

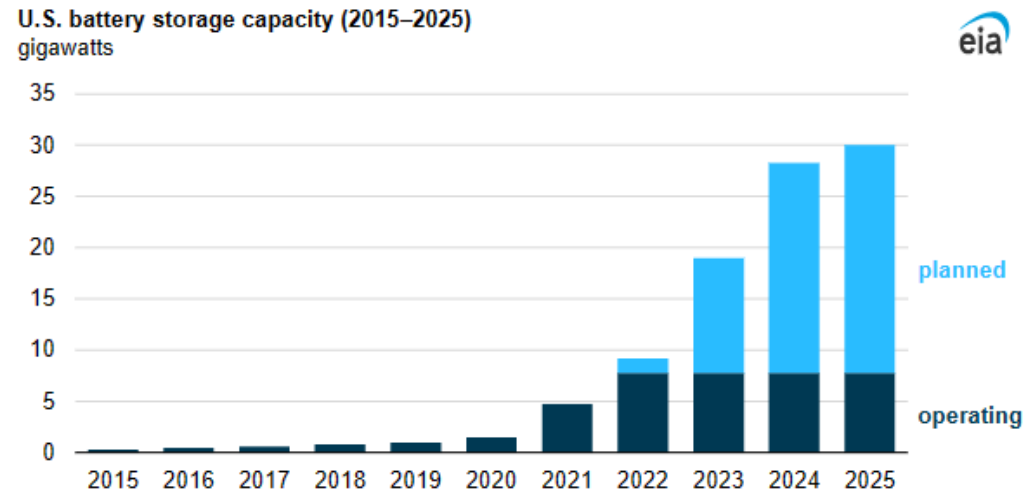


2024 Commissioning of a Cost Effective “Underground Battery” in Texas

Lev Ring, Sage Geosystems

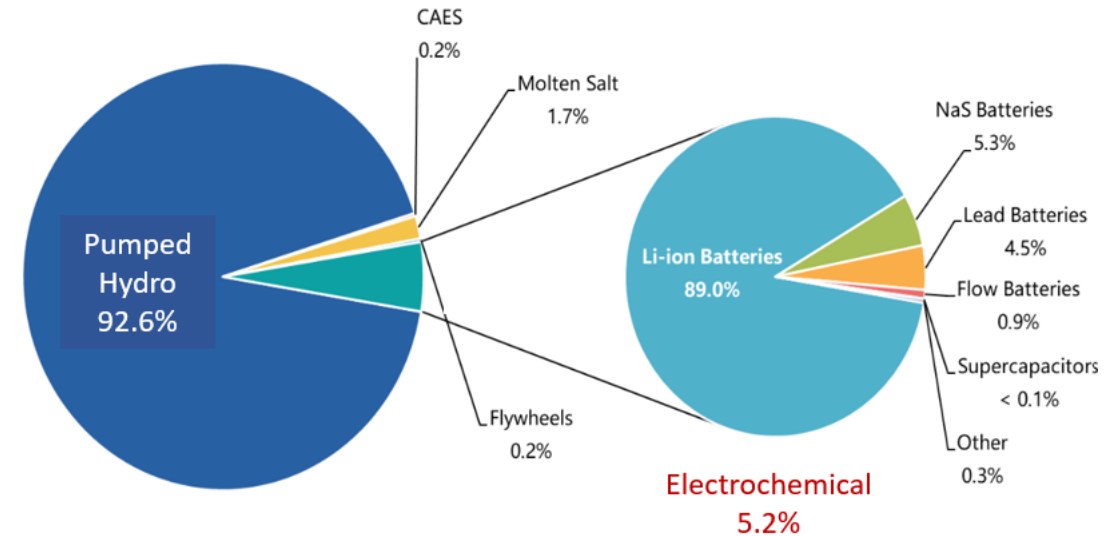
Is there an alternative to long-duration PSH?

U.S. battery storage capacity will increase significantly by 2025



Data source: U.S. Energy Information Administration, *Preliminary Monthly Electric Generator Inventory*, October 2022

Reference: U.S. Energy Information Administration ([U.S. Energy Information Administration - EIA - Independent Statistics and Analysis](https://www.eia.gov))



Reference: CNESA Global energy Storage Market Analysis – 2020.Q1 (Summary) ([China Energy Storage Analysis](https://www.cnesa.org) – en.cnesea.org)

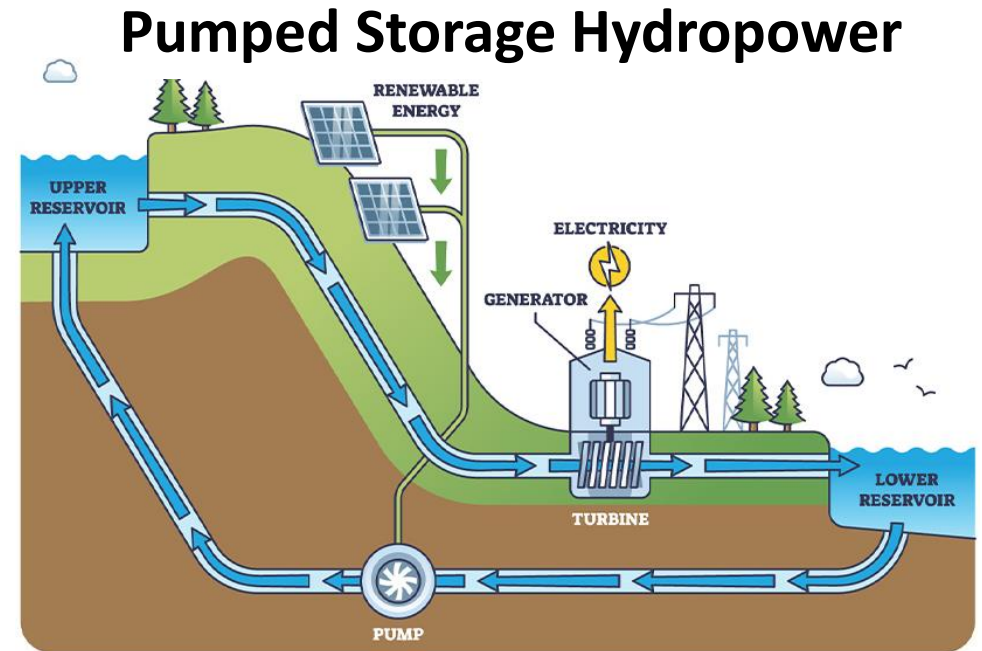
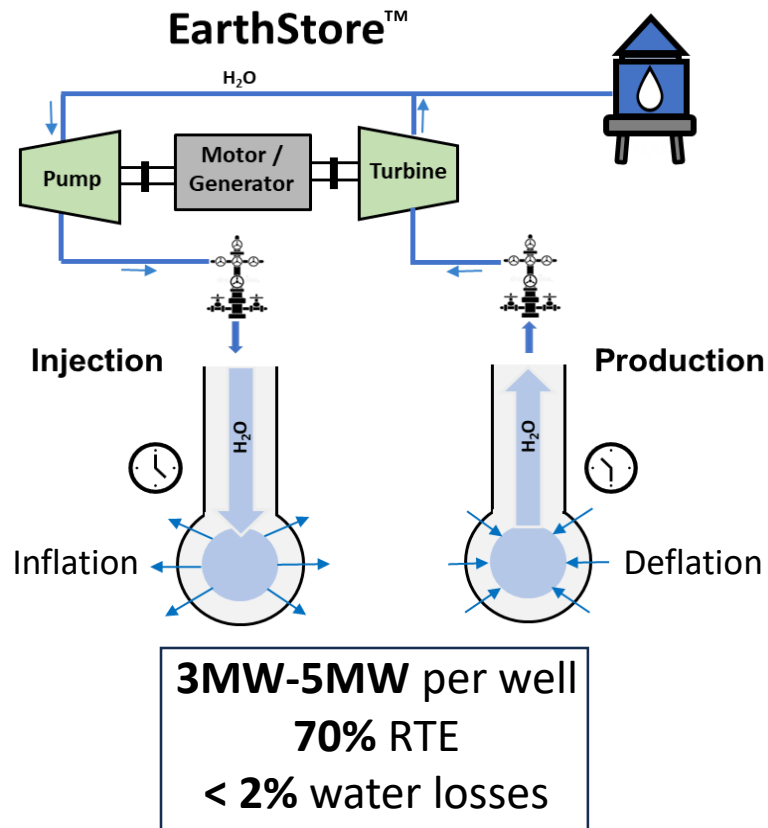
Projected Needs for Energy Storage in the U.S.

- Power plant owners plan to significantly increase utility-scale storage capacity (by 22GW) over next 3 years
- Currently there is 7.8GW utility-scale storage with need for 30GW by end of 2025

- Projected to change the U.S. electric grid generating portfolio (much like solar has)
- Adds stability to variable energy sources such as wind and solar
- > 75% of 22GW new installations will be in Texas (7.9GW) and California (7.6GW)



EarthStore™ is Subsurface Pumped Storage Hydropower (PSH)



PSH is 90+% of current energy storage around the world

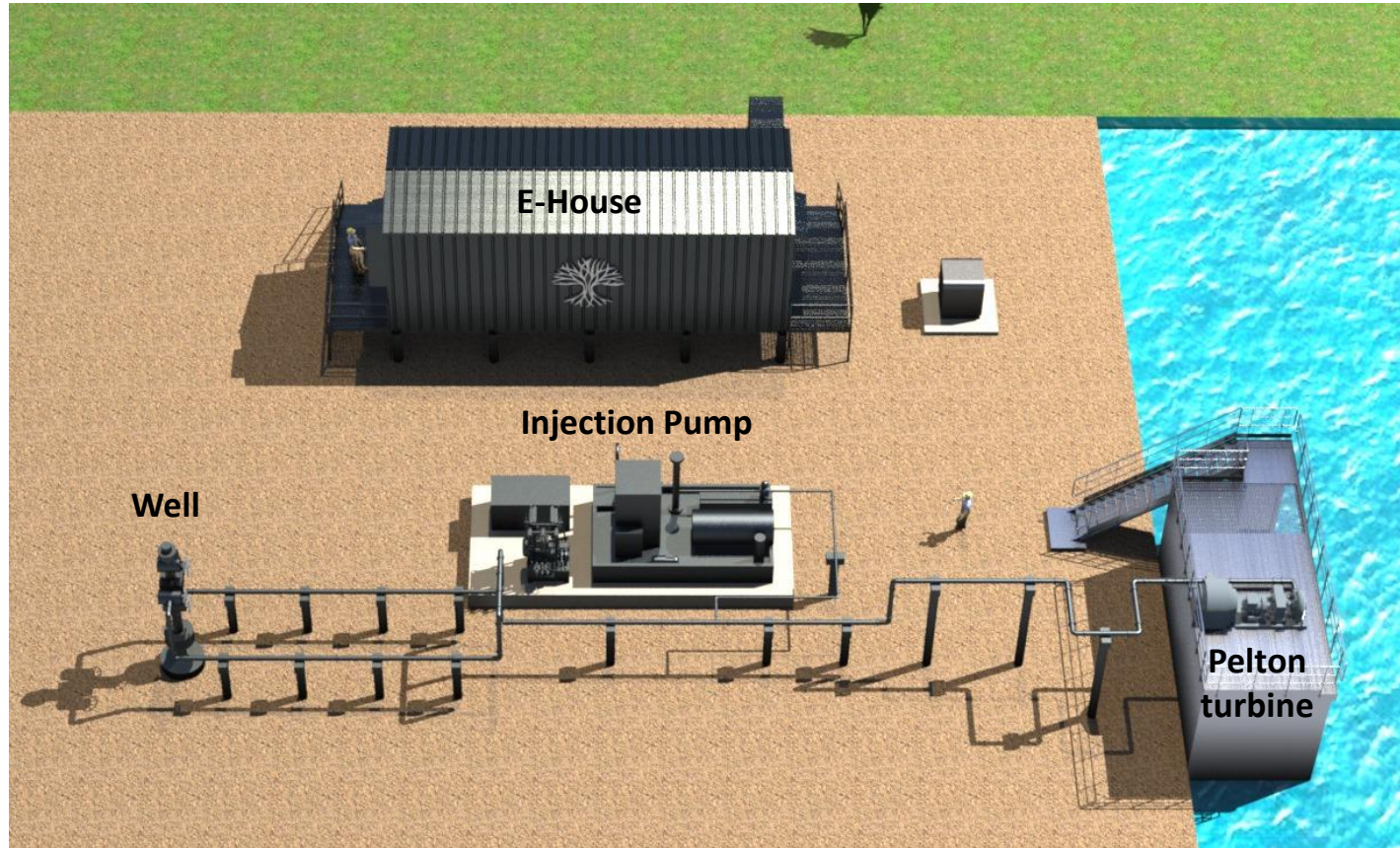
Advantages of EarthStore™ over Pumped Storage Hydro (PSH)

- Modular / ability to scale < 100MW
- Not geographically limited to mountainous areas
- Smaller footprint
- Higher energy density
- Weeks versus decades to permit
- Cost-competitive at scale

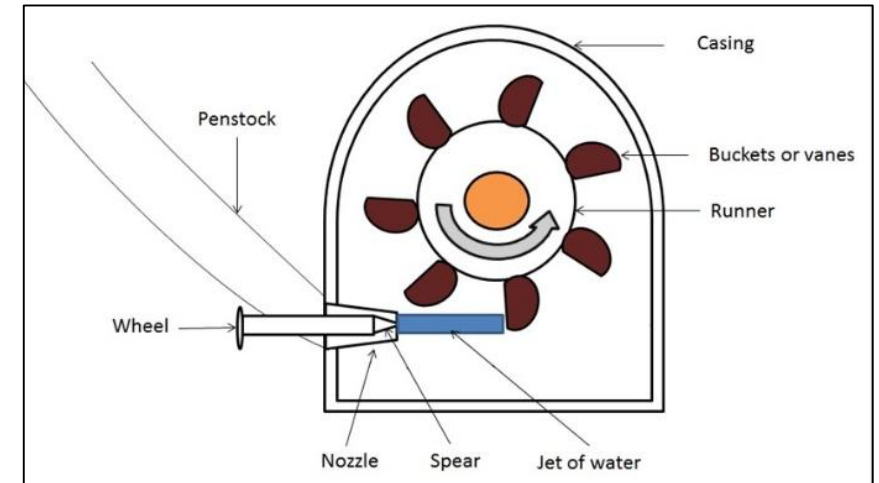


First Commercial 3MW EarthStore™ Facility

- COD in December 2024 in the ERCOT South Load Zone
- In partnership with a Texas electric cooperative building 400MW solar in 2026

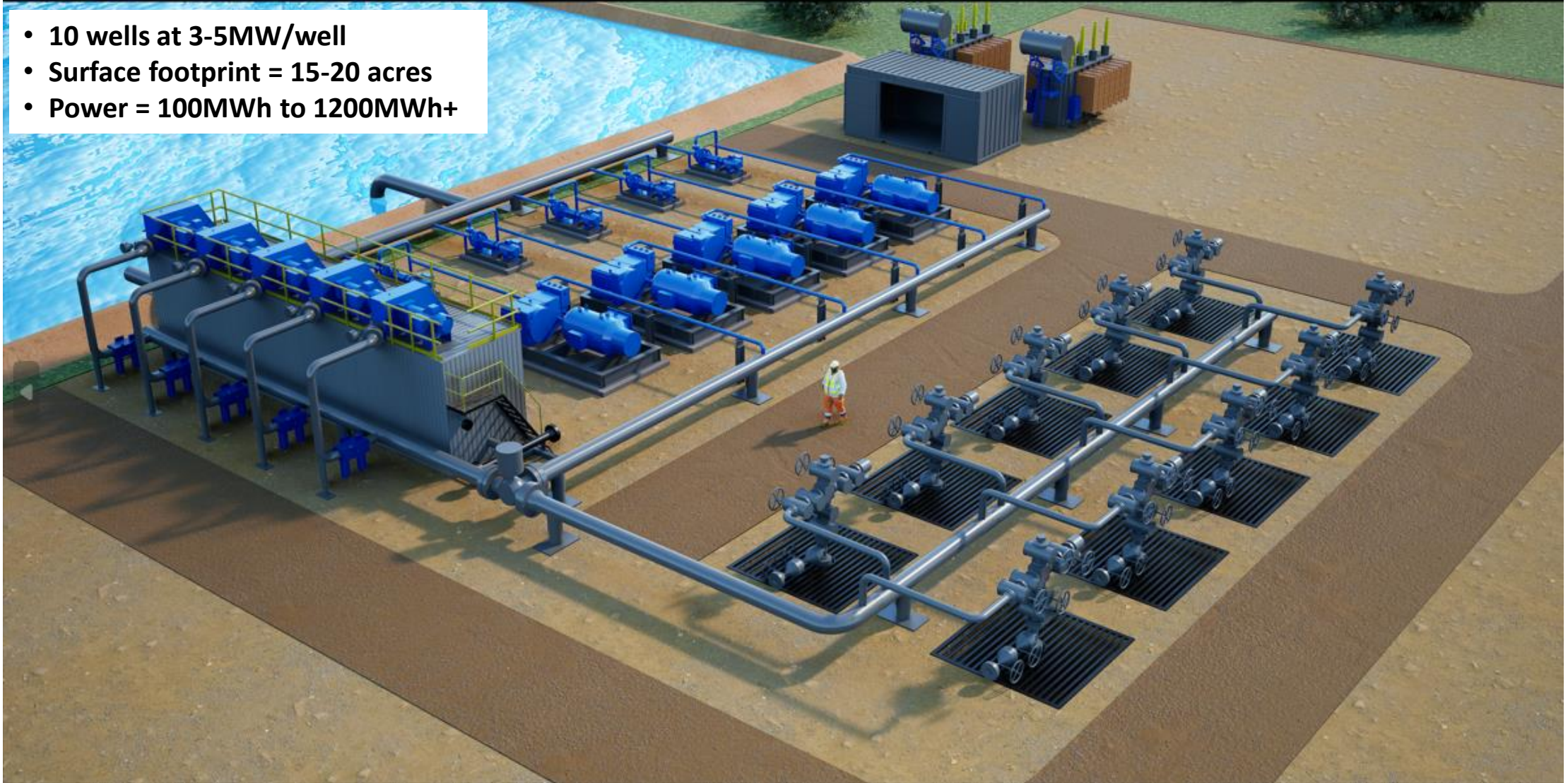


5,000 psi Pelton turbine runner

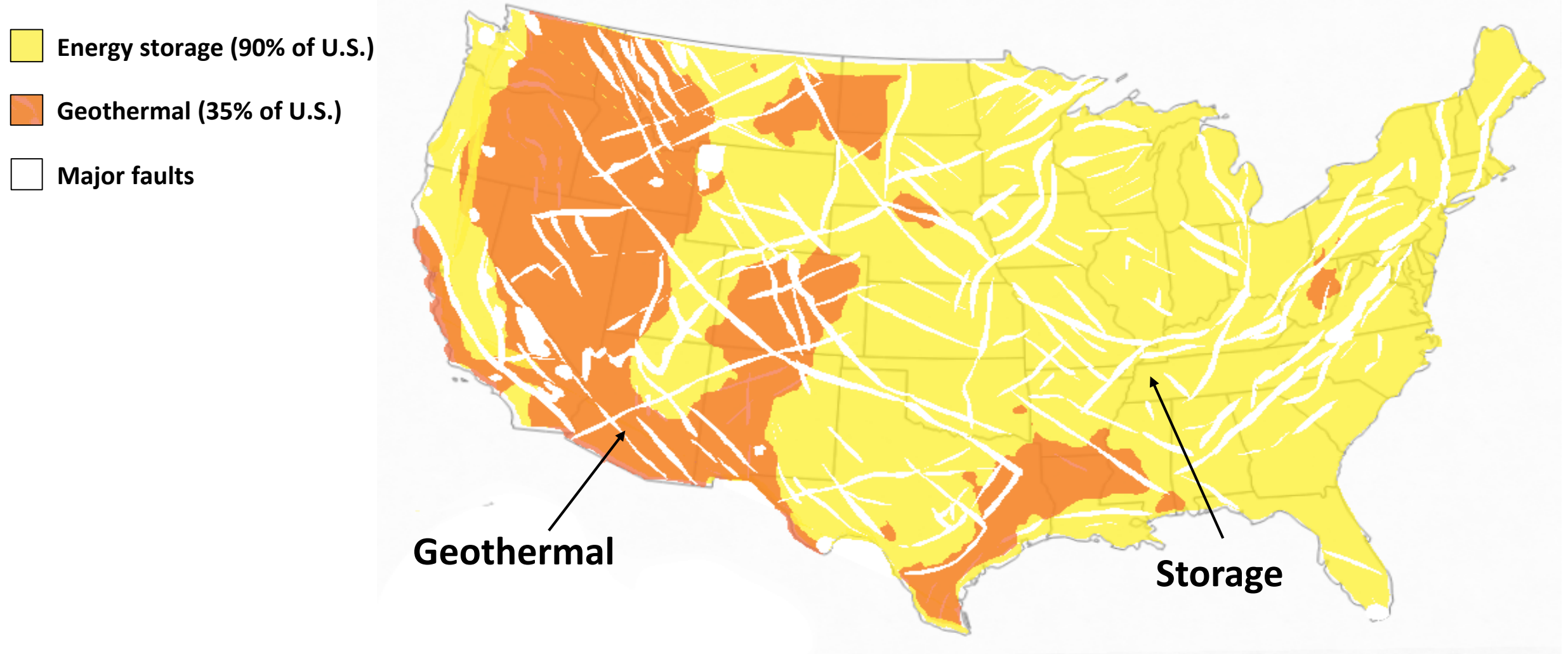


Scale Rendering - Sage's 30-50MW EarthStore™ Facility

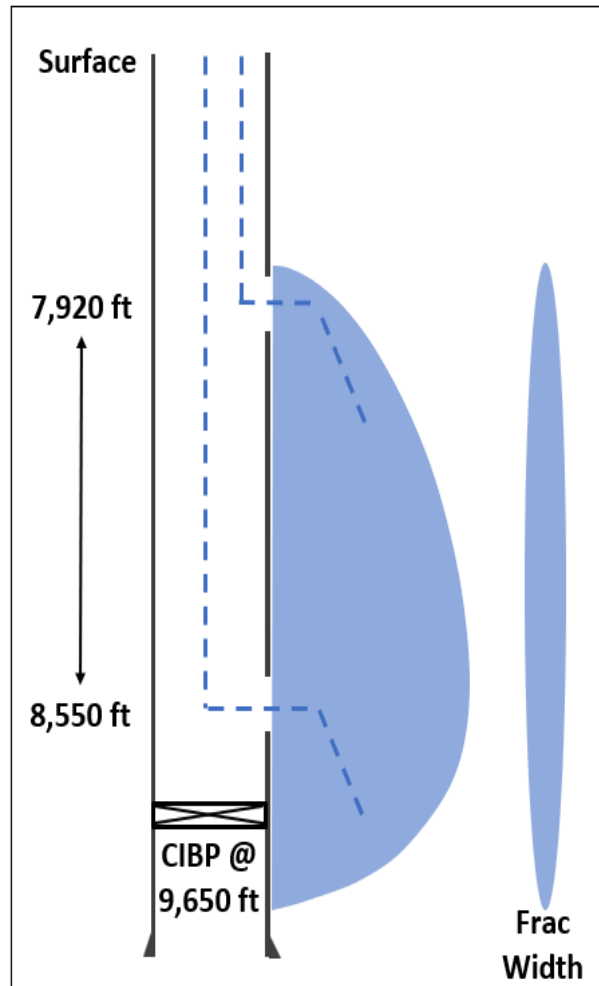
- 10 wells at 3-5MW/well
- Surface footprint = 15-20 acres
- Power = 100MWh to 1200MWh+



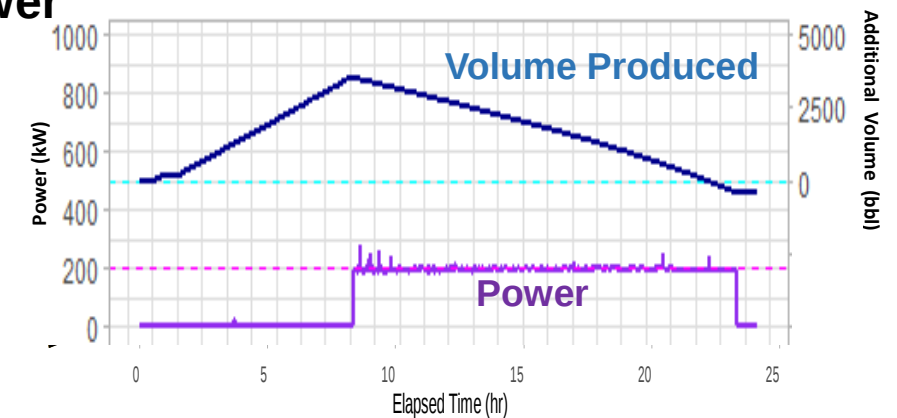
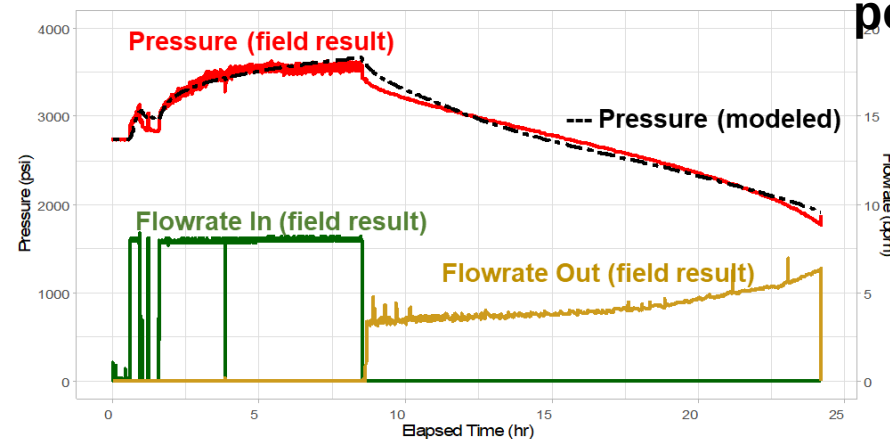
Where EarthStore™ Can Be Deployed - Anywhere!



2023 EarthStore™ Demonstration in Starr County, TX

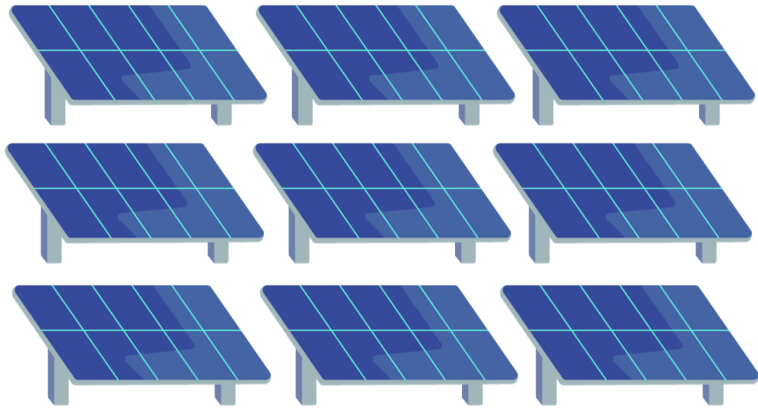


Long-duration for pairing with solar
7 hours of inflation (store) & 17 hours of deflation (generate) at constant power



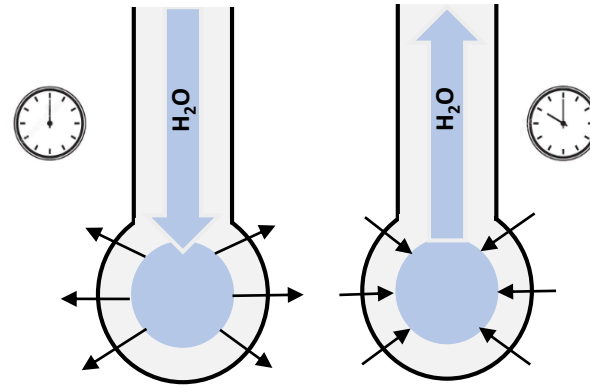
200MW Scale: Solar + EarthStore™ = 24/7 Generation

Solar



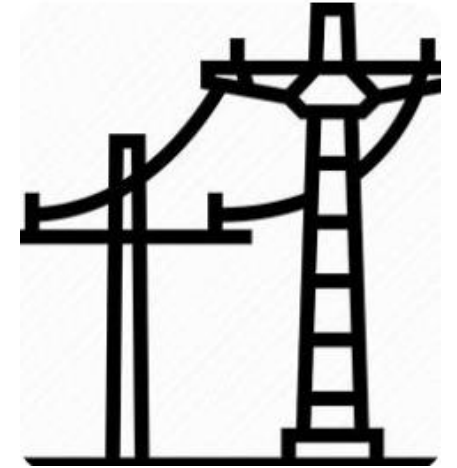
- **Solar = 200MW** to sell for **8 hours** (1.6 GWh/day)
- **Solar overbuild (2.7x) = 540MW** to store for **8 hours** (4.8 GWh/day)

EarthStore™



- **EarthStore™ = 200MW** to sell for **16 hours when sun is down** (3.2 GWh/day)

24/7 Generation



- **24/7 = 200MW** to sell for **24 hours** (4.8 GWh/day)



200MW Scale: Solar + EarthStore™ Economics

Blended LCOE

Plant Power (MW)	200		
RTE	0.7		
	7 hours Solar	8 hours Solar	9 hours Solar
Injection Duration	7	8	9
Production Duration	17	16	15
Solar LCOE (\$/kWh)	\$ 0.0194	\$ 0.0172	\$ 0.0156
EarthSore LCOE (\$/kWh)	\$ 0.0683	\$ 0.0665	\$ 0.0640
Blended LCOE (\$/kWh)	\$ 0.054	\$ 0.050	\$ 0.046
Blended LCOE (\$/MWh)	\$ 54.06	\$ 50.07	\$ 45.83

Notes

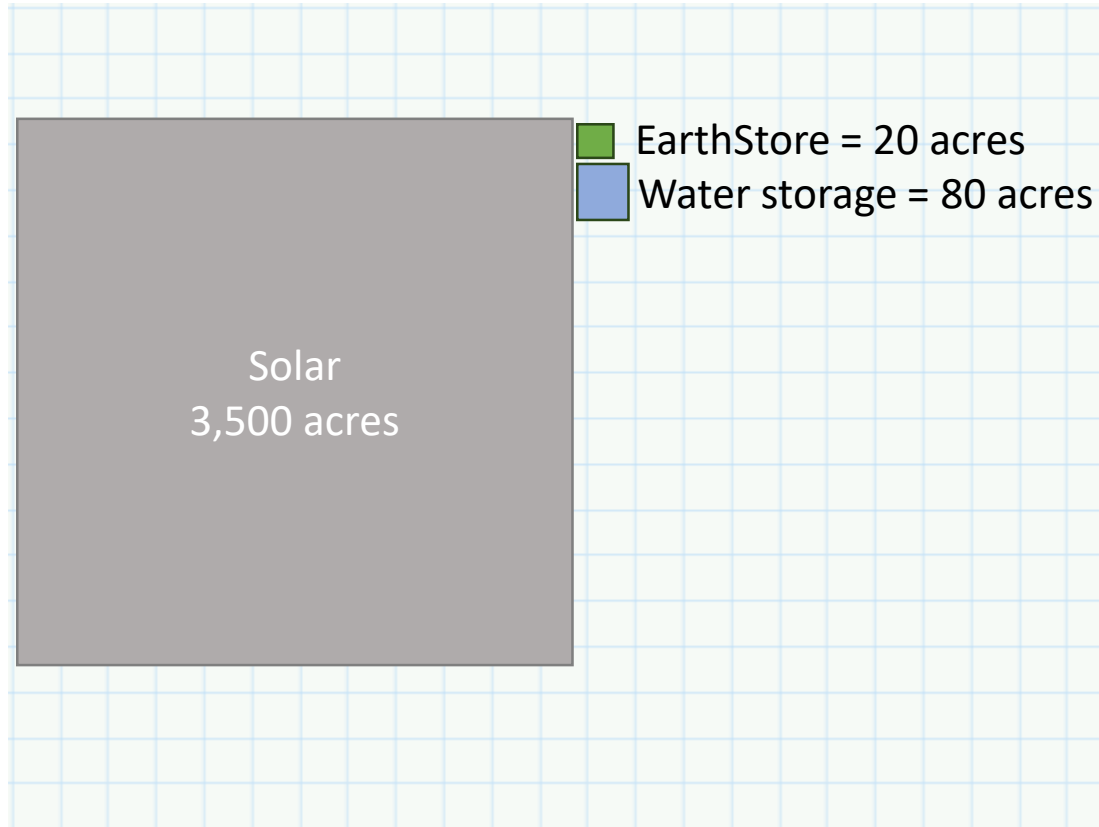
- Blended LCOE assumes no IRA tax credits
- Solar cost assumption ~ \$0.02/kWh

Plant Power (MW)	200
RTE	0.7
Injection Duration (hours)	8
Production Duration (hours)	16
Earthstore CAPEX	\$ 681,065,866.67
Earthstore CAPEX per MW	\$ 3,405,329.33
Surface	\$ 378,700,000.00
Subsurface (wells)	\$ 170,546,666.67
Other	\$ 131,819,200.00
Solar CAPEX	\$ 120,000,000.00
Solar CAPEX per MW	\$ 600,000.00
Additional Solar CAPEX	\$ 342,857,142.86
Total System CAPEX	\$ 1,143,923,009.52
Total System CAPEX per MW	\$ 5,719,615.05



200MW Scale: Solar + EarthStore™ Footprint

200MW for 24 hours



Footprint per MW

- Solar = 4 acre/MW
- EarthStore = 0.1 acre/MW
- Water storage = 0.2 acre/MW



200MW Scale: Solar + EarthStore™ Use Cases

Data Centers



Mining



Solar+™

Refineries / Chemical Plants



Food / Pulp & Paper

