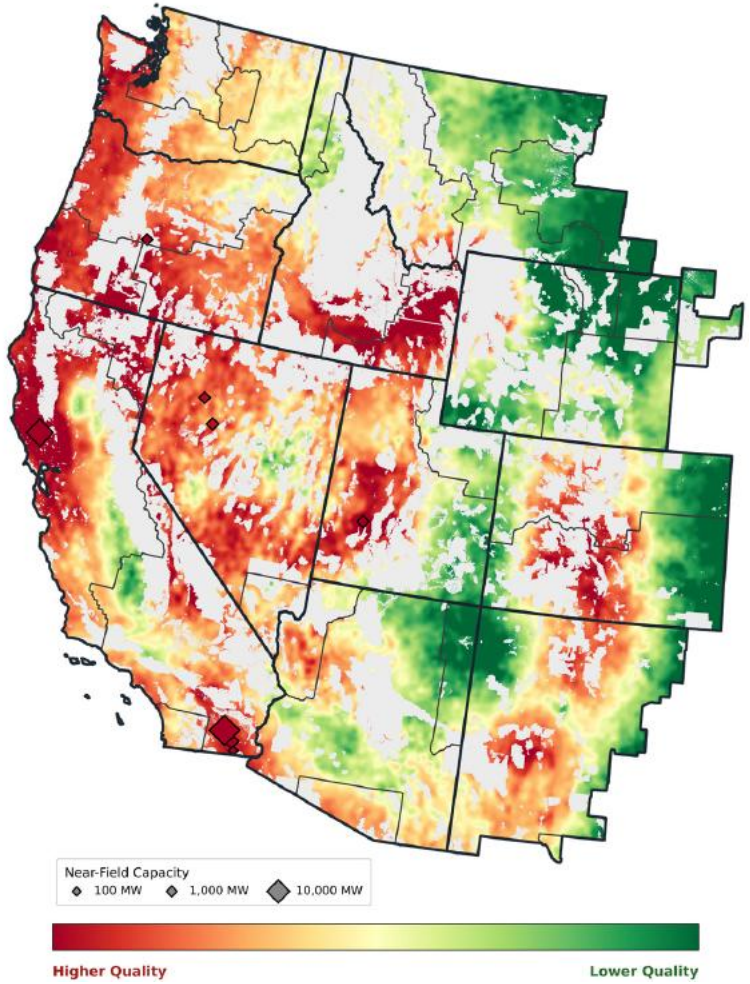
California needs clean firm power

- From the latest SB100 Joint Agency Report draft results: "All scenarios demonstrate a need for large amounts of renewable and zero carbon resources and *in particular*, **clean-firm resources** by 2045"

Next-generation geothermal is one of the most promising clean firm candidates

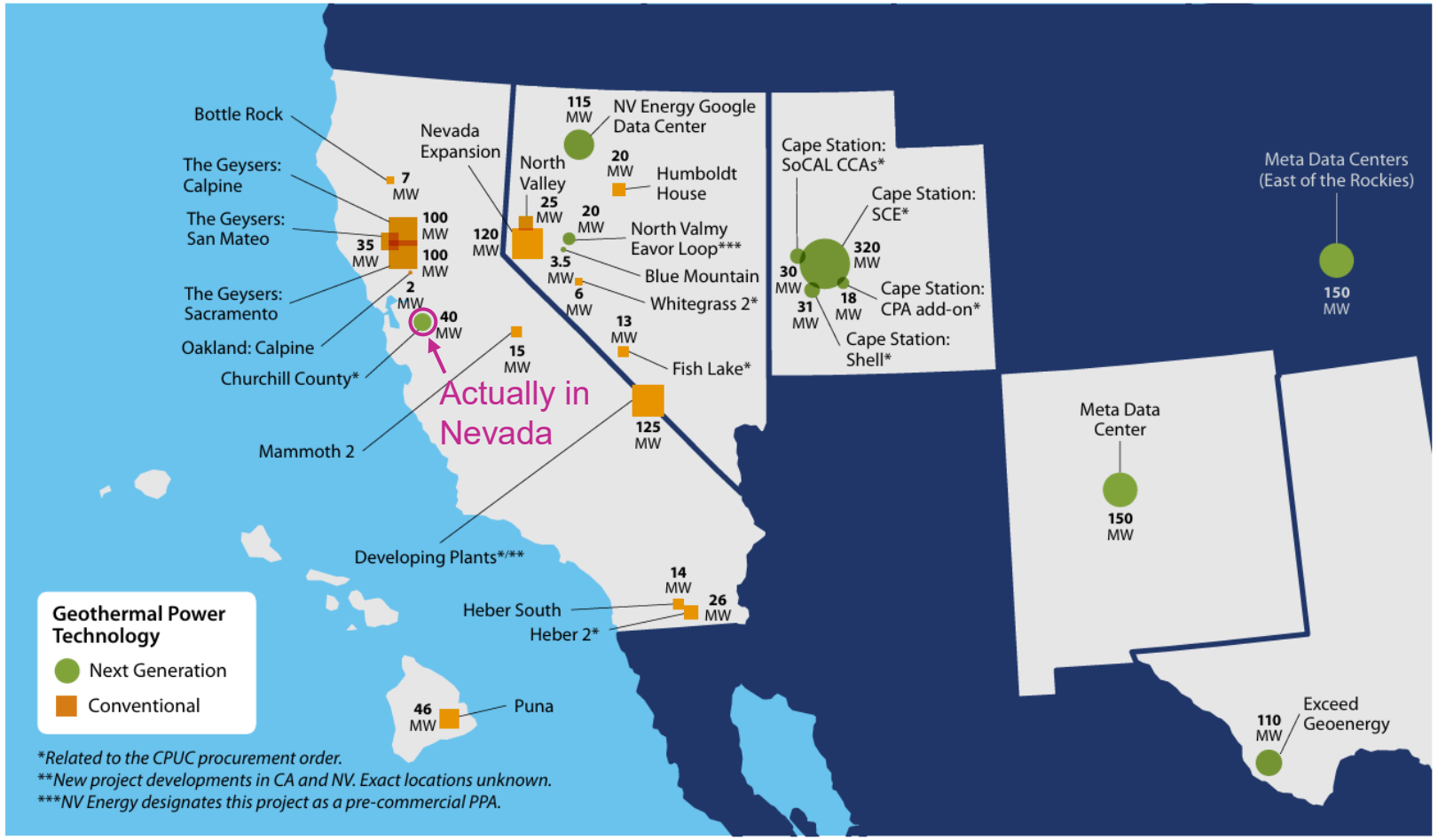
- California's geothermal resource base is among the highest-quality nationwide (and globally)

Geothermal Resource Quality in the Western US



— A Nascent Industry

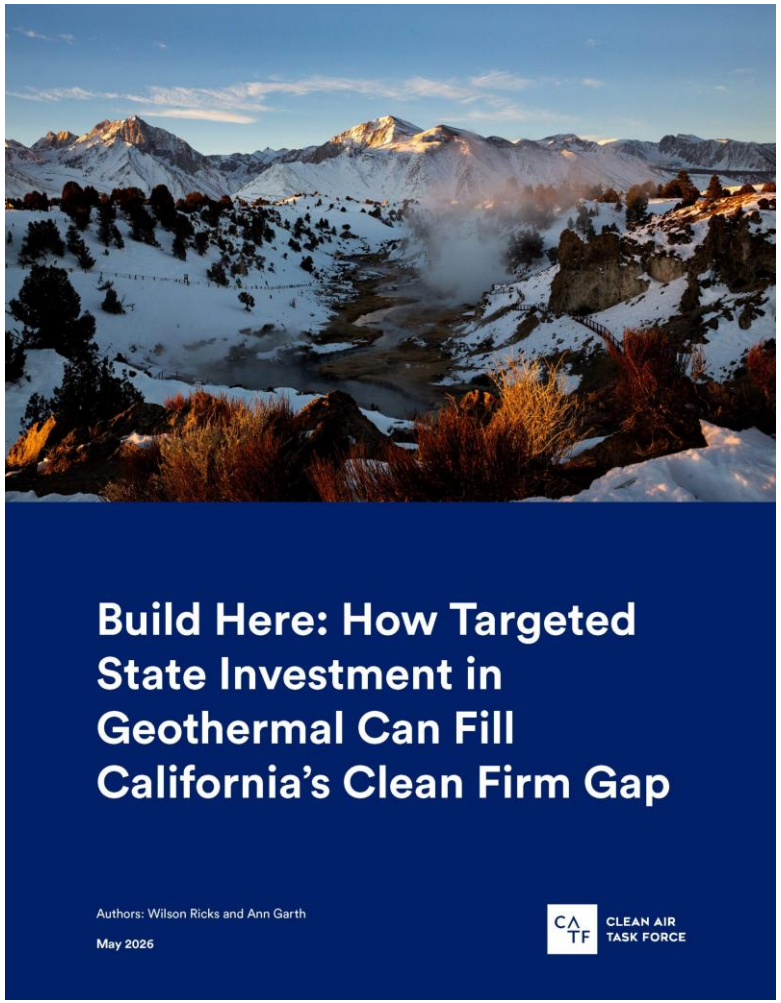
Recently-signed geothermal power purchase agreements



- **>1 GW of next-generation geothermal** is already under commercial contract in the U.S., with most of it sold into California…
- **…but every project is being built out-of-state.**

Source: NLR, 2025 U.S. Geothermal Market Report

— New CATF Research

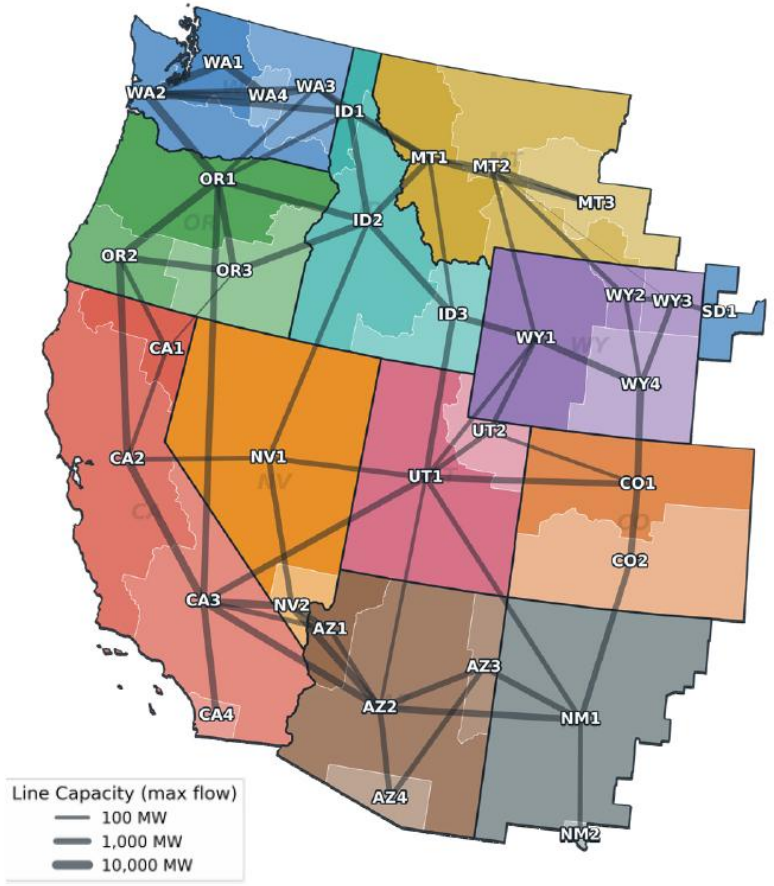


- What role could next-generation geothermal play in California's energy future?
- What would be the benefits of building an in-state industry?
- What state actions are needed to enable scale-up?

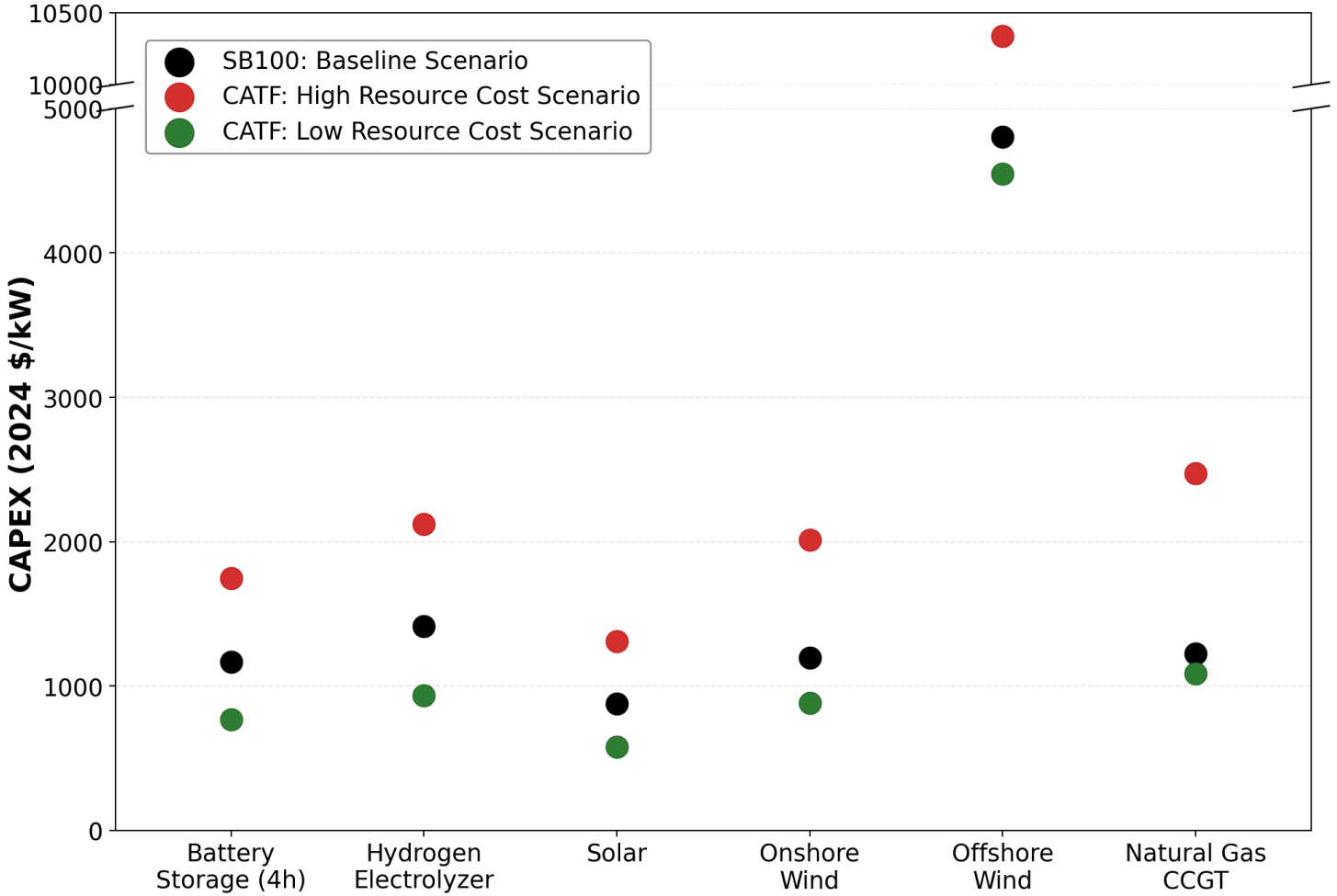
— Modeling Approach

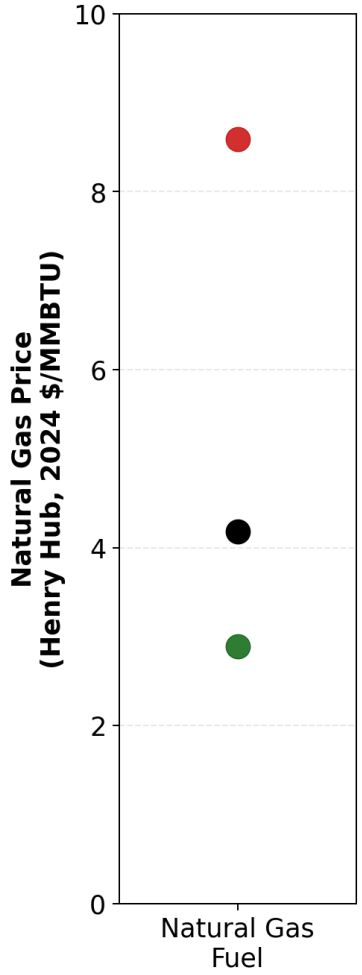
- **Used the open-source model GenX** to examine the impacts of next-generation geothermal – specifically enhanced geothermal systems (EGS) – on the achievability of California's 2045 clean energy targets
- **Represented the entire Western Interconnection** and modeled operations at hourly resolution
- **Designed to mirror the SB100 Joint Agency Report:** similar representation of out-of-state resources; 8 $MMtCO_2$/yr cap on CA electricity emissions (including imports); Diablo Canyon retirement by 2030
- **Examined scenarios with:**
  a) No new clean firm resources available
  b) EGS available, but only outside California
  c) EGS available everywhere

Western Interconnection Model Topology



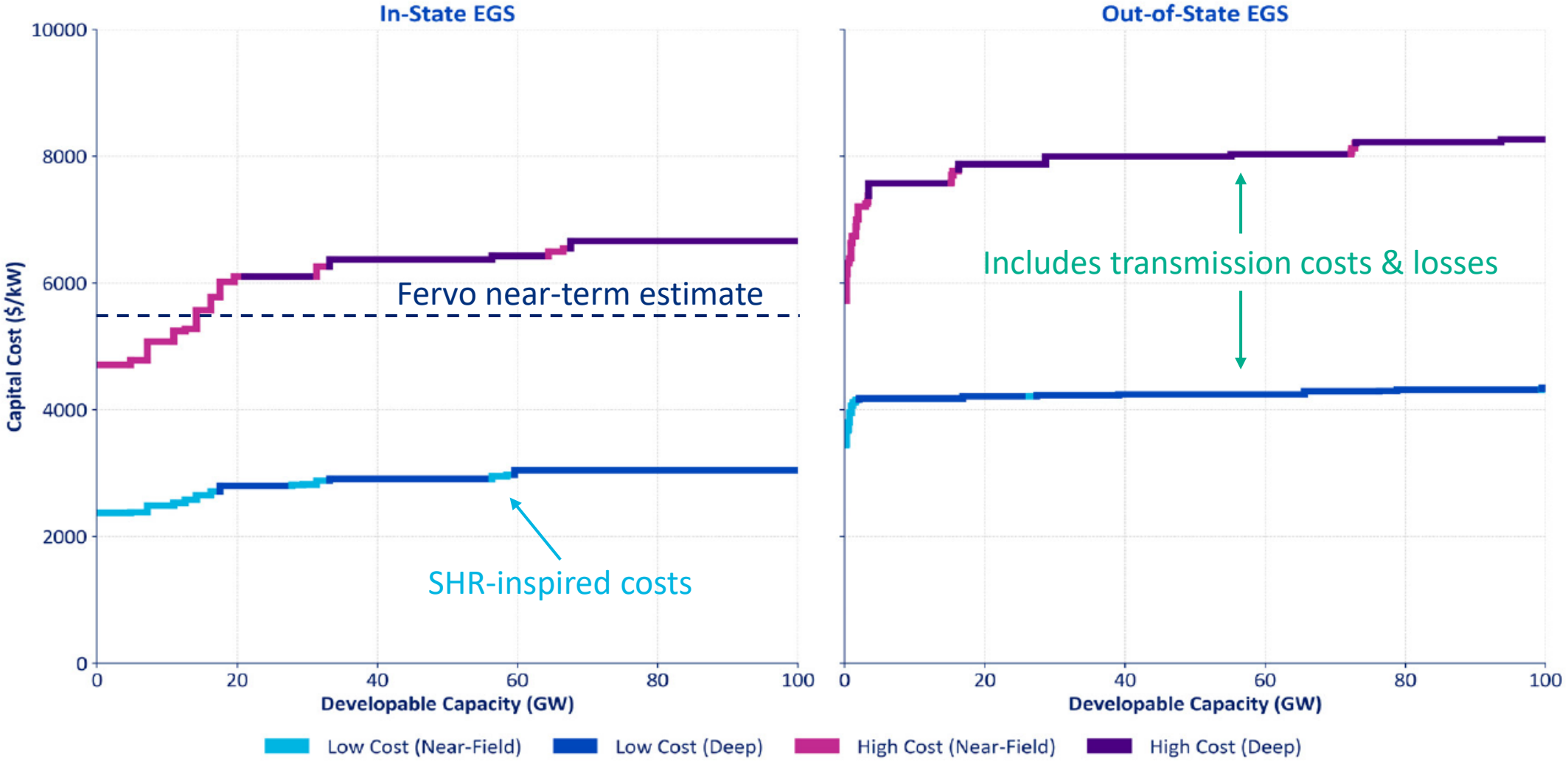
— Input Assumptions: Resource Cost Scenarios





- Used bounding cost scenarios to ensure we understand the influence of assumptions
- **Note:** in the High Resource Cost scenario, costs are still generally lower than the present day

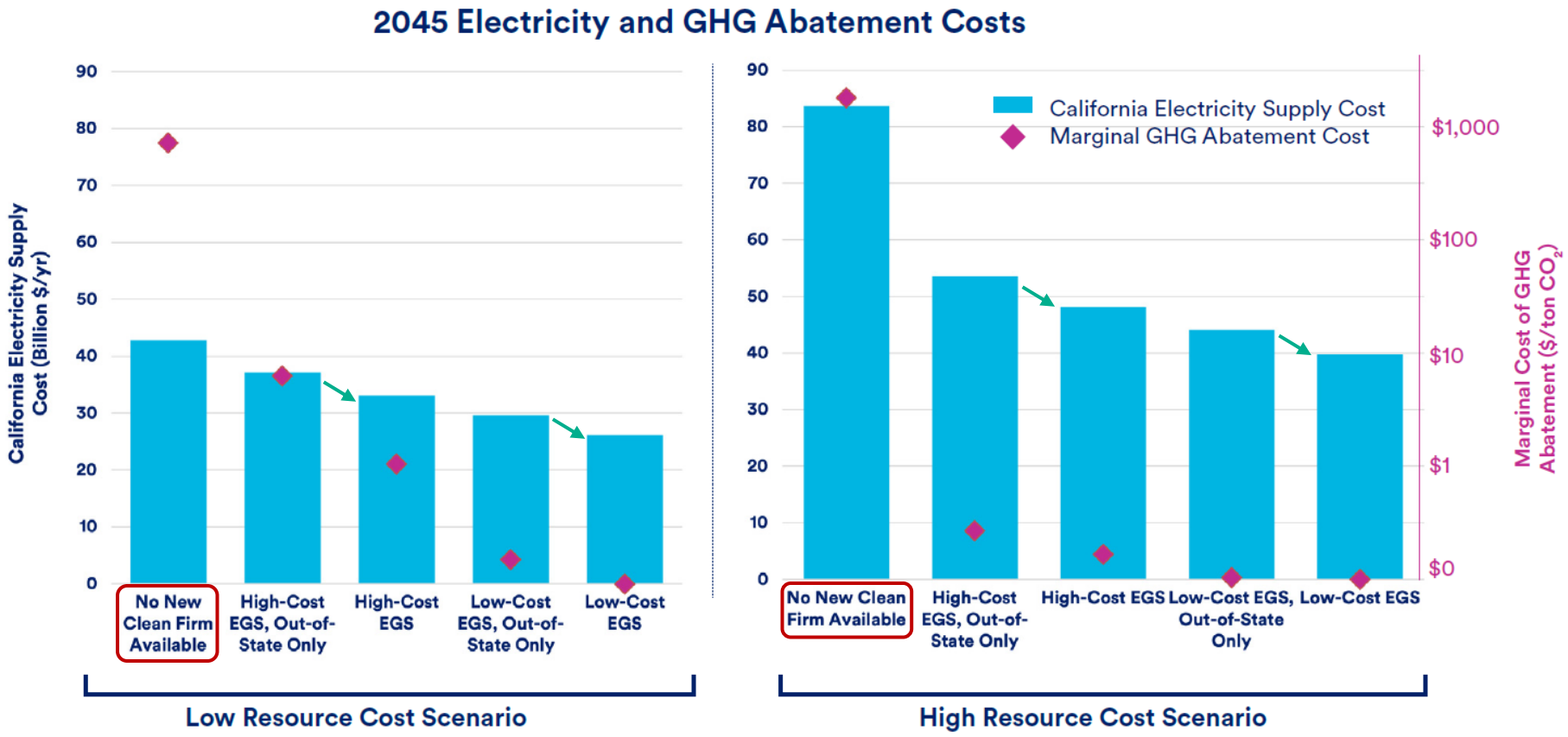
— Input Assumptions: EGS Cost and Availability



Results

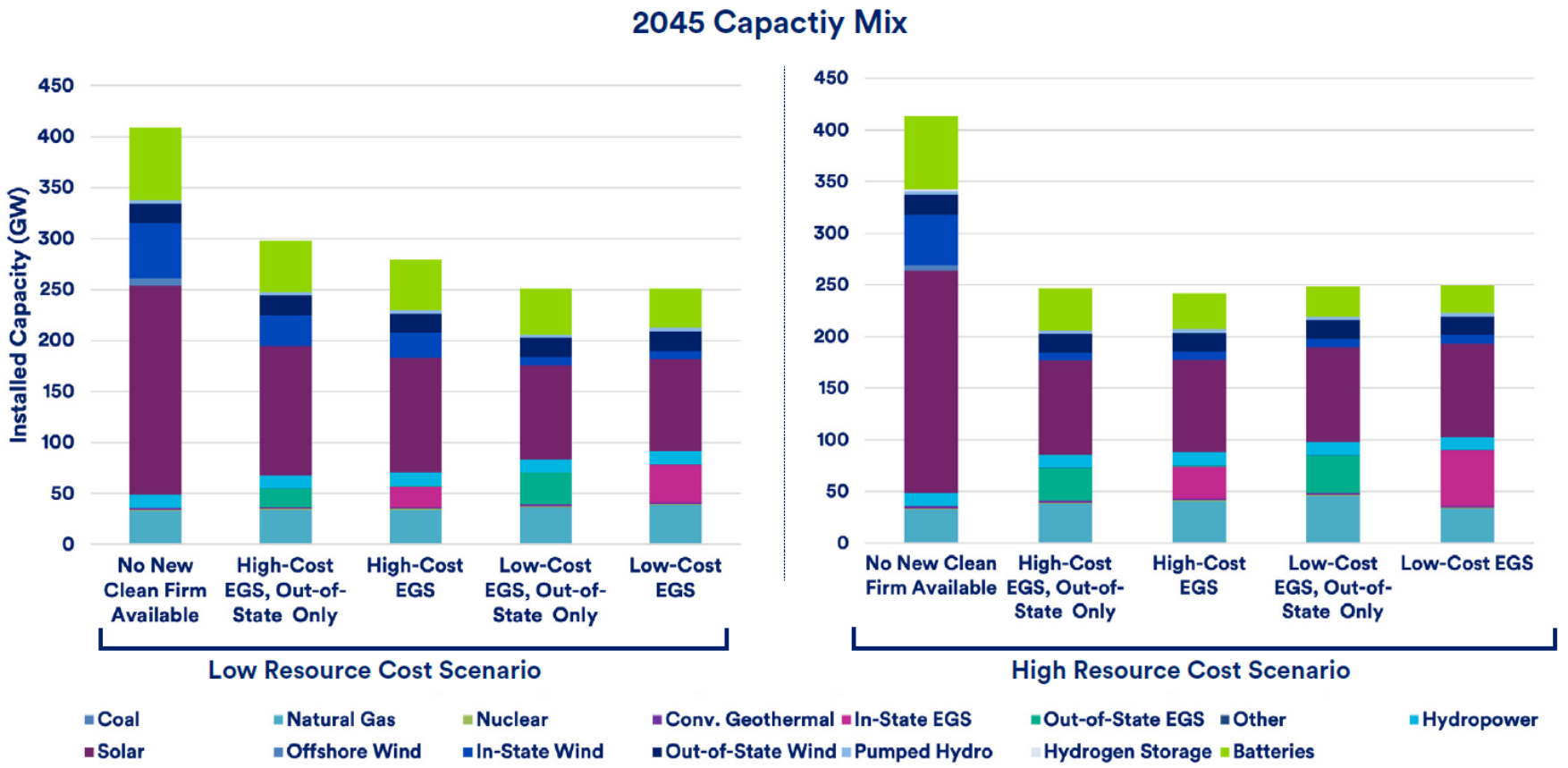
— EGS Consistently Reduces Electricity Costs

- Availability of EGS reduces annual electricity supply costs by **$10-44 billion**, or **23-52%**
- The marginal cost of further carbon abatement (i.e. the necessary CO_2 price) also falls substantially
- Costs are lower ($3.5-5.5 billion per year) when EGS is deployed in-state



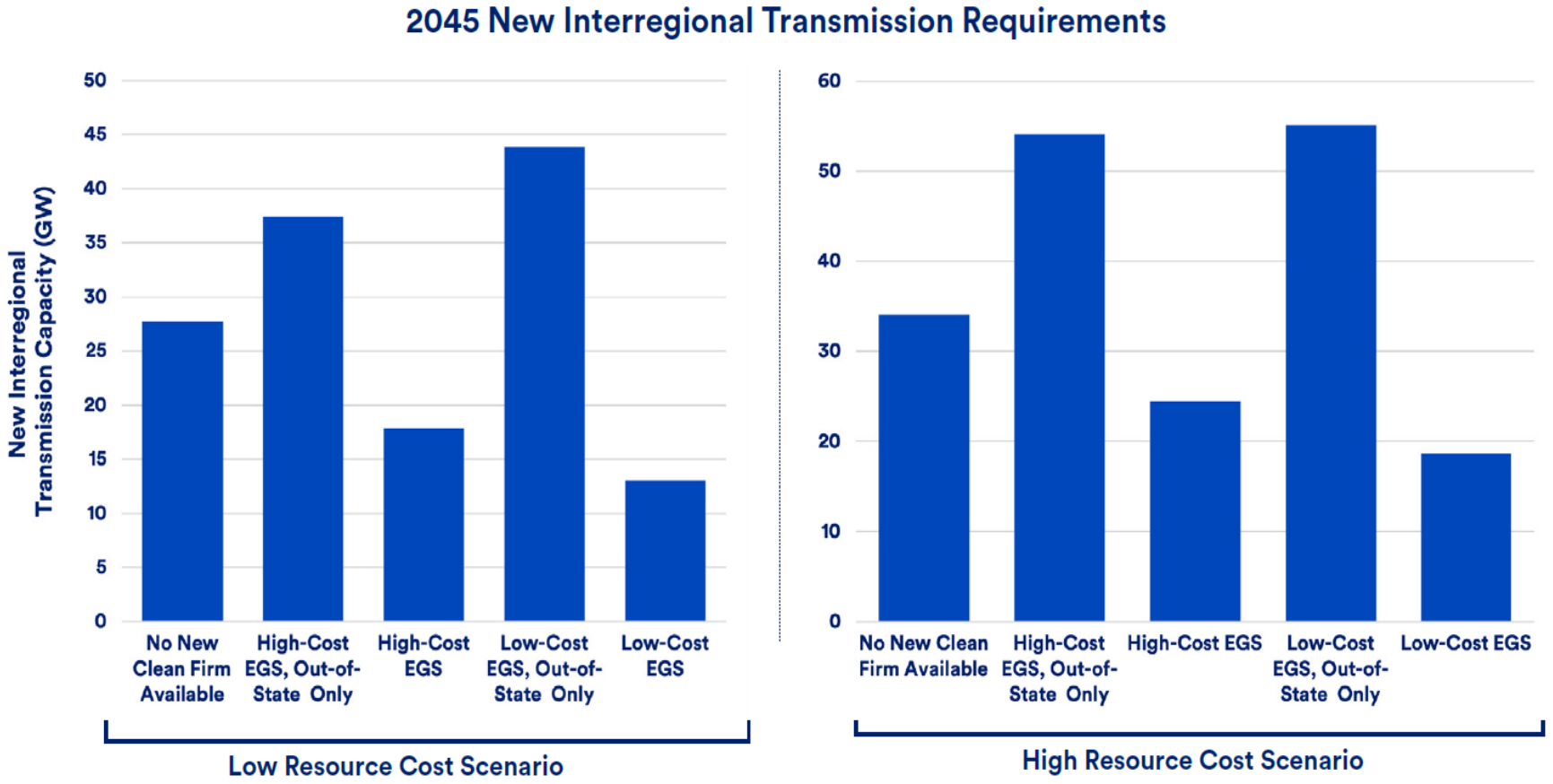
— Required Buildout Rates are Substantially Lower

- Without clean firm options, hitting the 2045 targets requires **large amounts of low-quality in-state wind**, and **solar buildout at a rate of 10 GW/yr**.
- EGS availability (in-state or out-of-state) reduces the required solar buildout to 3 GW/yr – roughly the present pace



— In-State EGS Reduces Transmission Needs

- Relying only on out-of-state EGS increases necessary interregional transmission by more than **10 GW**
- **Deploying EGS in-state drastically reduces interregional transmission buildout requirements**
- Long-distance, cross-jurisdictional transmission deployment is one of our most difficult infrastructure challenges: **SunZia took almost two decades**



— Takeaways

- Incorporating next-generation geothermal into the supply mix can **substantially reduce the cost and infrastructure requirements of a decarbonized electricity supply in California**
- In-state next-generation geothermal deployment reduces costs meaningfully, but its biggest benefit is **drastically lower interregional transmission expansion**, which could be a major bottleneck
- Other emerging technologies could fill a similar role, but geothermal is among the most promising – **and we only have so many shots on goal**
- We urge California to support local development via: **testbeds that de-risk local geology**, **improved electricity system planning**, **permitting and regulatory modernization**, and **proactive community engagement**

Thank you