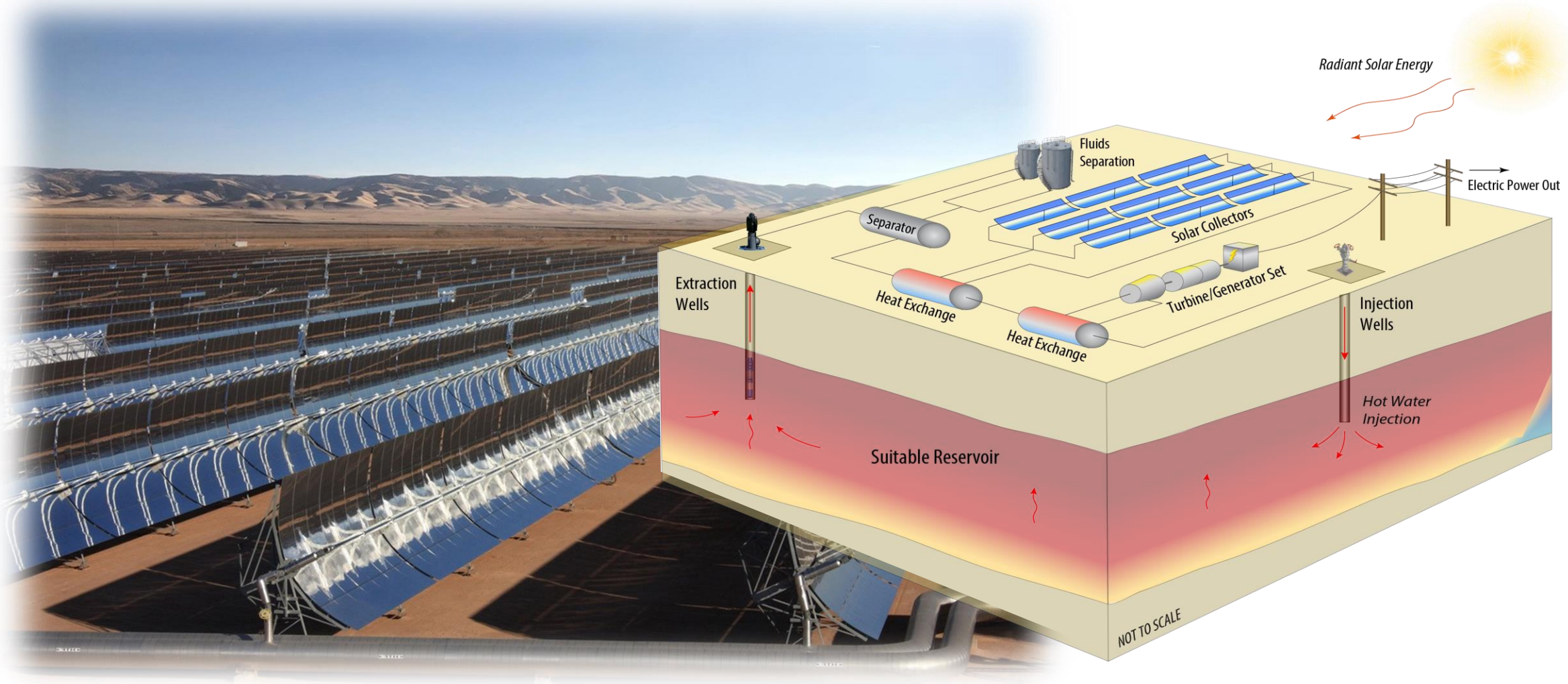
Geologic Thermal Energy Storage (GeoTES)

Premier Resource Management, LLC



DISPATCHABLE GEOTHERMAL POWER – 1,000+ Hour Storage

Renewable Power. Peaking Power. Zero Emissions. Seasonal Storage.

WHAT WE NEED TO DEMONSTRATE

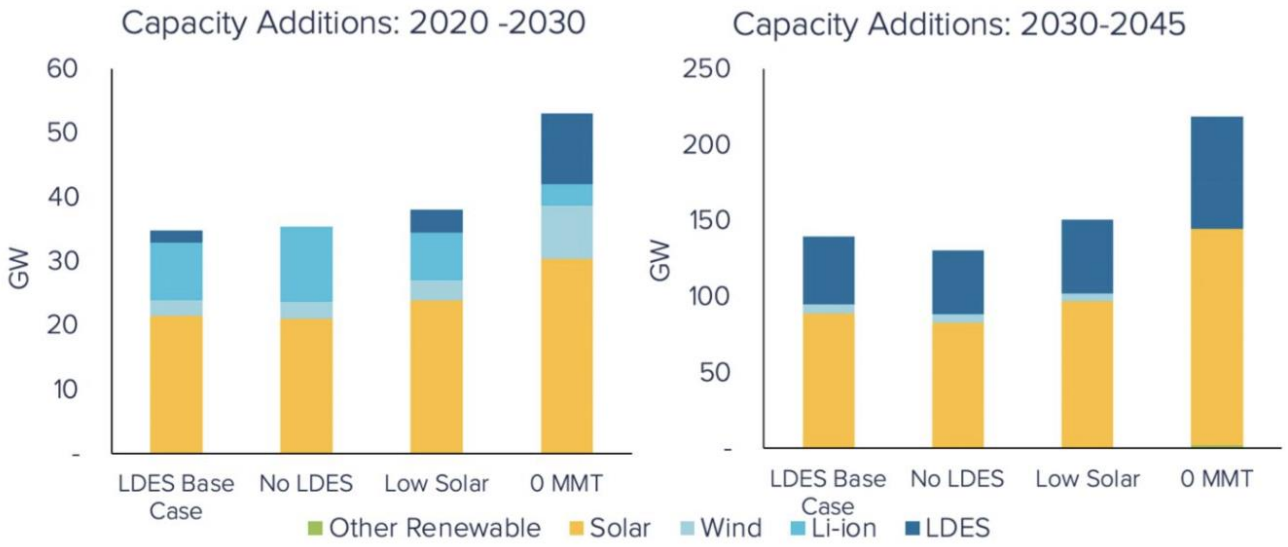
PRM has been working on the following items since 2017, each requires CalGEM to process applications or NOIs:

1. Tulare Aquifer Exemption is ready for Public Hearing
2. UIC for GeoTES
3. 8 new wells for GeoTES Demonstration (6 injectors, 2 producers) within established oil field boundaries at Antelope Hills

PROBLEM

California's grid does not have long duration energy storage.

CAISO needs 50 gigawatts installed by 2040.



https://www.greentechmedia.com/articles/read/california-could-need-55gw-of-long-duration-storage-to-meet-2045-carbon-free-grid-goal

GEOLOGICAL THERMAL ENERGY STORAGE (GeoTES) IS THE ANSWER.

GEOLOGIC THERMAL ENERGY STORAGE

GeoTES DEVELOPER

PRM, LLC
Premier Resource Management, LLC

TECHNOLOGY PARTNERS

RAMSGATE ENGINEERING, INC.

GOSSAMER SPACE FRAMES

GEOTHERMAL PARTNERS (Since 2023)

NREL Transforming ENERGY

BERKELEY LAB
Lawrence Berkeley National Laboratory

INL
Idaho National Laboratory

U.S. DEPARTMENT OF ENERGY

$6 MILLION GRANT – SOLAR ENERGY TECHNOLOGIES

U.S. DEPARTMENT OF ENERGY

MILESTONES

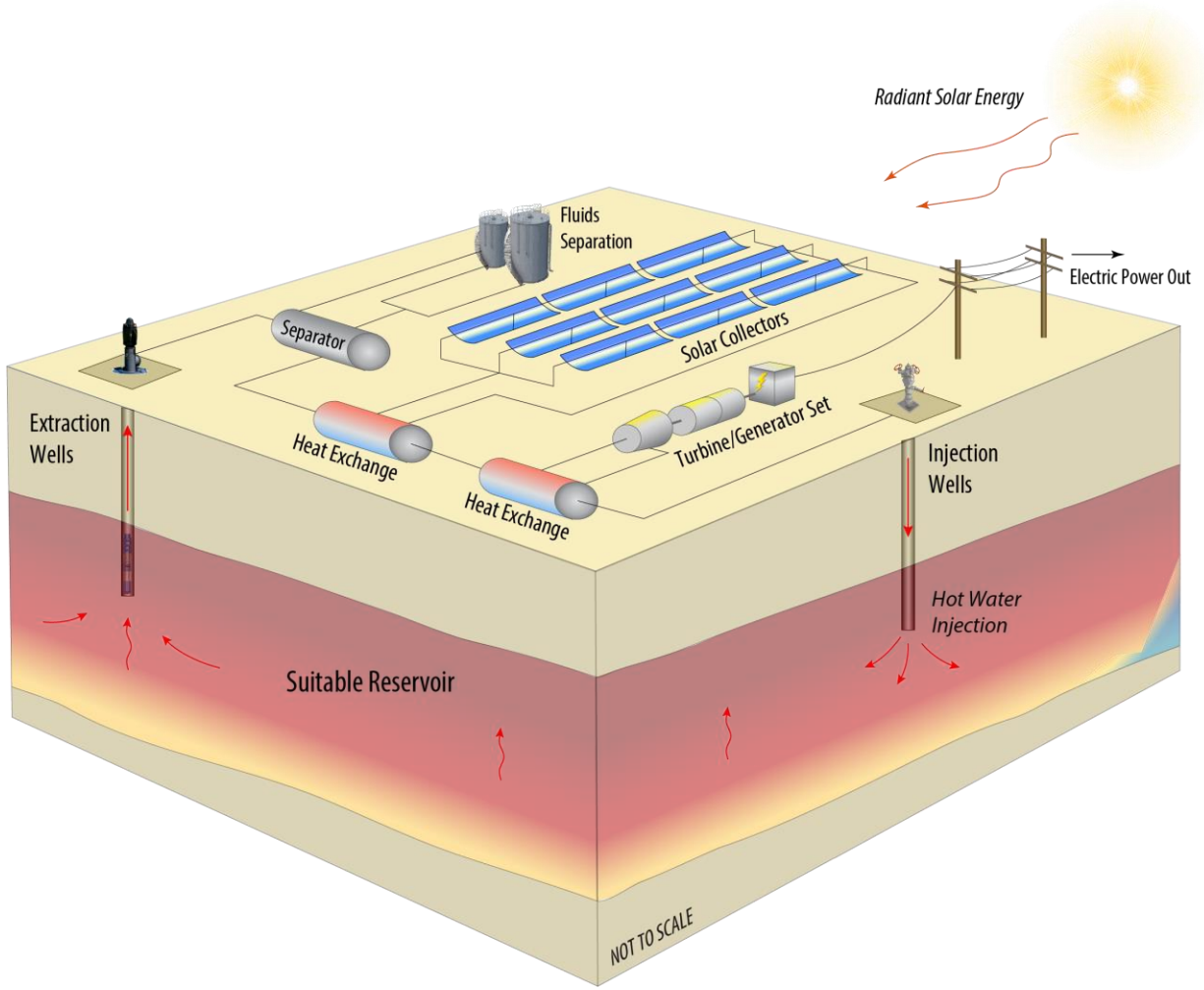
2025 – Complete Permitting

2026 – Start Construction

2027 – Technology Demonstration

Premier Resource Management (Bakersfield, CA): In partnership with the National Renewable Energy Laboratory, this project will develop a 100-kilowatt electric demonstration power plant with more than 12 hours of storage, which stores thermal heat underground at depleted oil reservoirs in California. (Award Amount: $6 million)

GeoTES TECHNOLOGY DEMONSTRATION



Premier Resource Management was awarded a **$6,000,000 grant from DOE Solar Energy Technologies Office** to demonstrate GeoTES in Kern County, California (2025-2028).

PRM's partners include National Renewable Energy Laboratory, Lawrence Berkeley National Lab, Idaho National Lab, DOE Geothermal Technologies Office.

PRM has been permitting for underground injection control and drilling wells since 2018, with limited progress.

PRM's GeoTES demonstration project will prove the conversion of oil reservoirs to dispatchable thermal energy storage systems capable of **producing geothermal power on a daily basis (peak and night) while offering 42 days of ultra long duration storage.**

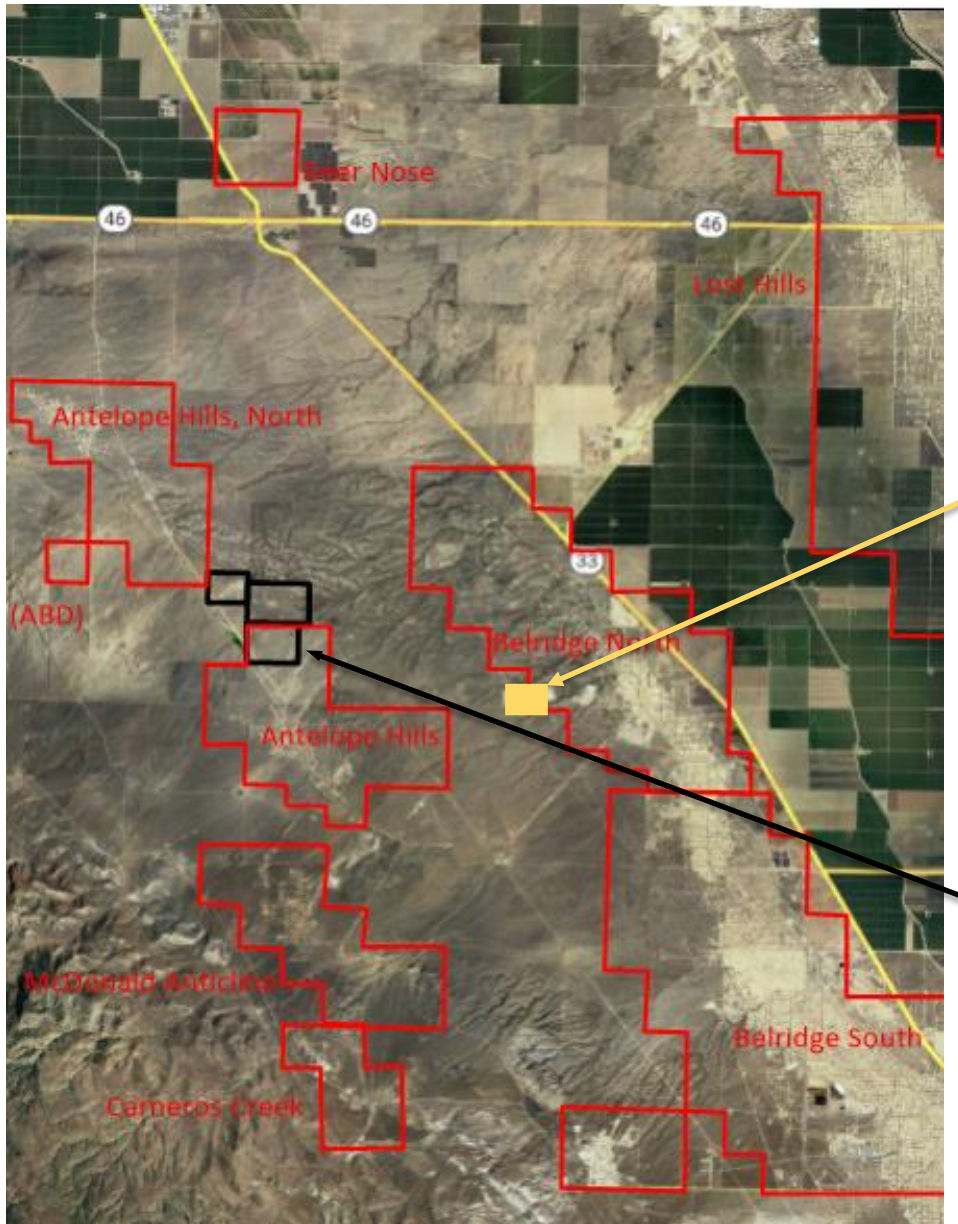
NREL Transforming ENERGY

BERKELEY LAB
Lawrence Berkeley National Laboratory

INL
Idaho National Laboratory

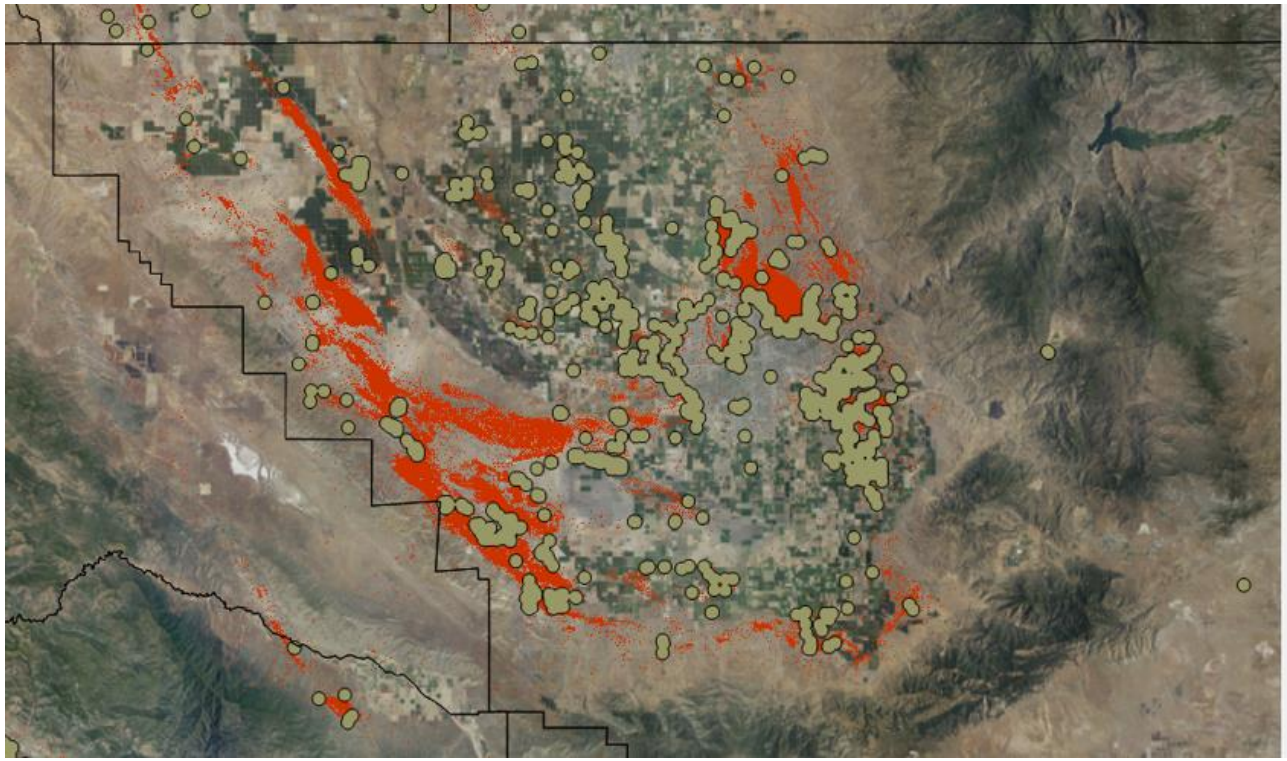
LOCATION ATTRIBUTES

- Demonstration will take place within Oil Field Boundaries - Antelope Hills
- Near PG&E substation
- Good solar area with flat land
- No impact to consumable water
- Only brackish water will be used
- Not near sensitive receptors
- Convert depleted oil reservoirs

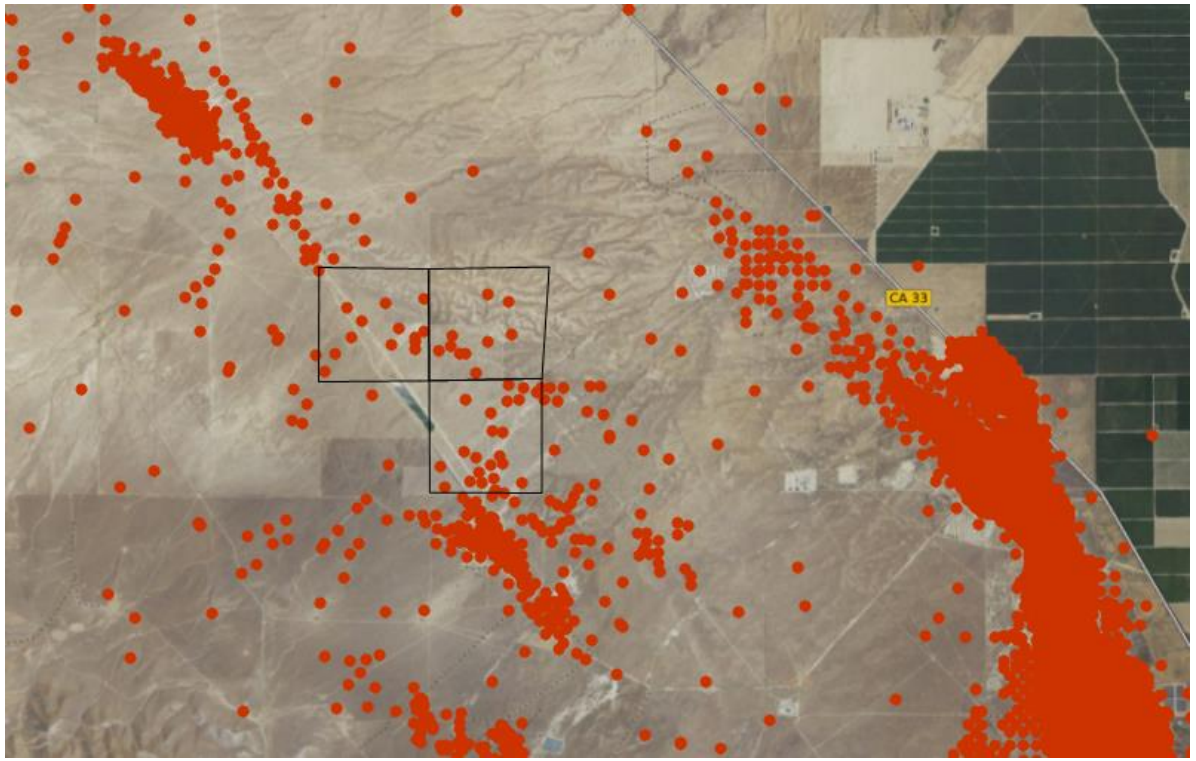


Oil field boundaries

PRM PROJECT LOCATION – WEST KERN COUNTY, CA



Oil and gas wells (red) in the southwest San Joaquin Valley with health protection zones (green/black outline)

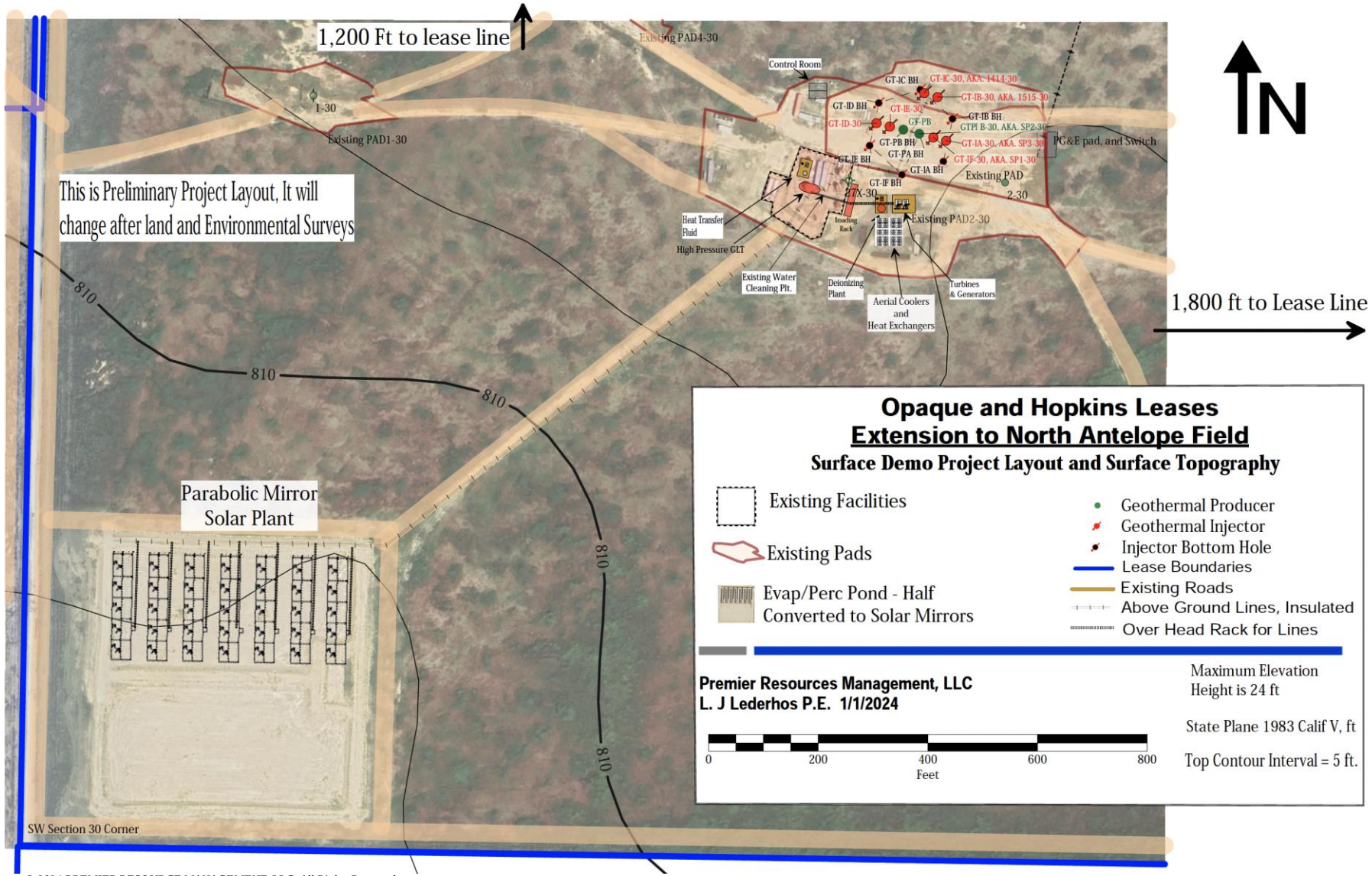


PRM's lease in Antelope Hills within the area (outlined in black) with oil and gas wells (red)

NOT NEAR SENSITIVE RECEPTORS

NO HEALTH PROTECTION ZONE

GeoTES Demonstration – Option A



N

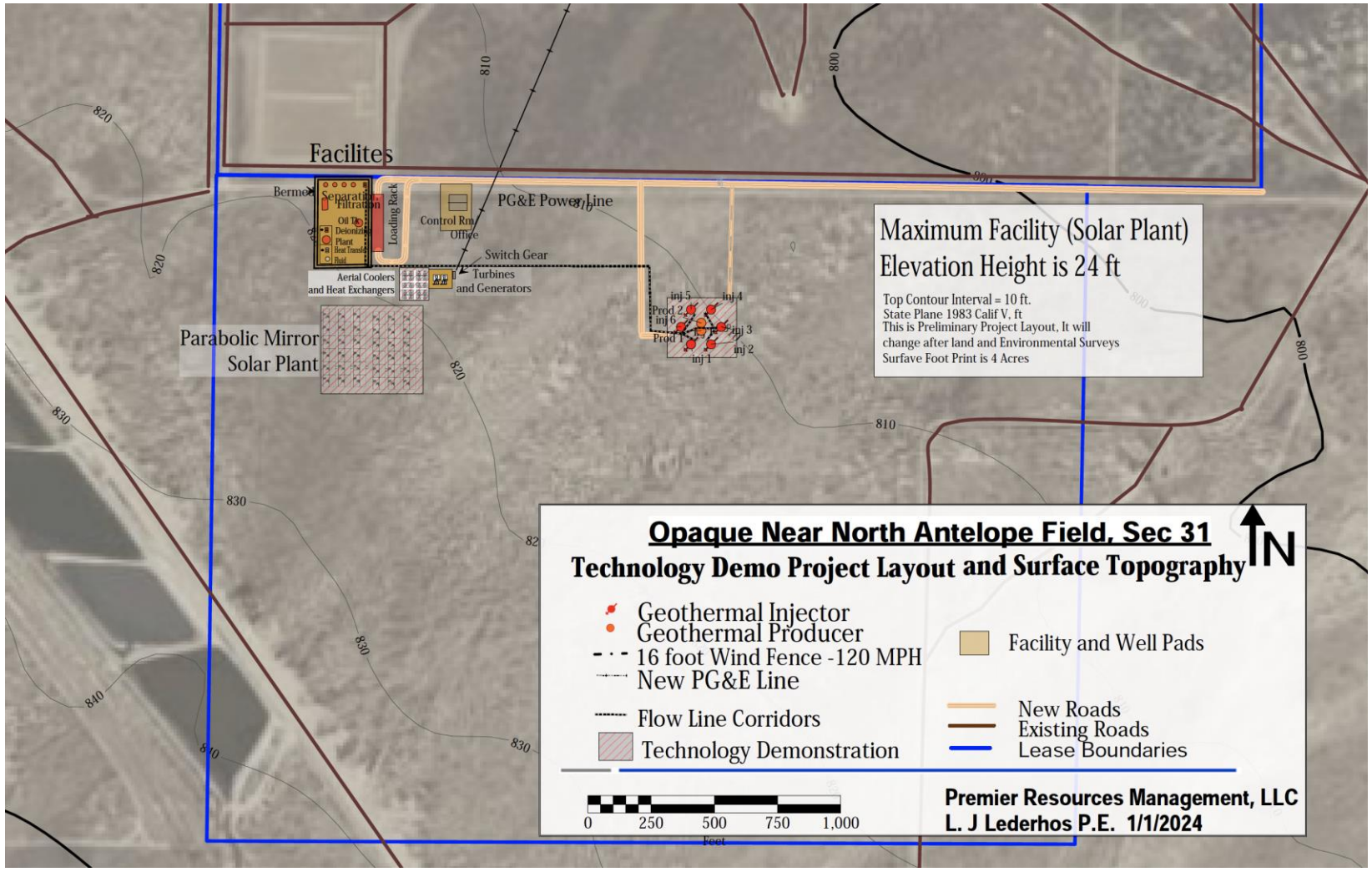
Convert existing facilities under Class 1 CEQA exemption.

NEPA will be completed in our first budget period w/ DOE.

PRM seeks fair treatment by CalGEM to process drilling permits.

PRM seeks fair treatment by Water Boards to process UIC.

GeoTES DEMONSTRATION – Option B



The GeoTES demonstration is located within the established oil field boundaries at Antelope Hills – West Kern County.

PRM will use less than five acres of surface for concentrated solar troughs (2 acres), facilities (1 acre) and well pad (1 acre).

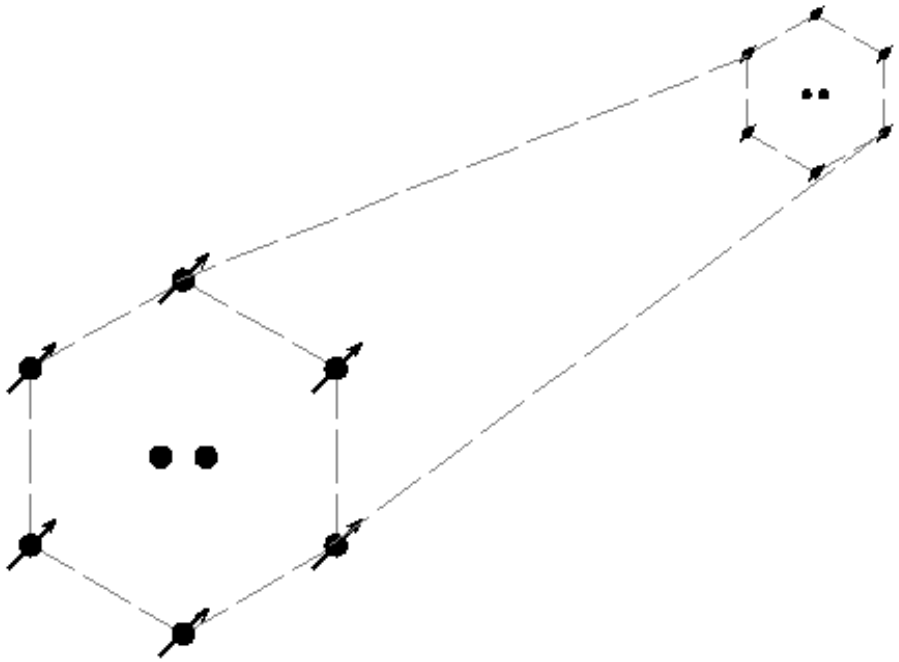
Biology and cultural surveys were completed in 2024, PRM's biology team is continuing surveys in 2025.

There will be no significant environmental impact from demonstrating GeoTES in existing oil fields that predate CEQA.

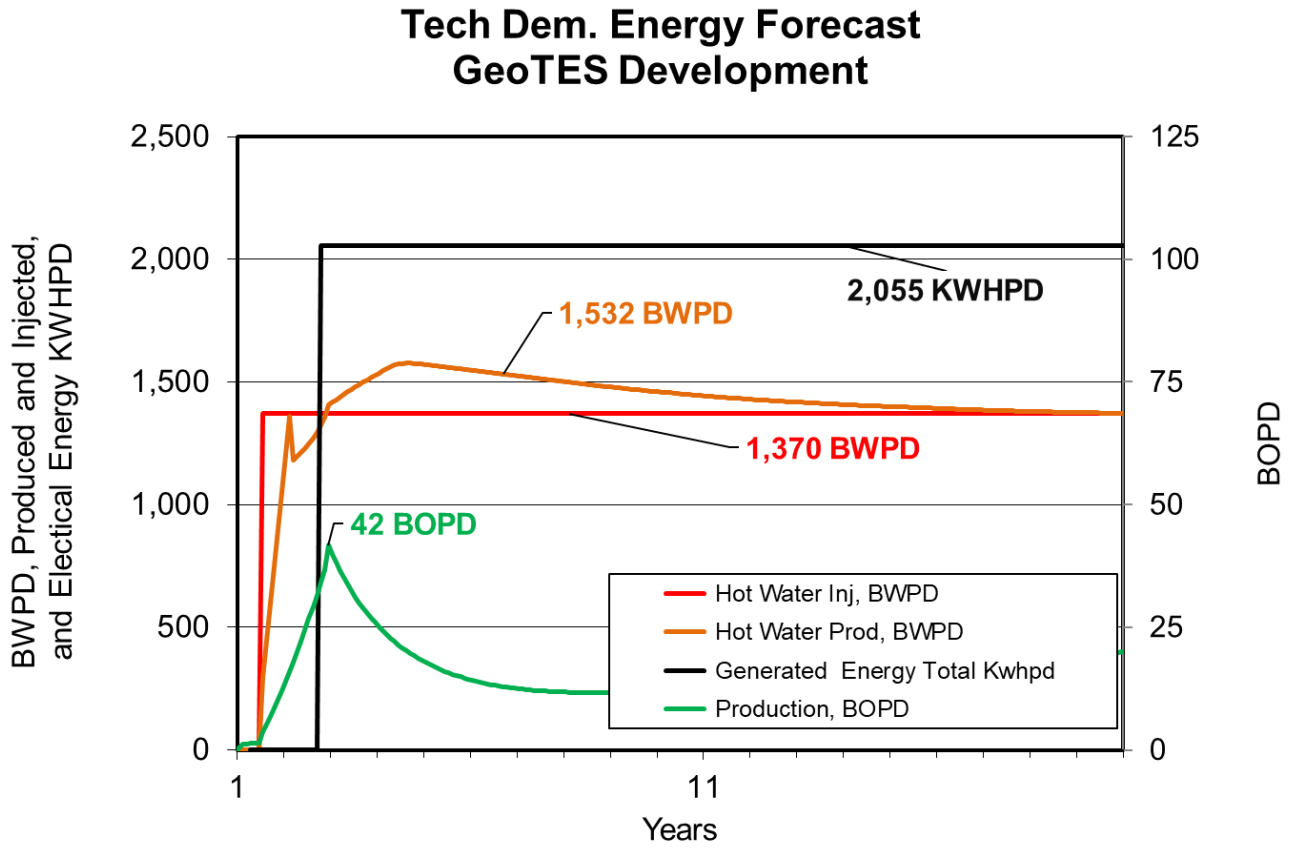
PRM seeks a Common Sense Exemption from CalGEM to demonstrate this first-of-a-kind clean energy storage technology.

Would CalGEM consider a CEQA Exemption pathway for the GeoTES Demonstration?

WELL PATTERN & PRODUCTION FORECAST



The well pattern above shows two producers surrounded by 6 injectors which will be drilled at ½-acre spacing from the well pad



The Technology Demonstration energy forecast above reflects the long-term energy production strictly from this demonstration

CARBON INTENSITY OF OIL PRODUCTION

California Air Resources Board Low Carbon Fuel Standard Crude Oil Lifecycle Assessment shows the 2022 Crude Average Carbon Intensity Value for Antelope Hills Oil was 2.84. The Annual Crude Average CI (all barrels) was nearly 4.5 Times Higher at 12.69.

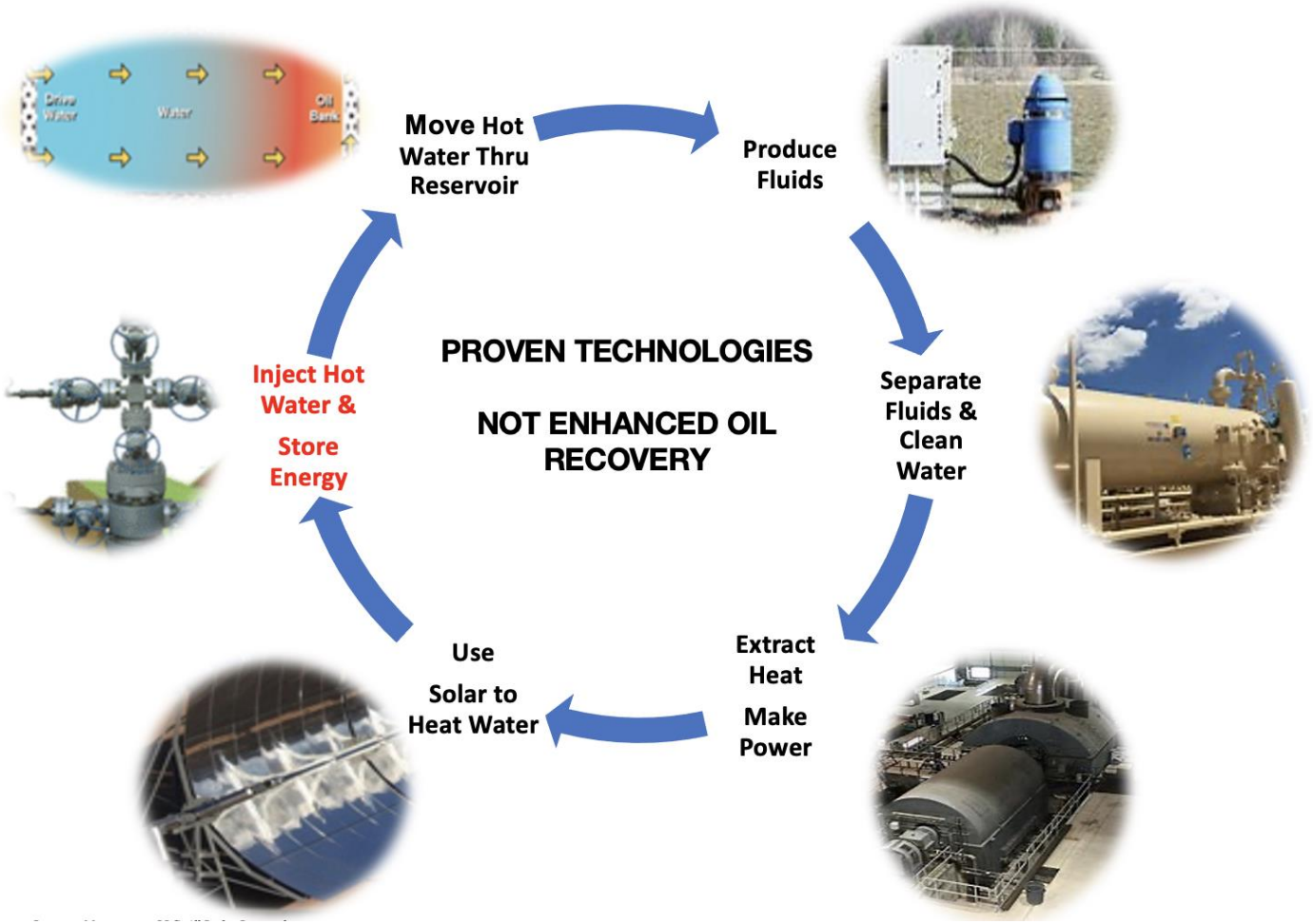
Low Carbon Intensity at Antelope Hills Supports Common Sense Permitting for GeoTES.

Table 2. 2022 Refinery Crude Supply

Country/State	Crude Name	CI (g/MJ)	2022 Volume (bbl)
	Annual Crude Average CI	*12.69*	
US California*	Aliso Canyon	4.94	78,156
	Ant Hill	20.81	12,392
	Antelope Hills	2.84	58,023

Source: https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/crude-oil/2022_Crude_Average_CI_Calculation_initial.pdf

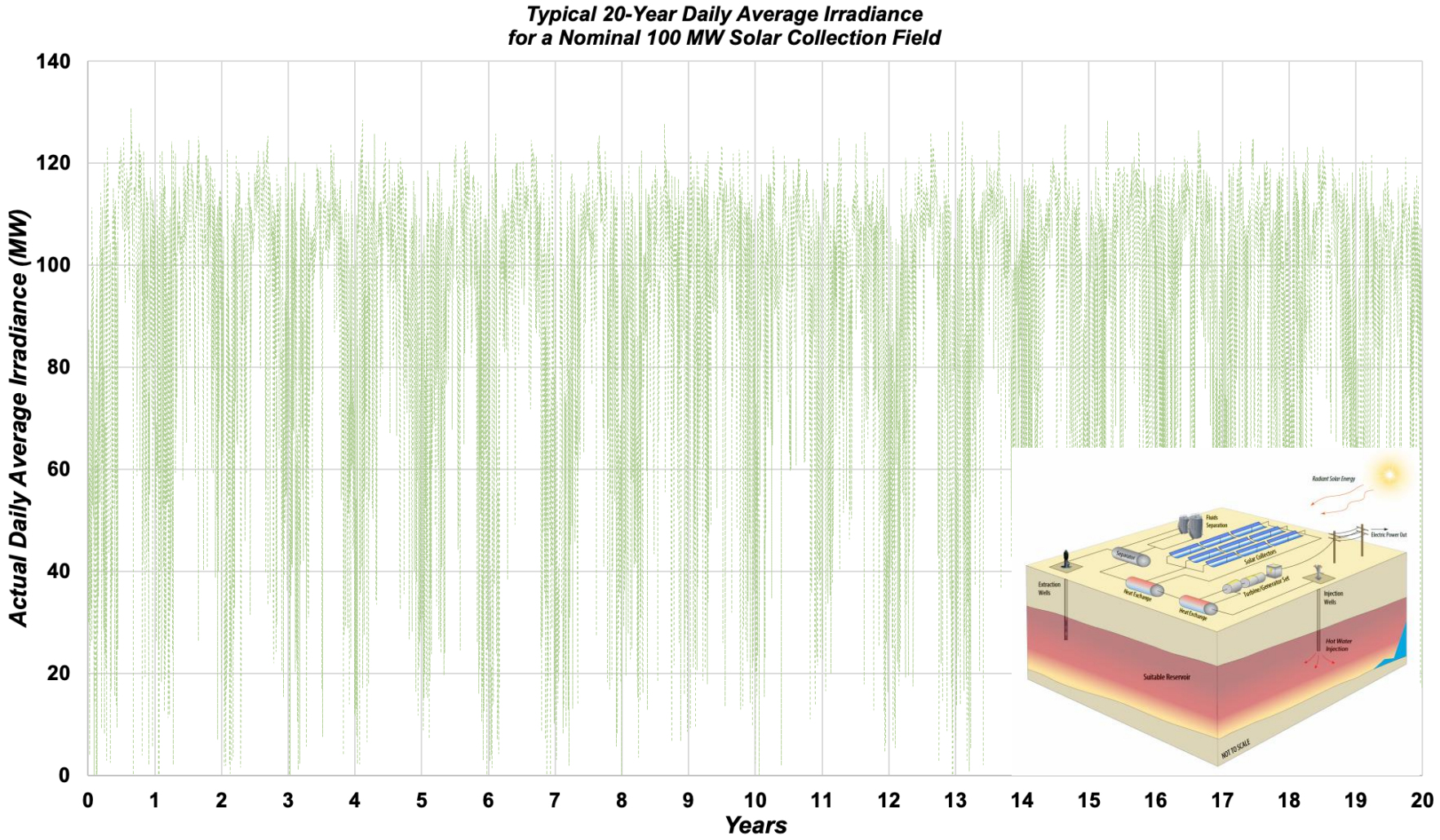
HOW CST-GeoTES WORKS



- Storing heat from the sun into a **porous permeable reservoir** for reuse in power production
- Heat is stored by collecting solar energy and transferring to circulating produced fluids
- Circulating fluid boils clean water to produce demand-matching power

RESERVOIR HEATING & SOLAR GEOTHERMAL COMPLEXITIES

- Solar irradiance is highly variable
- Heat absorption process is limited by fluids circulation
- Power production is controlled by fluid circulation and limited by grid demand

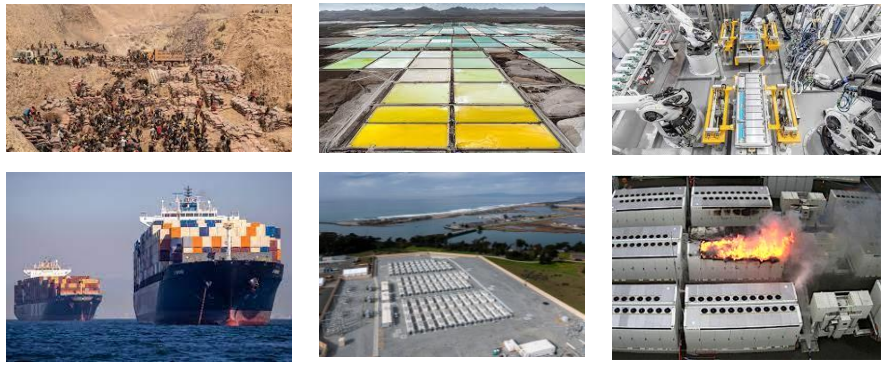


COMPETITION

GeoTES

Eliminate Fossil Fuels

2-4 Hour Lithium Batteries



HYBRIDIZE

Concentrated Solar

Reservoir Storage

Benefits

Jobs & Investment

Cheap, clean power

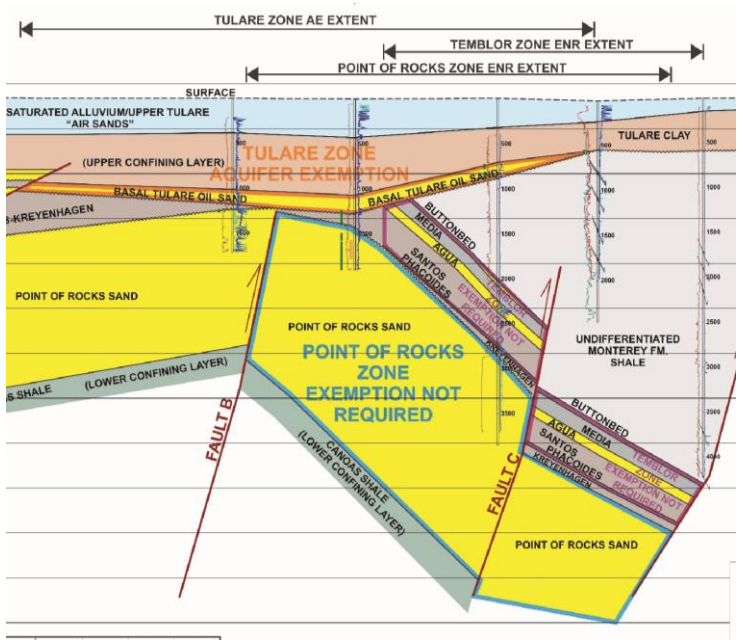
Local supply chain

Water reuse

No waste stream

Zero emissions

1,000 Hour Reservoir Storage



Above: Project site. Below: subsurface cross section.

CALIFORNIA POLICY REQUESTS

- CEQA exemption to demonstrate the technology
- PRM would like **fair treatment** by CalGEM (drilling permits) and Water Boards (UIC).

CONCLUSIONS

- The GeoTES technology demonstration is a combination of known technologies, integrated in a novel process.
- GeoTES aligns with AB32, SB100, and clean energy goals.
- Application of this technology supports local jobs and disadvantaged communities.
- Application of this technology supports local manufacturing and reduces reliance on foreign oil, mineral supply chains, and foreign-made batteries.
- The use of “levelized” metrics are of marginal value as currently employed, and are not appropriate to use in public policy. Current policies and associated metrics are creating and exposing a fragile grid while impacting all ratepayers with ever-increasing utility costs.
- Clean, affordable, reliable energy can be achieved with GeoTES, with integral long duration energy storage potential (1,000 hours).
- Transitioning oil fields in Kern County to GeoTES offers the potential for 100GW of electric power in both dispatchable and seasonal support services, to supply all of California’s electrical needs, with a power/emissions production performance equivalent to nuclear power plants, but in much shorter time periods and lower costs.
- Any crude oil produced as a byproduct of GeoTES in Kern County will be among the lowest carbon intensity products in the world, providing a pathway towards decarbonization that aligns with the California Environmental Quality Act.