February 5, 2024

# Sage Geosystems

# Company Overview

- **Energy storage**
  Completed energy storage commercial pilot in April 2023 demonstrating both long duration (18+ hours) and load following energy storage with 70-75% RTE and < 2% water loss. Generated electricity with Pelton turbines to run equipment on location.

- **First commercial energy storage facility**
  Sage's 3MW full-scale EarthStore™ energy storage facility to be commissioned in Q4 2024.

- **Geopressured Geothermal System (GGS)**
  First company to demonstrate cost-effective and commercially-viable hot dry rock geothermal with Sage's proprietary GGS design that converts pressure and heat to electricity.

- **Scale immediately**
  By using existing oil & gas equipment and technology, we can scale now globally.

# Sage Geosystems Team

## Cindy Taff *Founder & Chief Executive Officer*

35+ years of energy industry managing large engineering and operations teams for well construction with an annual budget > $ 1 billion. Previously global VP of Unconventional Wells & Logistics at Shell.

## Dr. Lev Ring *Founder & President*

30+ years of energy industry experience and > 100 patents. Prior to Sage, co-founded Metis Energy, a drilling technology company. Previously Director of Technology Development at Weatherford where he commercialized Managed Pressure Drilling (MPD) technology, a $0.5 billion annual revenue business. He also commercialized expandable casing technology, a technology that he co-developed, as the Technology Development Manager at Enventure.

## Lance Cook *Founder & Chief Technology Officer*

40+ years of energy industry experience and > 100 patents. Prior to Sage, co-founded Metis Energy. Previously Chief Scientist for Wells and Production Technology at Shell and invented the Versaflex liner hanger which was licensed to Halliburton. He also commercialized expandable casing technology, a technology that he co-developed, as CEO of Enventure and led a well manufacturing joint venture in China also as CEO.

## Doug Simpkins

***Director of Simulation / Modeling***

## Shannon Bolton

***Project Manager***

## Mike Eros

***Chief Geoscientist***

## Nate Weiss

***Power Plant Engineering Manager***

# Current Investors

**CHESAPEAKE ENERGY**

*Engages in the acquisition, exploration, and development of oil, natural gas, and natural gas liquids from underground reservoirs*

**NABORS**

*The global market leader in drilling onshore wells and executing on advanced wellbore designs*

**VIRYA LLC**

*Leading climate investor with a proven track record of helping disruptive companies reach commercialization and scale*

**GEOLOG**

*A global leader in subsurface characterization and drilling optimization*

# Sage Geosystems - Timeline

**<u>Sage Geosystems fundraising to date</u>**
- Seed investments = $25MM
- U.S. Air Force grant = $1MM
- Series A = $16MM of $30MM (ongoing - Evercore advising)

2020

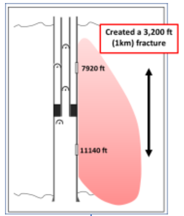
Sage is incorporated

2021

Virya invests

Nabors invests

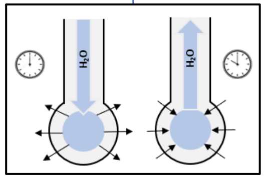
Gravity fracturing field proven




Re-enter test well in Starr County, TX

2022

Gravity fracturing patent issued

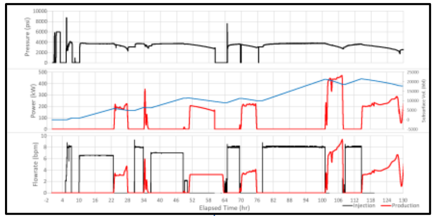


GGS field proven

2023

TRL-7

Energy storage field proven



Electricity produced with Pelton turbines

CHK invests

2024

<u>Key objective - energy storage</u>
1,000 hours continuous operation (per DOE) to enable moving from equity to project financing

2025

TRL-8

Energy Storage Commercial Facility Commission

2026

TRL-8

GGS Geothermal Commercial Power Plant Commission

# EarthStore™ First Commercial Energy Storage Facility

Scale rendering - Sage 30MW Energy Storage Facility

## Project details

- Full-scale 3MW with duration of 4-12 hrs
- Q4 2024 commissioning
- Identified partners include four utility companies in Texas, including lignite coal plant to leverage existing switch station
- Tolling agreement to be in place Q1 2024

# Series A Use of Proceeds

Targeting $30 million in aggregate, with a first close of $16 million with CHK complete as lead investor and continued support from existing investors

## Use of Proceeds

- **$16 million** - First commercial energy storage facility
  - $4MM - Drill and complete new well
  - $4MM - High pressure Pelton turbine detailed FEED and build
  - $5MM - Balance of surface facility (VFD, pump, and electrical)
  - $2MM - Interconnection
  - $1MM - OPEX for energy storage facility
- **$6 million** - Continued technology engineering to better support scale while driving down cost
  - $3MM - Pelton turbine and generator modular design enhancements
  - $1MM - Controls for large scale applications
  - $2MM - Interconnection investment to aid scale up
- **$3 million** - Matching funds for U.S. Air Force Tactical Funding Increase (TACFI) to commission geothermal power plant with ORC turbine
- **$5 million** - Targeted G&A to support growth

# Patent Portfolio

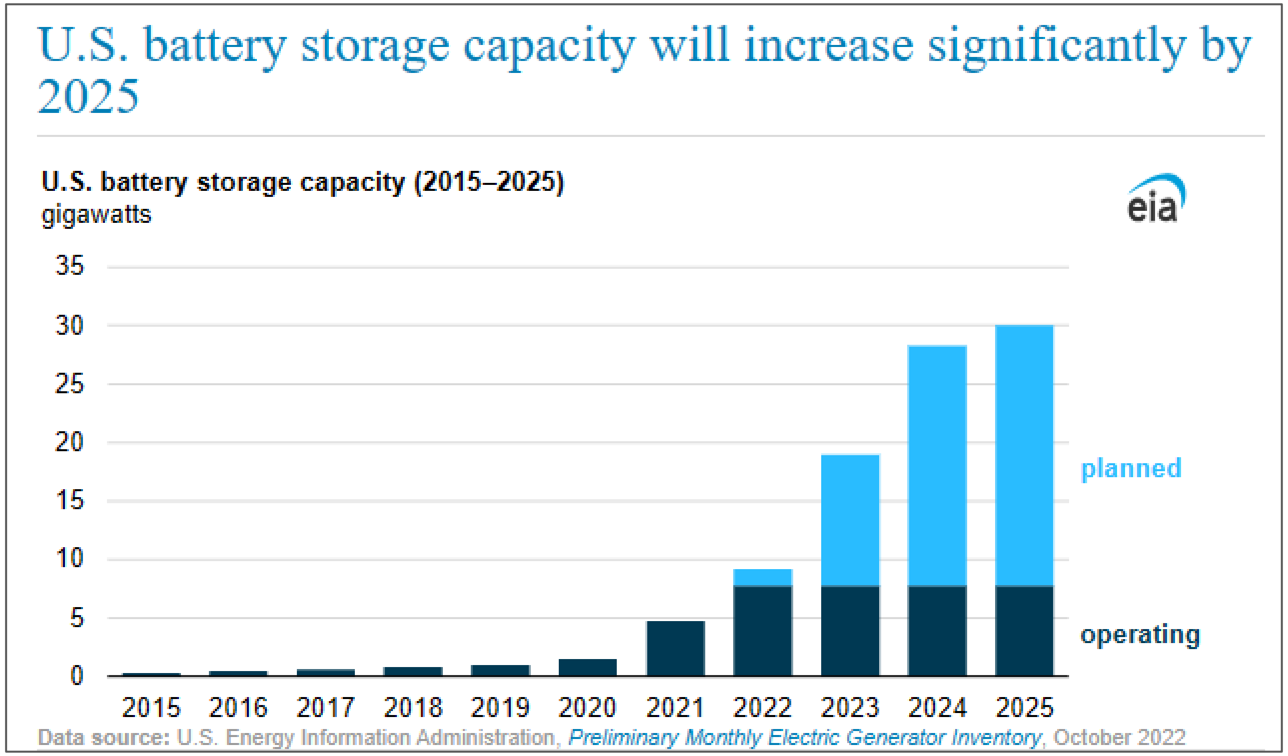
- **In less than 3 years, Sage has:**
  - **One granted patent (issued in April 2022)** - Downward-oriented fracturing methodology (HeatRoot™)
  - **One patent with all claims allowed (notified in August 2023)** - The patent examiners ruled that all 15 claims related to method to convert pressure to power in addition to converting heat to power are novel and allowable
- **Another 17 patents pending review, both in the U.S. and internationally**
- **Patent cycle in the U.S. is normally 3 years or longer**

# Advancing two material business lines

1. Energy Storage
2. Geothermal Baseload

# 1. Energy Storage
(via High-Pressure Pelton Turbine)

# Projected Needs for Energy Storage in the U.S.




**Reference**: U.S. Energy Information Administration (U.S. Energy Information Administration - EIA - Independent Statistics and Analysis)

## U.S. EIA Projections

- **Power plant owners plan to significantly increase utility-scale storage capacity (by 22GW) in the U.S. over the next 3 years**
- **Currently there is 7.8GW of utility-scale storage in the U.S. with need for 30GW by the 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)**

# Energy Storage (EarthStore™) Overview

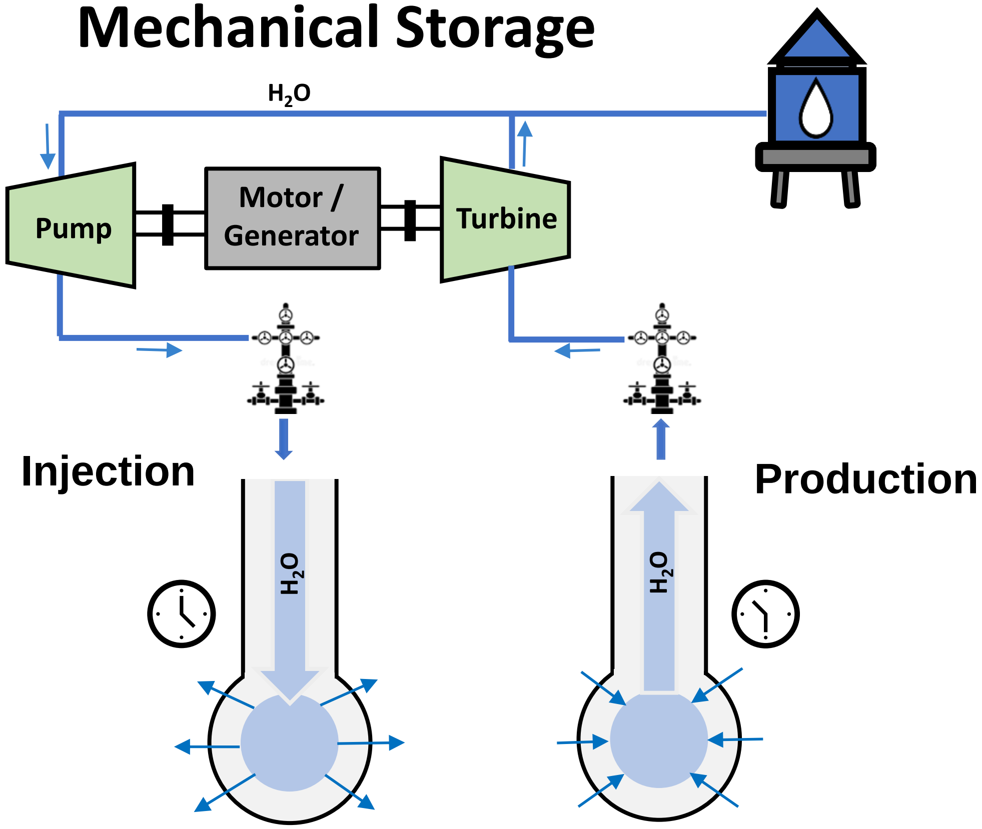
**Sage Geosystems' energy storage solution (called EarthStore™) is ready to scale now at a lower cost than pumped storage hydropower (PSH) and lithium-ion batteries. Sage can put this energy storage virtually anywhere and it has a meaningfully smaller footprint.**

- Can provide both short- and long-duration energy storage
- Cheaper than PSH; order of magnitude cheaper than lithium-ion batteries for long-duration applications
- Ability to pair with existing wind and solar projects to create 24/7 baseload power
- Better economics than natural-gas peaking plants
- High flexibility and scalability to meet most energy storage needs

# Scale Rendering - Sage 30MW Energy Storage Facility

# How Does Energy Storage (EarthStore™) Work?

## Mechanical Storage



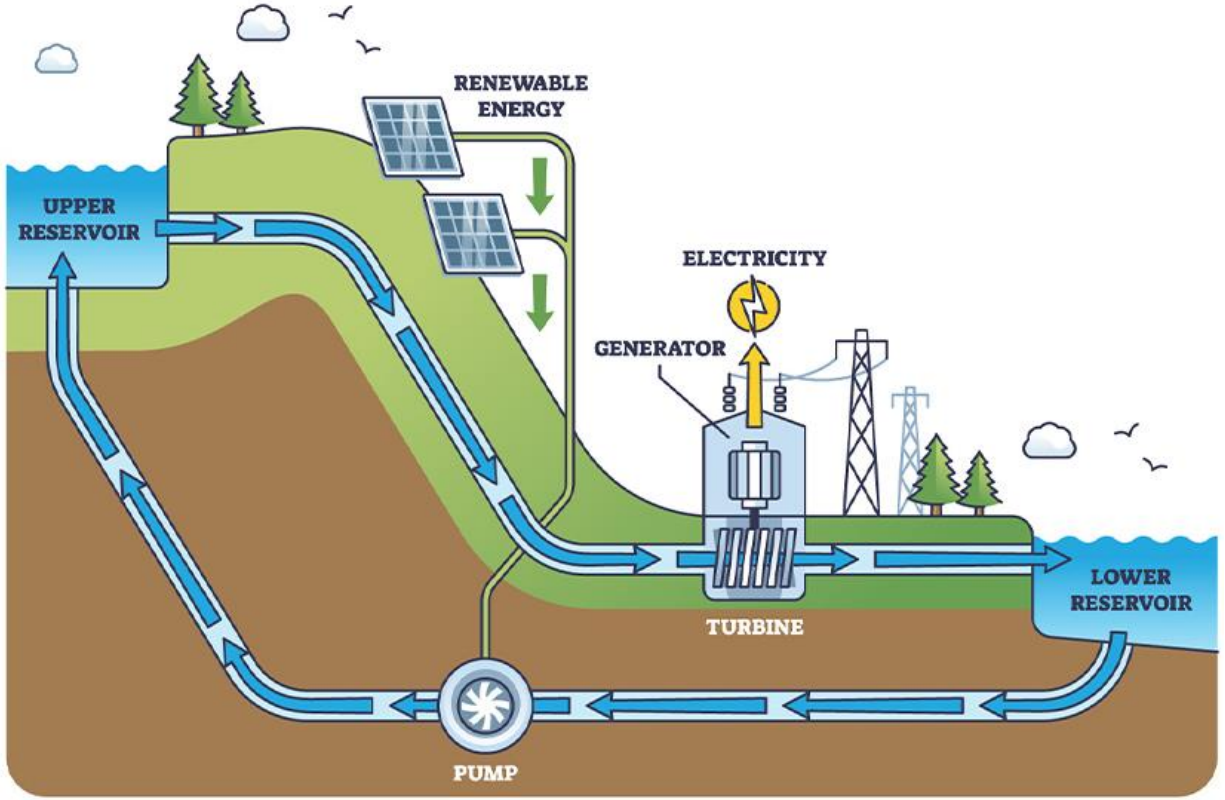

**Harvesting *pressure***
70-75% RTE
3MW per well
< 2% fluid losses

- Pumps on the surface use electricity to inject water downhole under pressure
- During the production cycle, valves are opened, and the water is released back to surface under considerable pressure which spins a Pelton turbine and generates electricity
- Can easily be designed for short-duration (3-4 hours) or long-duration (18+ hours)
- Short-duration design is best suited for load shifting
- Long-duration design can be paired with wind or solar to convert these intermittent renewable energy sources to 24/7 power

# Comparison to Pumped Storage Hydropower (PSH)

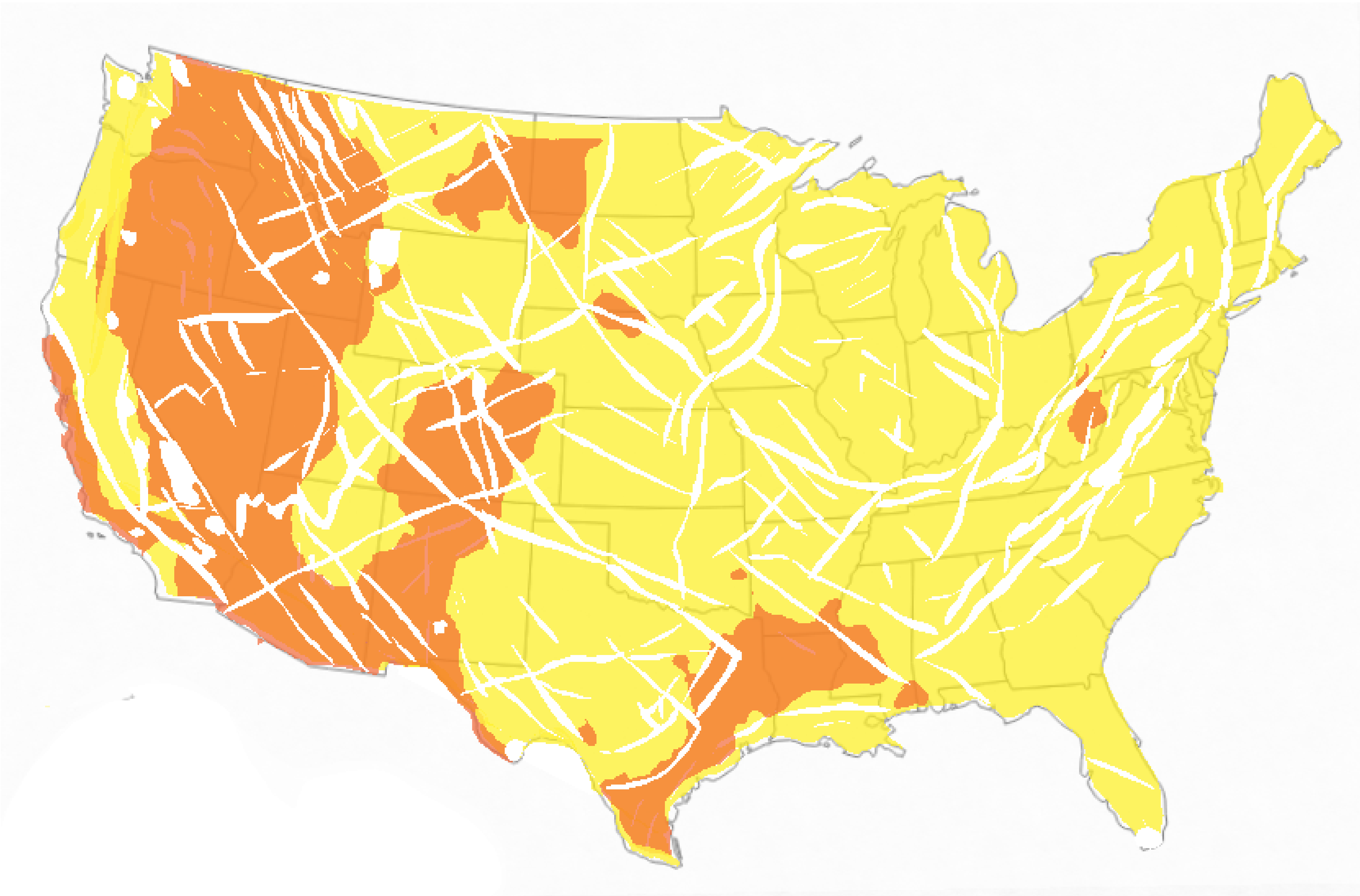
**Comparison to Pumped Storage Hydropower**
**(PSH is 90+% of current storage around the world)**

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

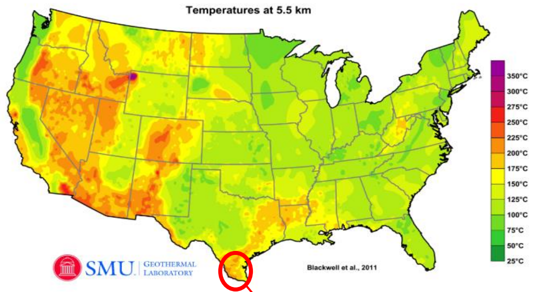


# Energy Storage is Not Geographically Limited

- Energy storage (90% of U.S.)
- Geothermal (35% of U.S.)
- Major faults

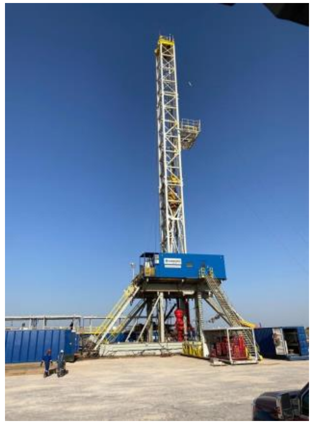


# Commercial Pilot in Starr County, Texas



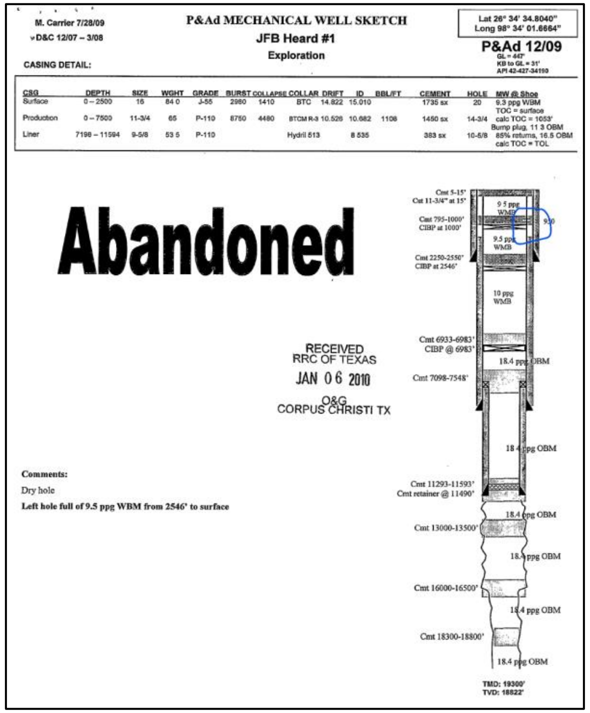

Pilot performed in Starr County, TX well

**Re-enter gas exploration well**
(August 2021)



**Create HeatRoot fracture**
(November 2021)

**Energy storage demonstration / Generate electricity**
(March 2023)



M. Carrier 7/28/09
D&C 12/07 – 3/08

P&Ad MECHANICAL WELL SKETCH
JFB Heard #1
Exploration

Lat 26° 34' 34.8040"
Long 98° 34' 01.6664"

P&Ad 12/09
GL = 447'
KB to GL = 31'
API 42-427-34190

CASING DETAIL:

| CSG | DEPTH | SIZE | WGHT | GRADE | BURST | COLLAPSE | COLLAR | DRIFT | ID | BBL/FT | CEMENT | HOLE | MW @ Shoe |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface | 0 – 2500 | 16 | 84 0 | J-55 | 2980 | 1410 | BTC | 14.822 | 15.010 | | 1735 sx | 20 | 9.3 ppg WBM TOC = surface |
| Production | 0 – 7500 | 11-3/4 | 65 | P-110 | 8750 | 4480 | BTCM R-3 | 10.526 | 10.682 | 1108 | 1450 sx | 14-3/4 | calc TOC = 1053' Bump plug, 11 3 OBM |
| Liner | 7198 – 11594 | 9-5/8 | 53 5 | P-110 | | | Hydril 513 | | 8 535 | | 383 sx | 10-5/8 | 85% returns, 16.5 OBM calc TOC = TOL |

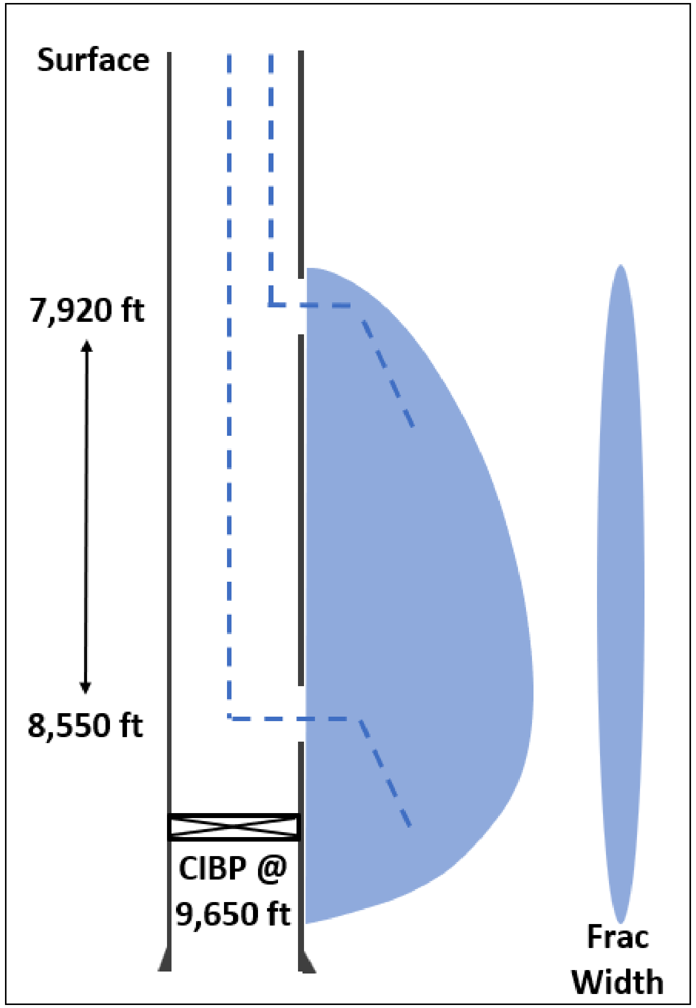
Abandoned

RECEIVED
RRC OF TEXAS
JAN 06 2010
O&G
CORPUS CHRISTI TX

Comments:
Dry hole
Left hole full of 9.5 ppg WBM from 2546' to surface



**Sage's test well in Starr County was drilled in 2008 by Shell and subsequently abandoned**

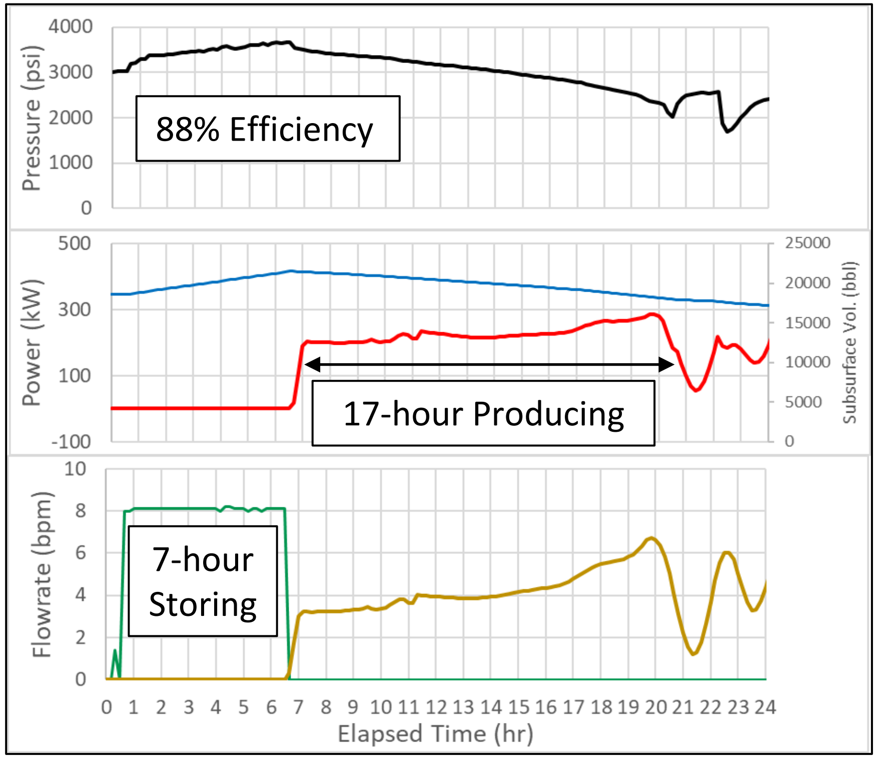



Video w/ sound - click to play

# Long-Duration or Load-Following Energy Storage

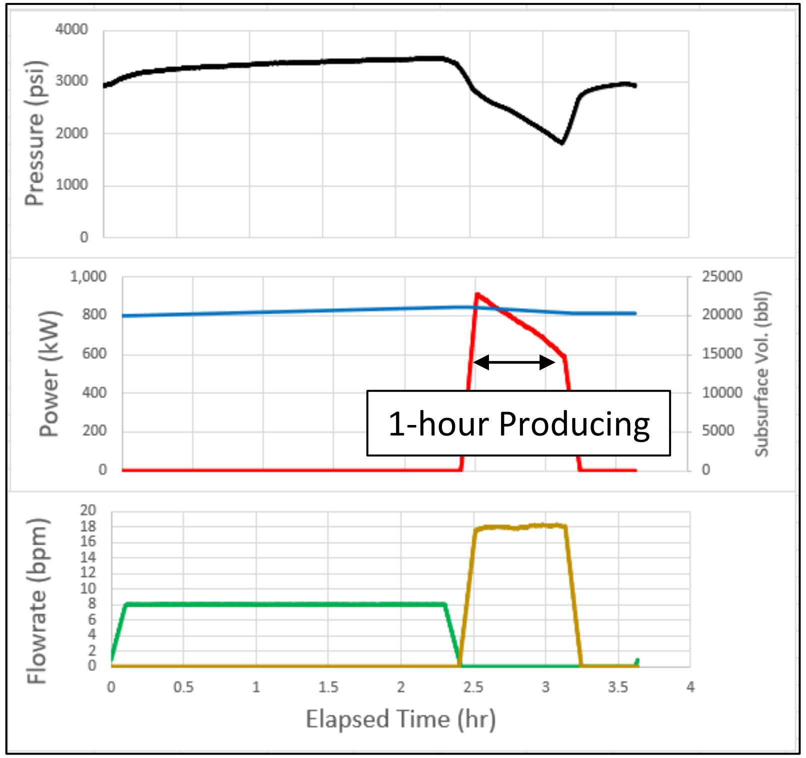
## Ready to scale now - everything has been proven in the pilot

(Technology Readiness Level TRL7)




**Long-duration**

**(17 hours production)**



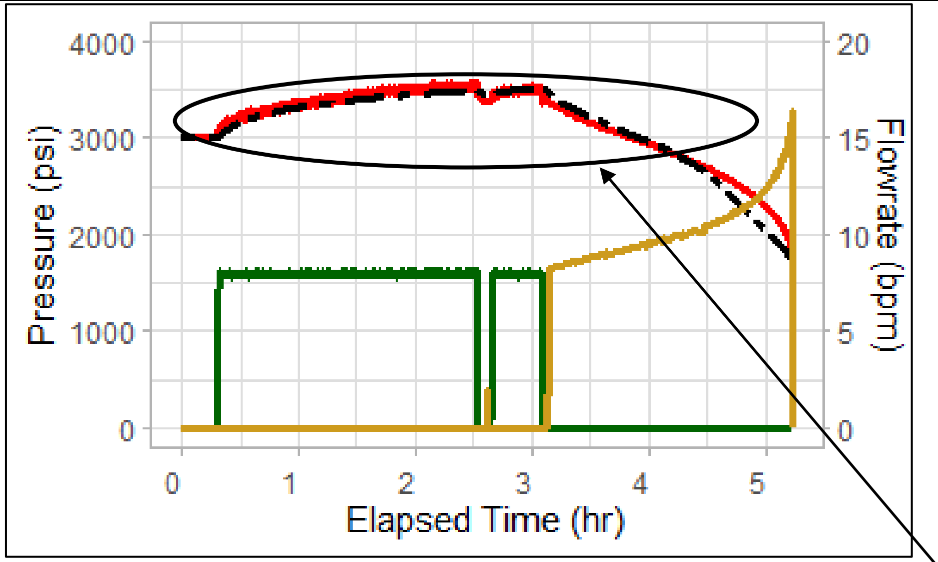

**Load-following**

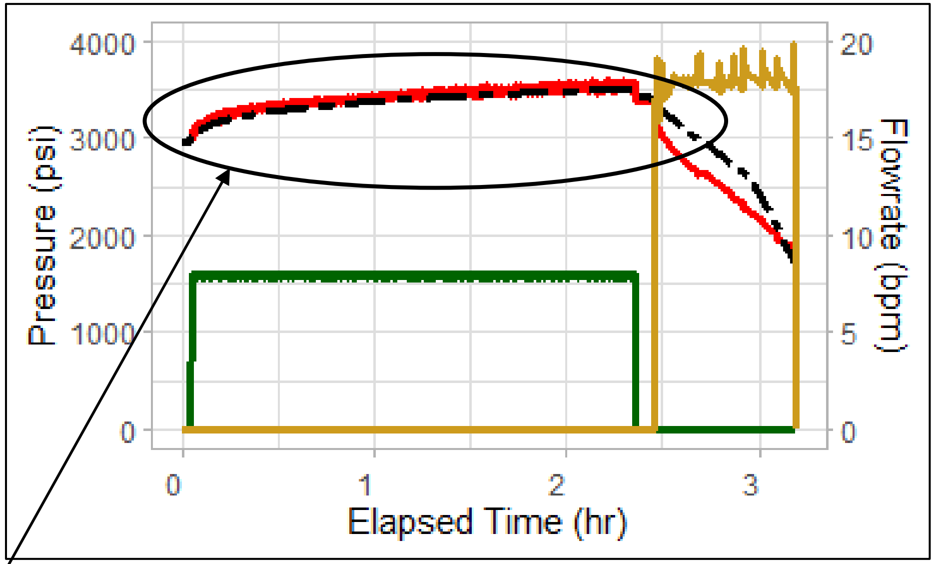
**(Release everything in one hour)**

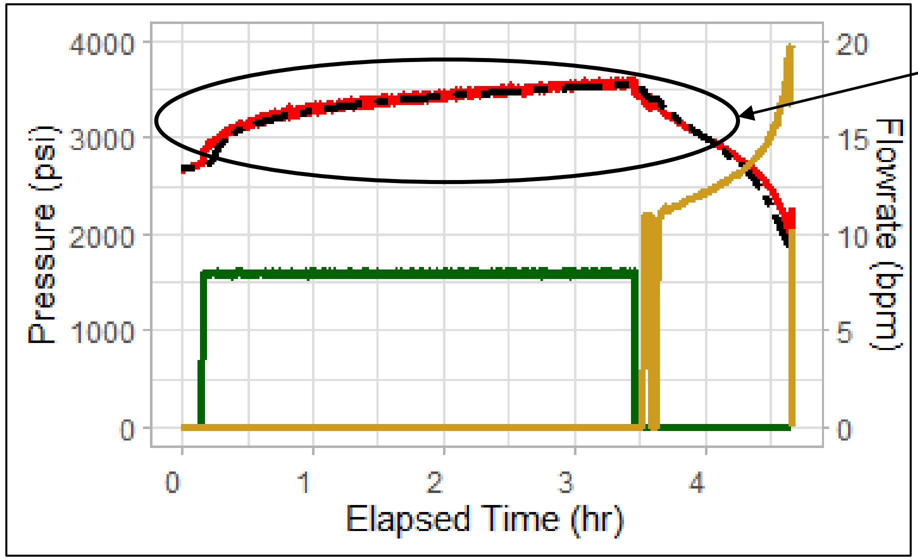
**Waste heat (95°C) for industrial use**

Food processing, DAC, agriculture, plastics, glass, etc.

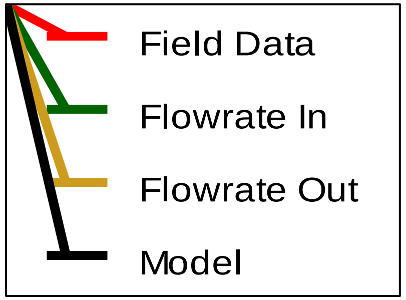
# GeoTwin Modeling versus Commercial Pilot Results



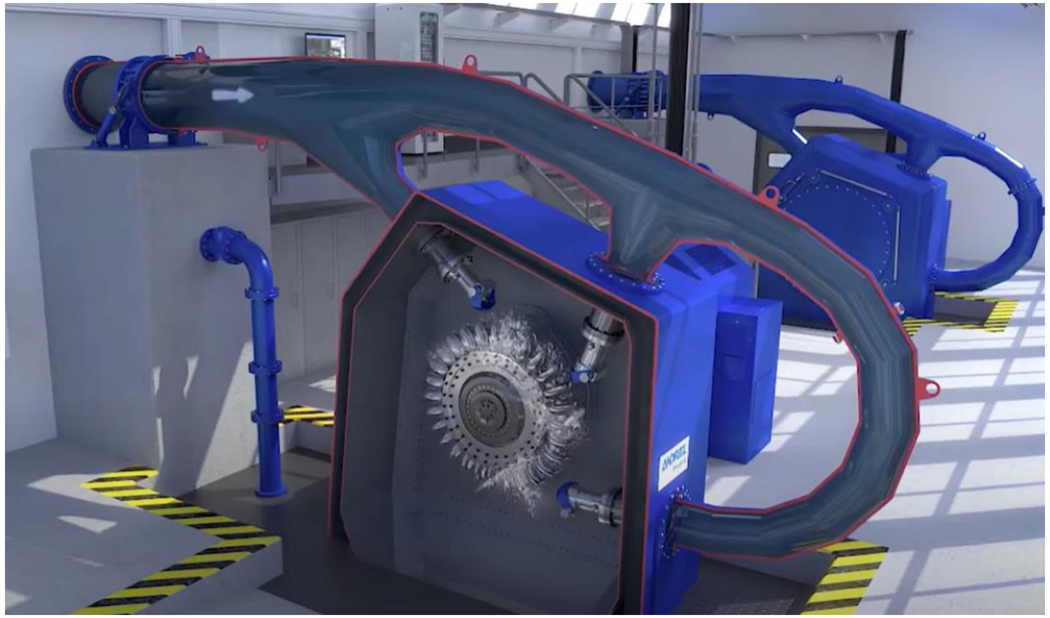

## <u>Modeling overlaid with field test results</u>



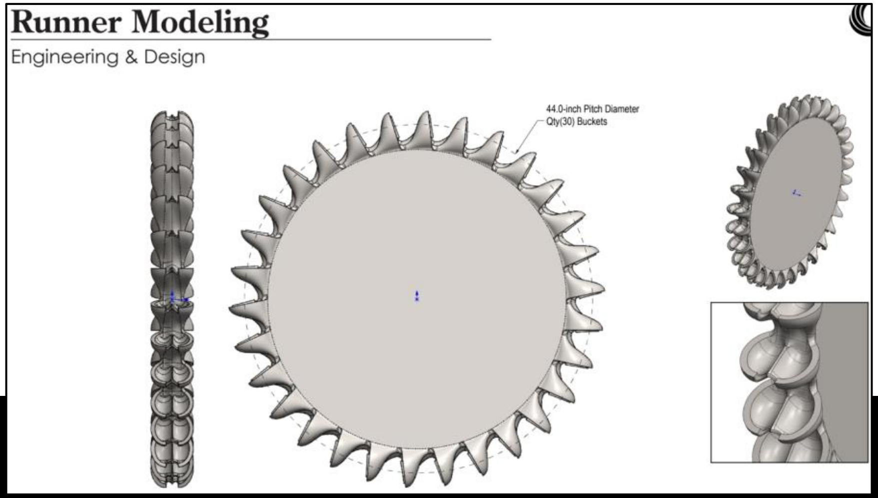

**70-75% RTE**
**3MW per well**
**< 2% fluid losses**

# High-Pressure Pelton Turbine

**Impulse-type water turbine invented in the 1870s by Lester Allan Pelton**



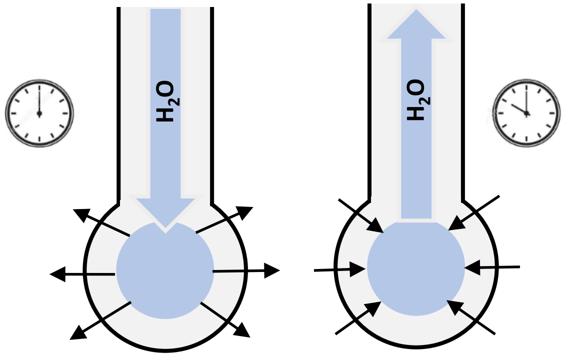
**Sage's high-pressure Pelton turbine**




- **Sage is upgrading the Pelton turbine commercial design to 5,000 psi (3MW)**
- **Current timeline to complete build is November 2024**
- **Scale-up to 50MW+ will be a techno-economic decision**
  - **Build larger Pelton turbines**
  - **Manifold together**
  - **Combination of the above**

# Use Case 1: Solar + Energy Storage = 24/7 Diurnal

**Mechanical Storage**

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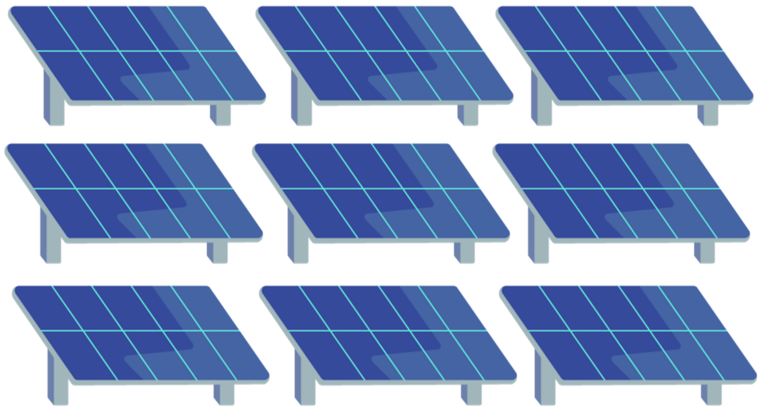
**Solar**



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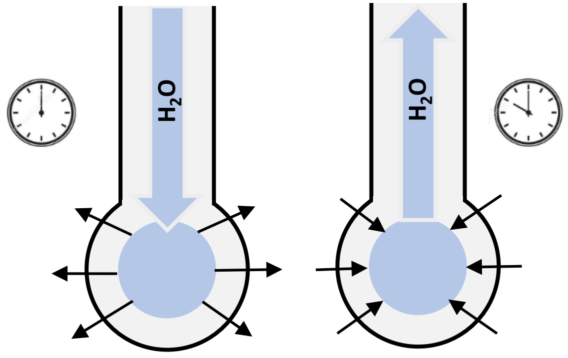
**24/7 Diurnal**

# Use Case 2: Load Shifting, Electricity Price Arbitrage

## Mechanical Storage

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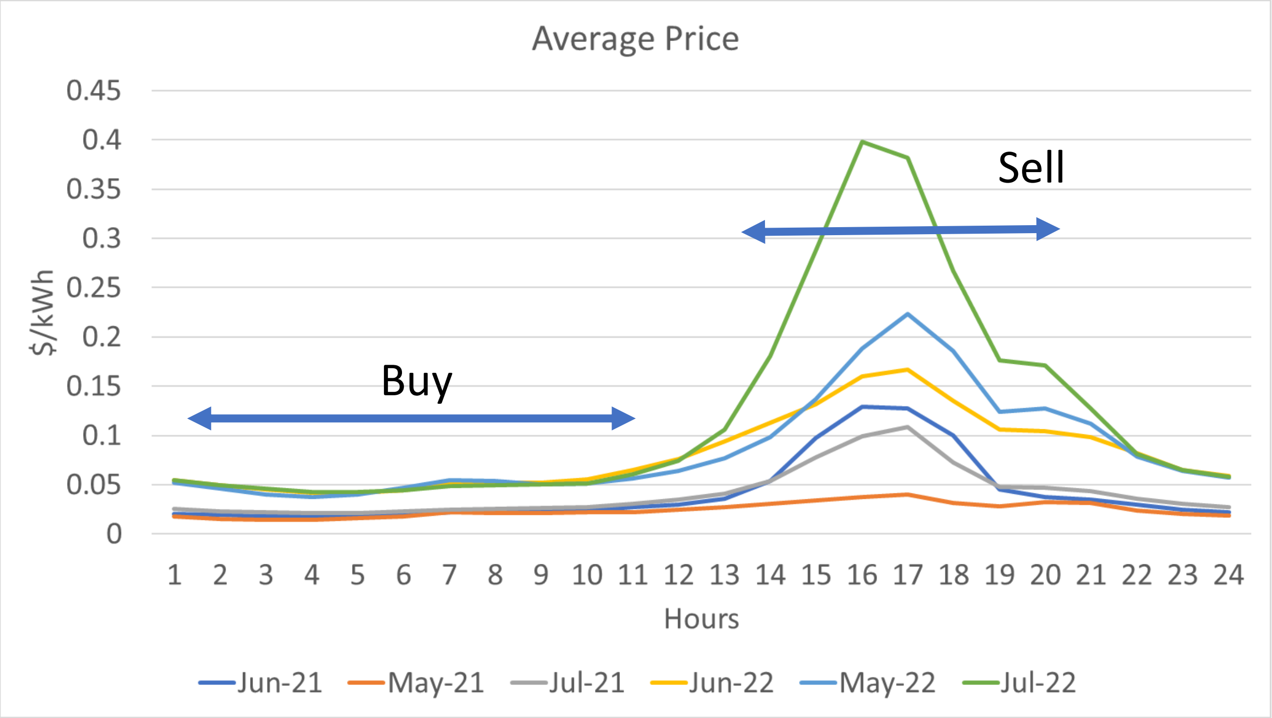
## Wind Farm




EIA projects wind curtailments in ERCOT could increase to 13% of total available wind generation, and solar curtailments could reach 19% by 2035

# Sage's Mechanical Storage - Upfront Capital & LCOS

## Beats Pumped Storage Hydro & Lithium-ion batteries

- Rapid payout
- IRR = 20 to 30%

### *Sage's EarthStore™*

| **PRE-SCALE** | **> 50MW SCALE** |
|---|---|
| **$2.5-3.5MM per MW (Any Duration)** | **$2.0-2.7MM per MW (Any Duration)** |
| LCOS = $0.03-0.04/kWh | LCOS = $0.02-0.03/kWh |

| ***PSH*** | ***Lithium-ion batteries*** |
|---|---|
| **$2.6MM per MW (Long Duration)** | **$3MM per MW (Duration < 4 hrs)** |
| LCOS* = $0.06-0.18/kWh | LCOS* = $0.25-0.30/kWh |

***Note: Difference in LCOS is attributed mainly to storage duration and Sage's ability to upgrade EarthStore to longer durations at a low cost.***

*Navigant Research 2Q 2019 – Comparing the Costs of Long Duration Energy Storage
20190626_Long_Duration Storage_Costs.pdf (slenergystorage.com)

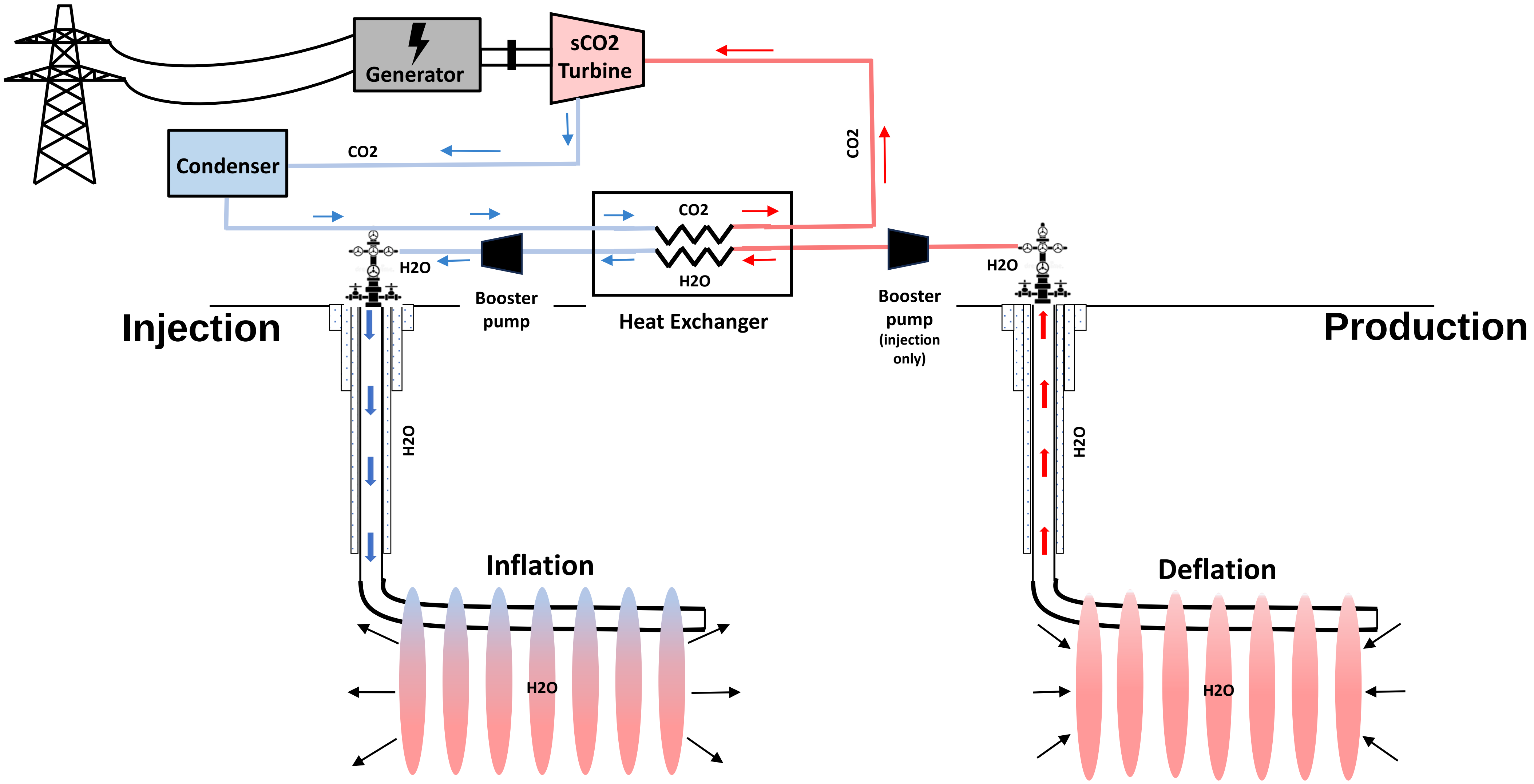
# 2. Geothermal Baseload (via $sCO_2$ Turbine)

# Geopressured Geothermal System (GGS) Overview

**In parallel to EarthStore, Sage Geosystems is advancing geothermal energy for dispatchable electricity generation.**

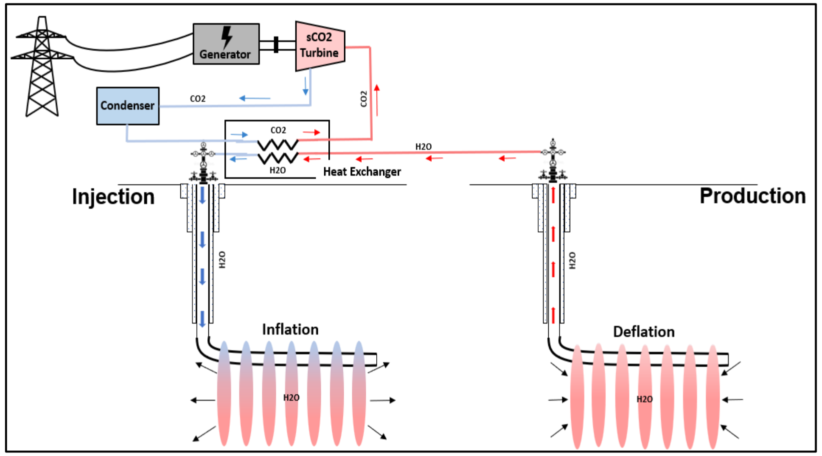
- The Company's first commercial energy storage facility in Q4 2024 will bring Sage 80% of the way to also proving its cost-effective Geopressured Geothermal System (GGS), enabling commercial geothermal almost anywhere
- Traditional geothermal requires a unique combination of heat and water in the formation and is therefore geographically limited (near volcanoes and the ring of fire)
- Sage's GGS technology has already demonstrated the ability to make geothermal electricity generation economical - and it can either be connected to the grid or deployed as a microgrid in remote locations
- Field testing allowed Sage to overcome the technical and economic challenges that have hindered commercialization of EGS (Enhanced Geothermal Systems) in hot dry rock for 50+ years
- The only technologies that Sage has yet to demonstrate are the heat exchanger and Sage's sCO2 turbine, both of which Sage will demonstrate over the next 12-18 months

# How Does Geopressured Geothermal System (GGS) Work?

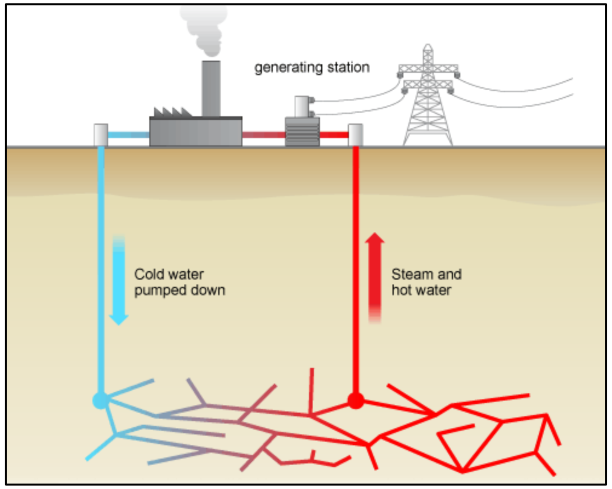


# How is Sage GGS Different for New Generation Geothermal?

**Sage GGS Technology - Solves challenges of EGS and delivers commercially-viable geothermal**

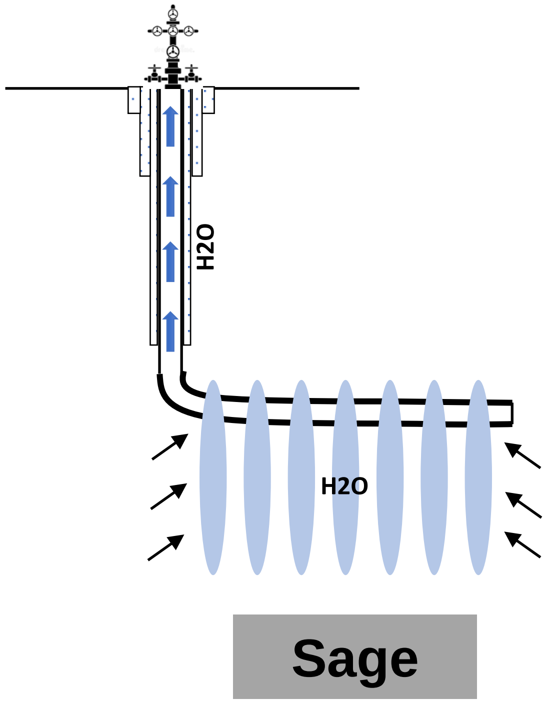


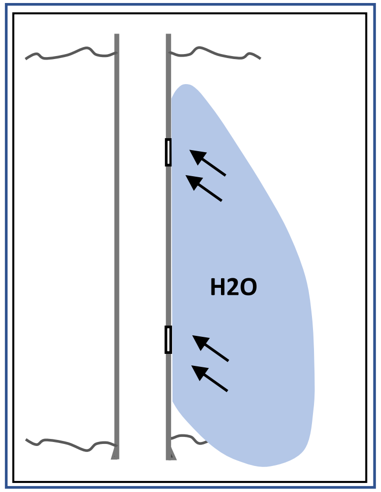

**DOE EGS Technology (since 1970s) - No commercial plants due to low net output**




- Connect wells on the surface (versus subsurface)
- Operate with fractures open, meaning commercially-viable net output (low friction losses and no cold-water breakthrough from water channeling)
- Sage does not vent pressure, resulting in 25-50% more net output
- Lower risk of induced seismicity

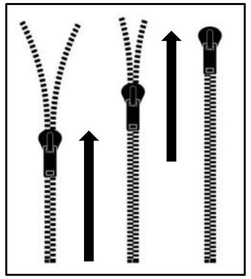
# Frac Closure of Sage’s vs. O&G Industry Fracture



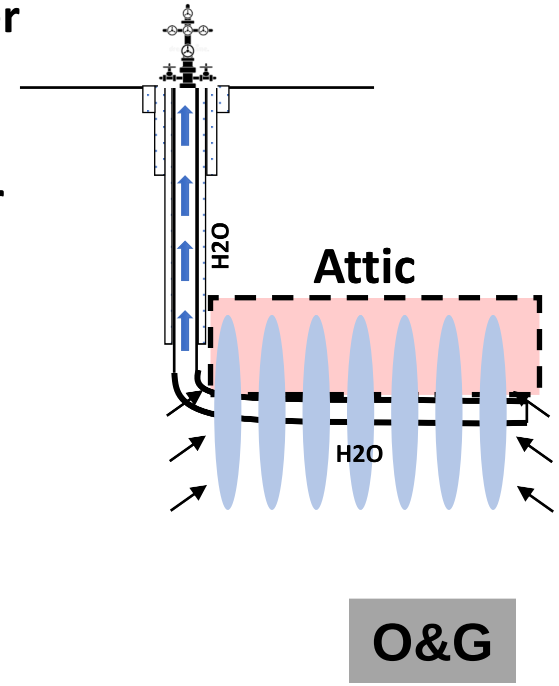



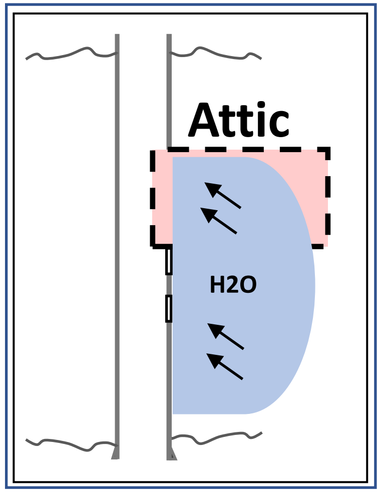

**Sage’s patented frac technology allows access to ~ 100% of the water**

**When an O&G-type fracture closes from bottom up, most of the water is trapped in an ‘attic’ above the perforations**



Fractures close from the bottom up (like a zipper)



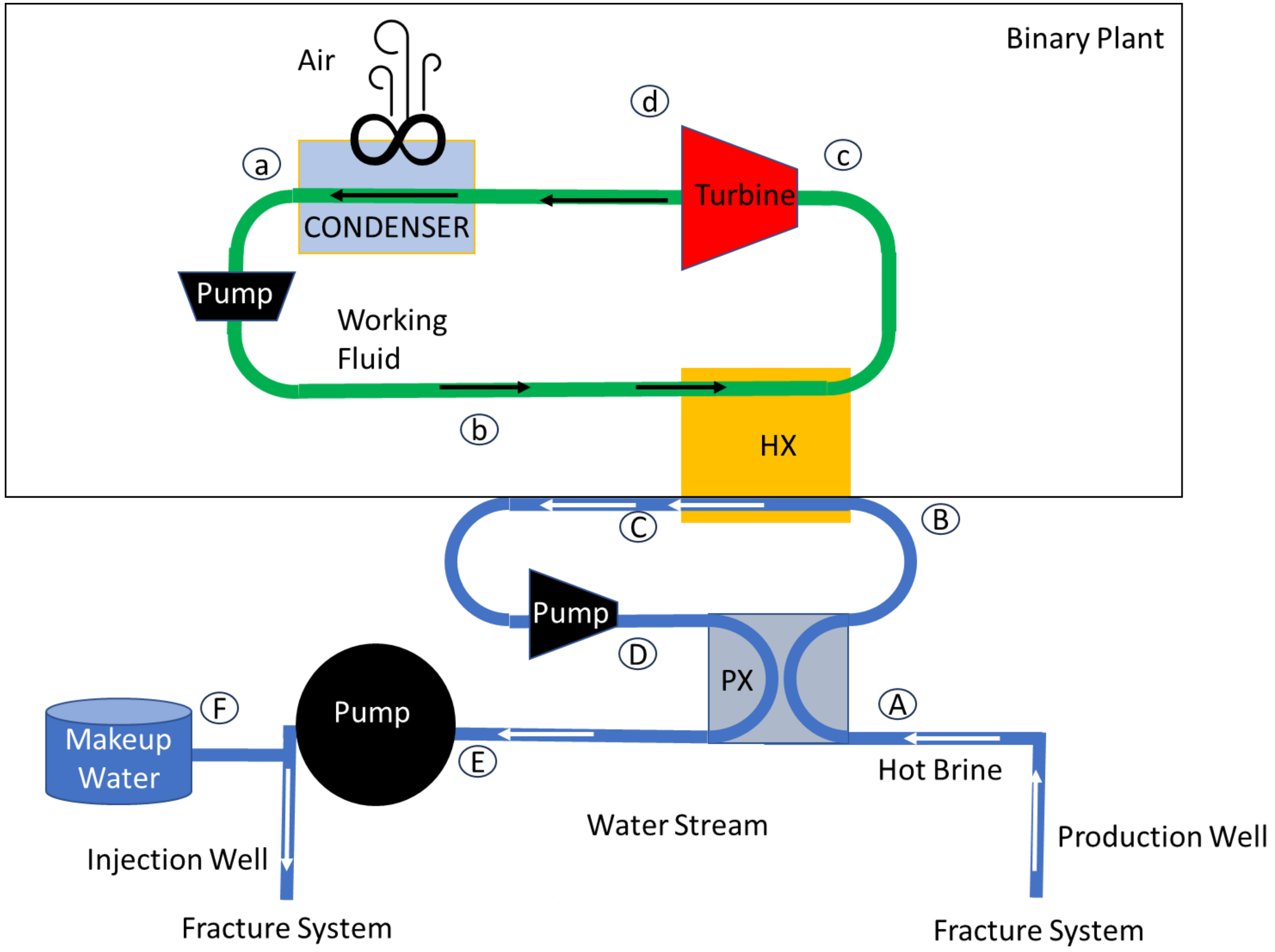
# Supercritical $CO_2$ turbine Delivers More Electricity


Sage's sCO2 3MW Turbine Ready for Load Test

Showing Scale

- Full-size 3MW prototype turbine designed and built
- Smaller and **50% less expensive** than Organic Rankine Cycle (ORC) turbines
- Delivers **more electricity** than ORC turbines
- **Sage owns IP on $sCO_2$ turbine**
- Load test in Q1 2024

# Geothermal Binary Power Plant Schematic




| Brine Circuit | Working Fluid/ Binary Cycle |
|---|---|
| A. Hot water produced from production well(s) enters a pressure exchange (PX) and exchanges pressure to the binary cycle.<br>B. Lower pressure water enters the heat exchanger (HX) to move heat from the water into the working fluid (WF) of the binary cycle (BC).<br>C. Lower pressure and lower temperature water exits the HX and enters a reinjection pump.<br>D. The reinjection pump increases the water pressure to cover frictional losses in the subsurface plus back-pressure the subsurface. | a. The WF is at its coldest densest point (liquid state) after the condenser. The WF enters a circulation pump to pressurize the working fluid.<br>b. The higher-pressure WF enters a HX gaining heat from the water.<br>c. The WF exchanges pressure with the high-pressure water pressurizing the WF and decreasing pressure in the water.<br>d. The WF is at its highest pressure and temperature and enters the turbine to create electricity by turning a generator.<br>e. Remaining latent heat is rejected to the atmosphere through an air-cooled condenser returning the fluid to a dense liquid state, thus completing the cycle. |

# Sage's Geothermal Baseload - Upfront Capital & LCOE

## Geothermal Baseload

### Path to $3-4MM per MW

| Levered Returns | |
|---|---|
| Internal Rate of Return | 19.5% |
| Multiple on Invested Capital | 5.0x |
| Payback Period (Years) | 7.2 |

LCOE = $0.09/kWh

**$7-9MM per MWh**

- ***Sage can deliver today***
- ***One-off well efficiency***

LCOE = $0.06/kWh

**$5-6MM per MWh**

- ***Design standardization***
- ***Multi-well pad drilling***
- ***Supply chain leverage***
- ***10-50MW scale***

LCOE = $0.04/kWh

**$3-4MM per MWh**

- ***Technology development***
- ***Manufacturing mode***
- ***> 100MW scale***

# Commercialization

# Project Pipeline

| Project | Initial Size | Timing | Status & Commentary |
| --- | --- | --- | --- |
| **Electric Cooperative** *(Energy Storage)* | 3-400 MW | 2024 | First commercial energy storage facility and then scale to repurpose lignite coal plant with PV solar integrated with energy storage |
| **U.S. Air Force** *(Baseload)* | 0.5 MW | 2025 | Commission geothermal power plant with ORC using U.S. Air Force TACFI funding; demonstrating technology for 3MW installation at Ellington Field |
| **Mining Operator** *(Energy Storage)* | 3-30 MW | 2024 | Drill test well in 1H2024 for energy storage test, to be paired with PV solar |
| **U.S. Army** *(Energy Storage & Baseload)* | 3-40 MW | 2024 | Deliver feasibility study for Fort Bliss and move to build/commission |
| **Big Tech Firm** *(Baseload)* | 3-100 MW | 2025 | Working with big tech firm to provide geothermal baseload for one of its data centers in Texas; in process of securing PPA |
| **Solar/Wind Producer** *(Energy Storage)* | 3-400 MW | 2026 | Working with large solar/wind producer to provide energy storage for one of its wind farms in Texas |
| **Entergy Corporation** *(Baseload)* | 5-300 MW | 2026 | Successfully reserved 5MW block in Louisiana with preferred pricing for up to 10 years through Entergy's Renewable Energy Program (REP) |
| **South Texas Electric Co-op** *(Energy Storage & Baseload)* | 3-300 MW | 2026 | Joint venture with the prominent Texas Rancher (McAllen Ranch family) for a 3MW pilot project followed by a 300 MW project |

# Forecasted Business Mix Summary

***$ in millions***

## Overview of Business Lines

**Sage Facilities: Facilities owned/operated by Sage**

- Targeting three facilities (energy storage and geothermal dispatchable baseload) owned/operated by Sage, with the first power plant to be commissioned 4Q 2024
- Strategy is to move rapidly towards third party Project Delivery

**Project Delivery: Energy storage and baseload projects built by Sage and sold to customers (Sage does not retain ownership)**

- Assumes that Sage enters engineering, procurement and construction (EPC) contracts to deliver projects at a 15% margin
- Assumes that Sage will additionally receive an ongoing royalty for IP on each project delivered
    - $0.01/kWh royalty for EarthStore and $0.005/kWh royalty for Geothermal
- Anticipates a mix of energy storage and geothermal baseload projects with construction starting in mid 2026

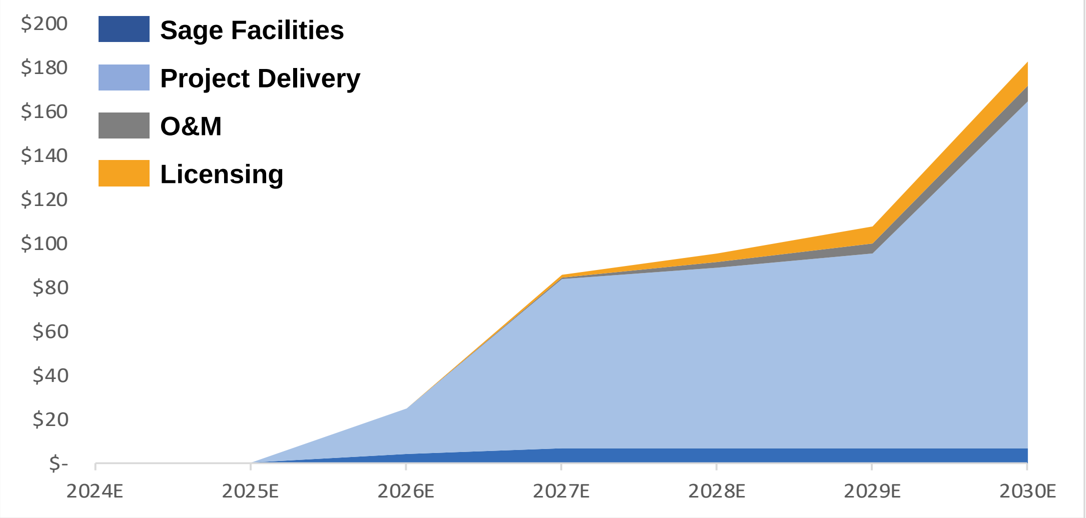
**Operations & Maintenance ("O&M"): Ongoing support services provided to Sage's Project Delivery customers**

- Estimates a ~25% margin on each service contract

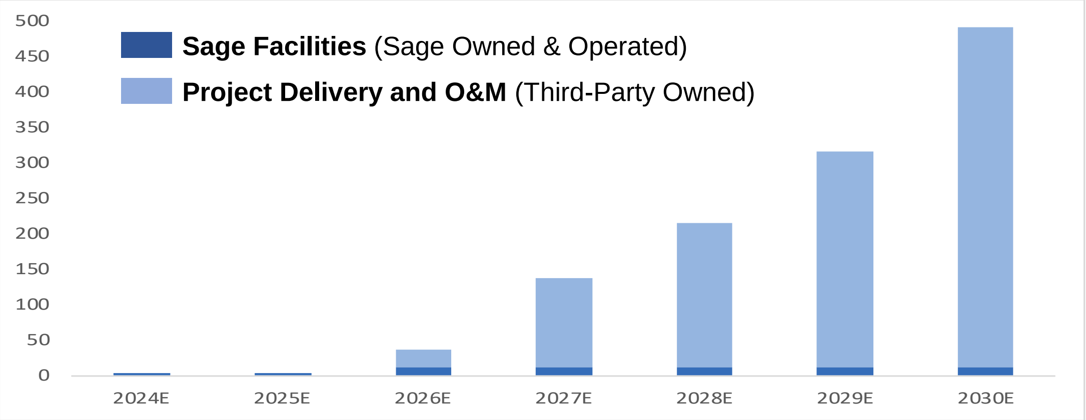
**Licensing: Technology licensed by Sage to third-parties for their own storage and baseload projects (Sage is not involved in project delivery)**

- Sage to earn a 5% royalty on revenue generated by licensed facilities
- Management acknowledges a fairly conservative approach taken; will ultimately be a much larger part of the mix in out years

## Gross Margin by Business Line




## Power Capacity by Business Line (MW)



# Technology Overview

# Sage Geosystems - Critical Technologies

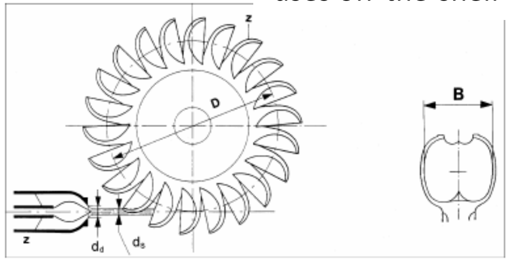
## ***Sage's technologies have been field-proven and are ready for commercial application***

## Power Plant

**Turbine wheel**

**Applications**
- Energy storage
- Geothermal

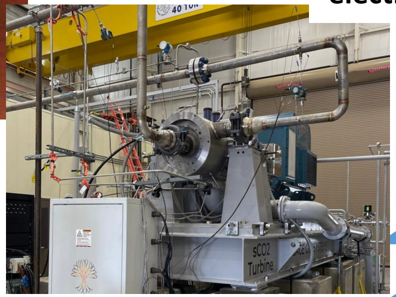
**High Pressure Pelton Turbine**
Proprietary high pressure hydro turbine for energy storage that uses off-the-shelf components



**Turbine wheel**

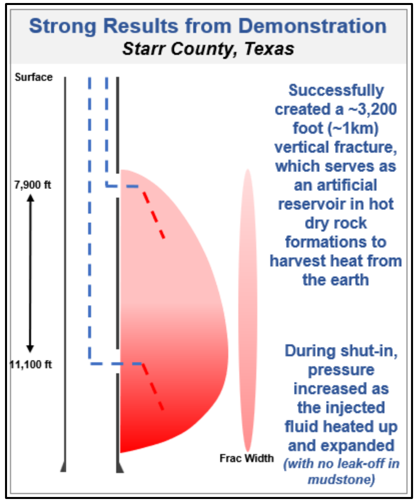
**Applications**
- Geothermal only

**sCO2 Technologies** Proprietary turbine for geothermal that is **50% cheaper** and delivers **more electricity** than ORC turbines



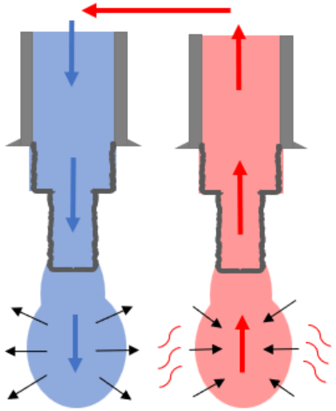
**HeatRoot™** → **HP Pelton Turbine** → **HeatCycle™** → **$sCO_2$ Turbine**

## Well Design




**Applications**
- Energy storage
- Geothermal

**HeatRoot™**
Proprietary gravity fracturing, which orients fracture downward towards hotter rock
(*Sage Geosystems - U.S. Patent No. 11,299,970*)

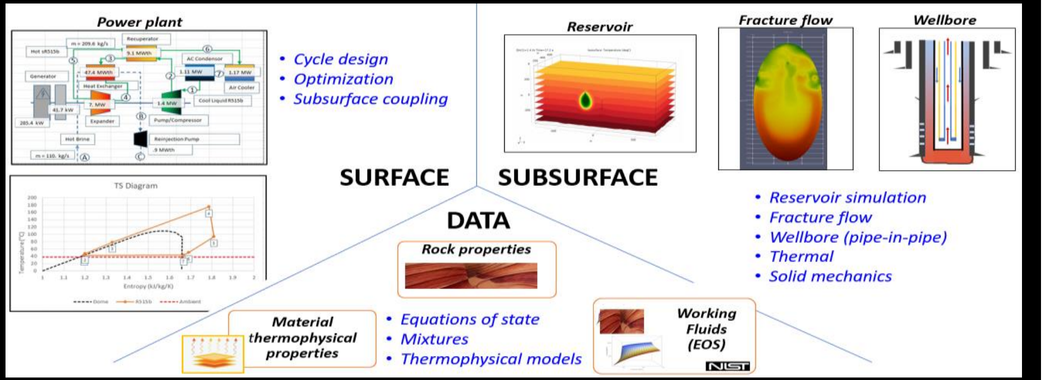


***Baseload Energy from Heat + Pressure***

**Applications**
- Energy storage
- Geothermal

**HeatCycle™**
Proprietary and field-proven cyclic injection operations harvesting the heat and pressure energy of water

# GeoTwin™

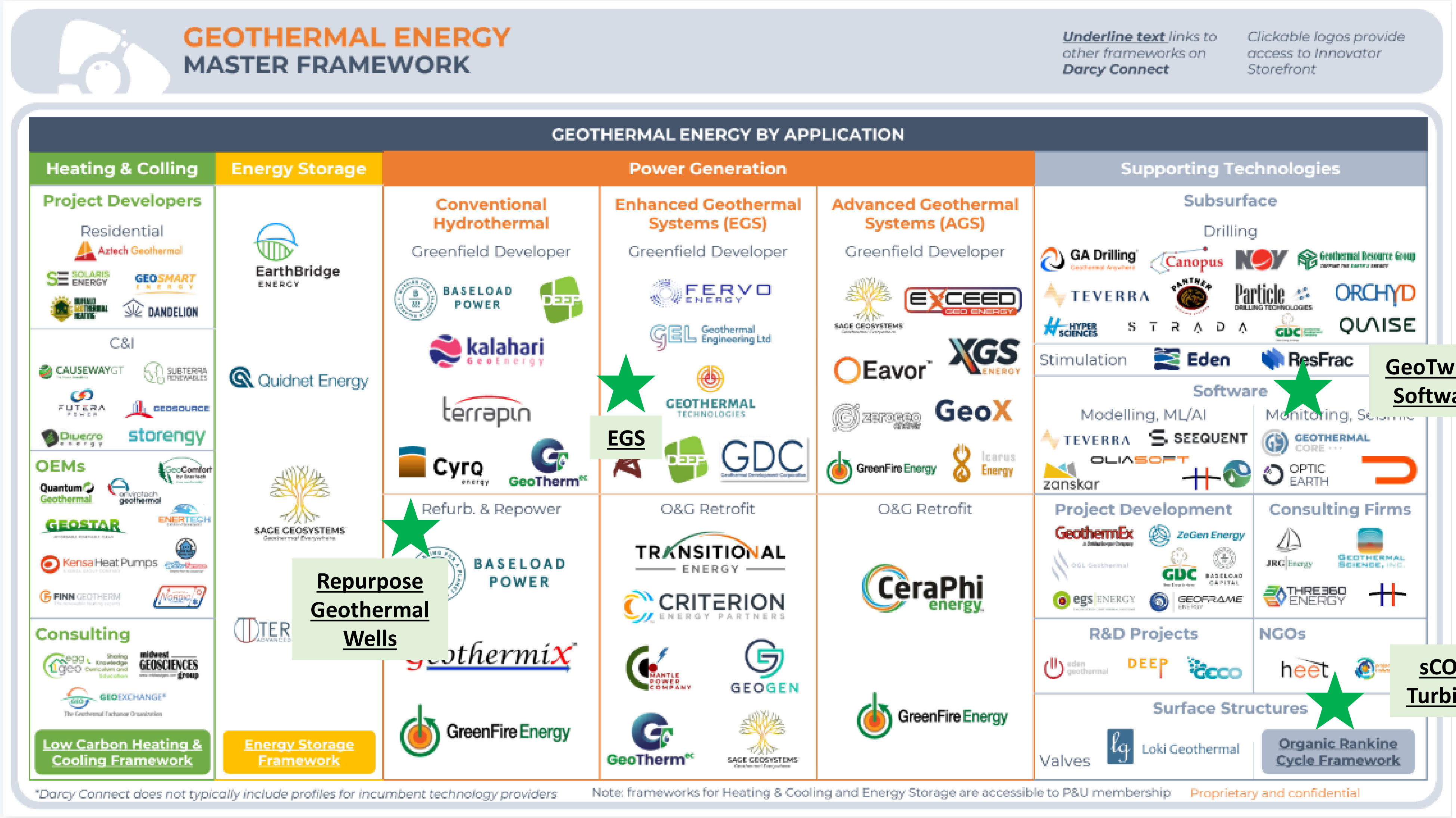



- **Proprietary** - Sage's modeling software is unique in that it integrates surface and subsurface modeling
- **System level modeling** - Uses fracture, fluid flow, and power conversion models to accurately estimate energy storage and/or geothermal power generation
- **Calibrated** - Using extensive U.S. DOE and Sage's field test data
- **Licensing** - Future source of revenue

# Back-up Slides

# Competitor Analysis - Darcy Partners

**Sage Geosystems**
Additional areas in which we are working
(working with Darcy Partners to update)




**EGS**

**Repurpose Geothermal Wells**

**GeoTwin™ Software**

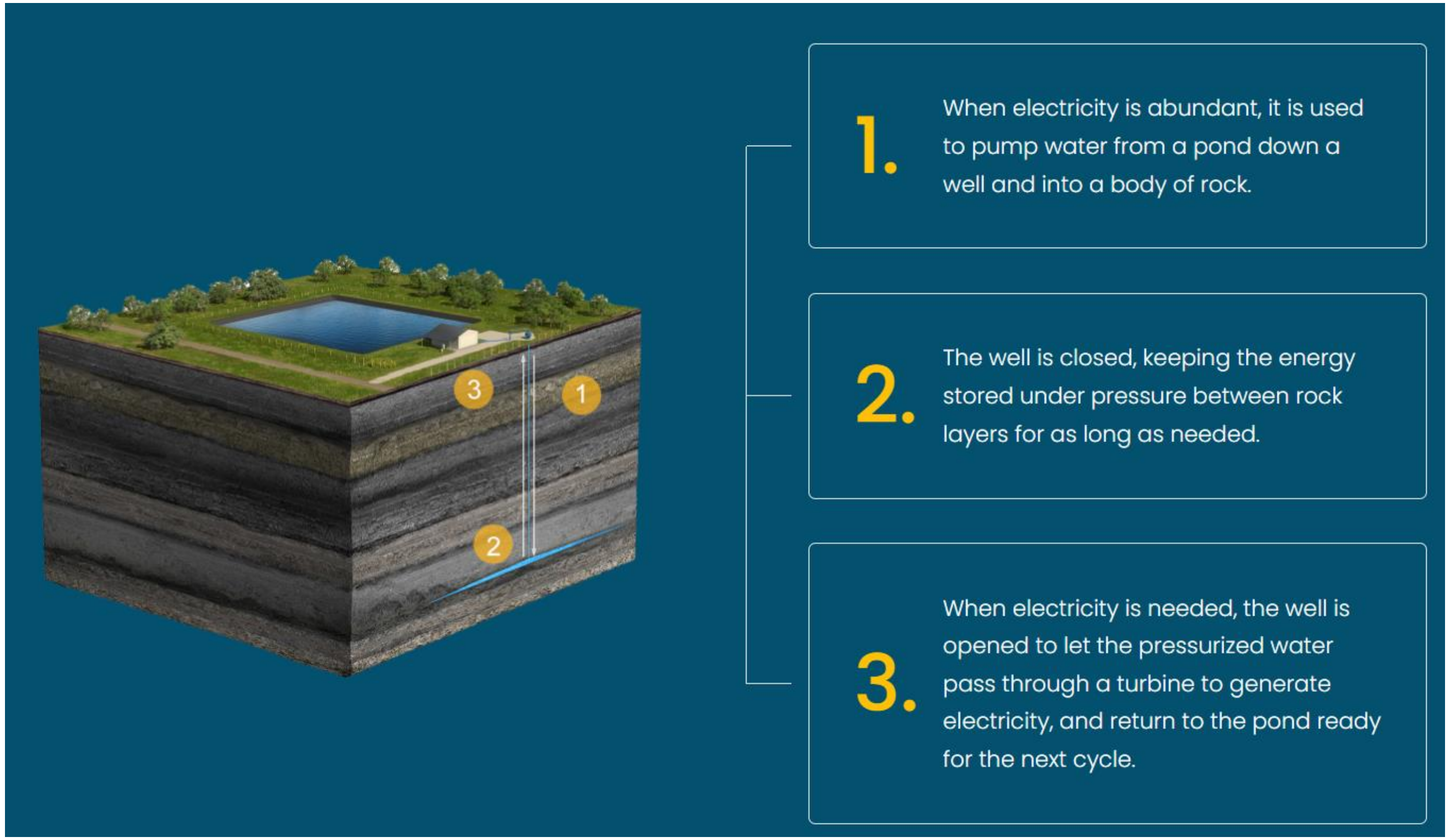
**sCO2 Turbine**

# Competitor Analysis

| | Eavor | FERVO ENERGY | GreenFire Energy | |
|---|---|---|---|---|
| Date Founded | 2017 | 2017 | 2010 | 2021 |
| Total Capital | $204 million | $188 million | $23 million | $25 million |
| Valuation | $564 million | $690 million | | $140 million |
| Round | 3 VC Rounds | 3 VC Rounds | Series A | Seed (Series A Underway) |
| Technology | Closed loop geothermal | Drilling technologies and fiber optics (use DOE EGS technology) | Stimulation technologies to improve performance of conventional geothermal wells | Proprietary GGS technology with HeatRoot stimulation, Energy Storage (EarthStore), sCO2 Turbomachinery, Geothermal Modeling |
| Investors | Vickers Venture, BP, Chubu Electric, Chevron | DCVC, Capricorn, Congruent Ventures, Macquarie, CPPIB, Prelude Ventures | Baker Hughes, H&P | CHK, Virya, Nabors, Geolog plus Non-equity grant from the U.S. Air Force and Defense Innovation Unit |

# Earth Storage Competitor - Quidnet Energy

Quidnet Energy




## Difference between Quidnet and Sage Energy Storage Systems

**Storage depth**

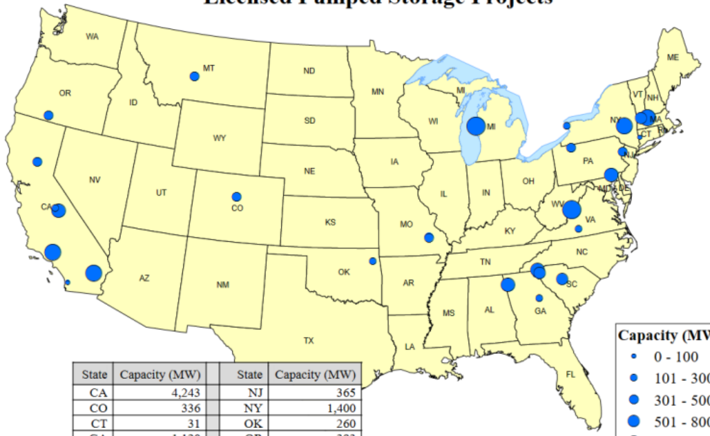
- Quidnet: < 3,000 ft (horizontal frac)
- Sage: > 7,000 ft (vertical frac)

**System power**

- Proportional to fracture opening pressure and thus to depth
- Sage: > 35x Quidnet capacity for the same fluid volume (proven in the field)
- Depth and heat component provides Sage with greater RTE: 75% RTE for mechanical storage 200% RTE for geothermal storage

# Projected PSH in the U.S. - We Can Do This Cheaper/Faster

**Licensed Pumped Storage Projects**



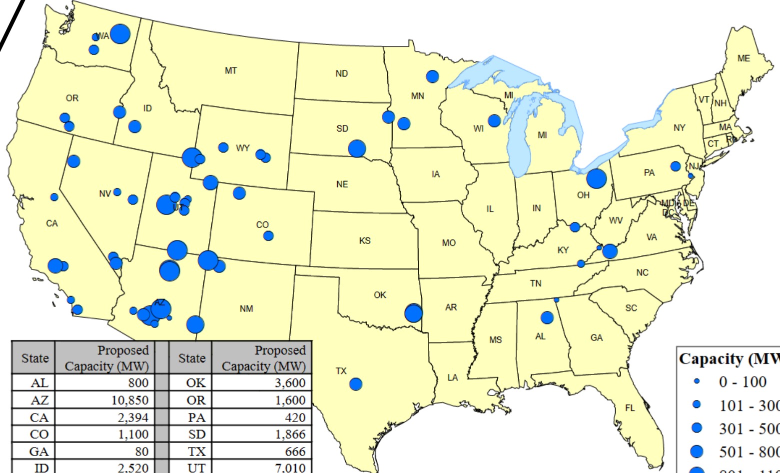
| State | Capacity (MW) | State | Capacity (MW) |
|---|---|---|---|
| CA | 4,243 | NJ | 365 |
| CO | 336 | NY | 1,400 |
| CT | 31 | OK | 260 |
| GA | 1,120 | OR | 393 |
| MA | 1,833 | PA | 1,280 |
| MI | 1,785 | SC | 1,221 |
| MO | 443 | SC/NC | 1,065 |
| MT | 400 | VA | 2,722 |
| TOTAL CAPACITY | | | 18,897 MW |

Source: FERC Staff, January 30, 2023

Capacity (MW): 0 - 100; 101 - 300; 301 - 500; 501 - 800; 801 - 1100; 1101 - 1400; > 1400

19GW


**Issued Preliminary Permits for Pumped Storage Projects**



| State | Proposed Capacity (MW) | State | Proposed Capacity (MW) |
|---|---|---|---|
| AL | 800 | OK | 3,600 |
| AZ | 10,850 | OR | 1,600 |
| CA | 2,394 | PA | 420 |
| CO | 1,100 | SD | 1,866 |
| GA | 80 | TX | 666 |
| ID | 2,520 | UT | 7,010 |
| KY | 716 | VA | 890 |
| MN | 1,332 | WA | 3,450 |
| NM | 2,100 | WI | 666 |
| NV | 2,500 | WY | 1,900 |
| OH | 1,500 | | |
| TOTAL CAPACITY | | | 47,960 MW |

Source: FERC Staff, January 30, 2023

Capacity (MW): 0 - 100; 101 - 300; 301 - 500; 501 - 800; 801 - 1100; 1101 - 1400; > 1400

48GW

## Huge projected U.S. growth for PSH

- **Due to wind/solar integration and to provide grid stability**
- **Sage's energy storage offers more**
  - **Smaller footprint**
  - **Not geographically limited**
  - **Ability to scale from small to large**
  - **Higher energy density**
  - **Better economics**
  - **Permits in weeks versus decades**

# Our Market Cap can be > $1 Billion in < 5 Years

***<u>Sage's Mechanical Storage</u>***

- ***Deliver 3MW per well***
- ***For 3GW = drill 1,000 wells***
- ***Use off-the-shelf technologies and start scaling now***
- ***Deliver 3GW in 5 years***
- ***IRR > 20%***

***<u>Market Capital Comparison</u>***

- ***Ormat Technologies (ORA)***
- ***Largest public geothermal company***
- ***1GW global electricity capacity***
- ***Market Cap = $4.7 billion***

**<u>"Largest Battery in the World"</u>**

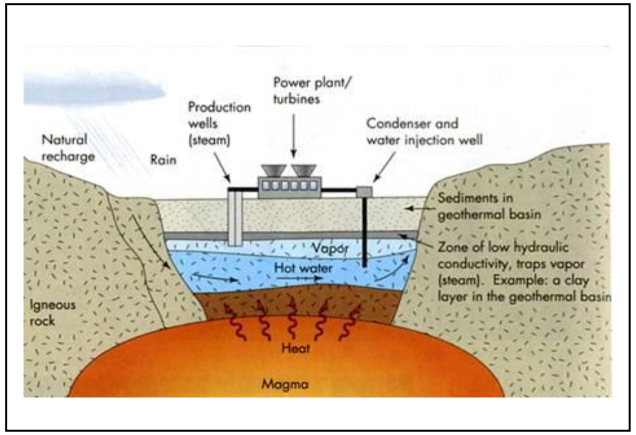
- Bath County, VA Pumped Storage - built in 1985, operating 37 years
- Cost of $1.6 billion ($4.35 billion in 2022 dollars)
- 3GW net output
- Height = 460 ft

# Other Hot Dry Rock Technologies

## Traditional Geothermal

### Hydrothermal
**Hot aquifer in rocks that naturally flow steam or water**
**(Ormat / Calpine)**

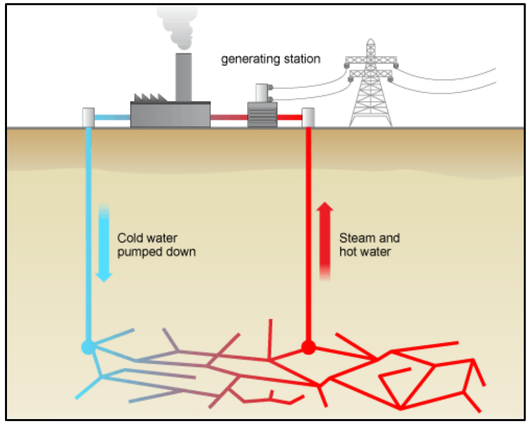
- Limited to areas near volcanoes
- High exploration risk
- ~ 40% of traditional wells are not performing




## Hot Dry Rock

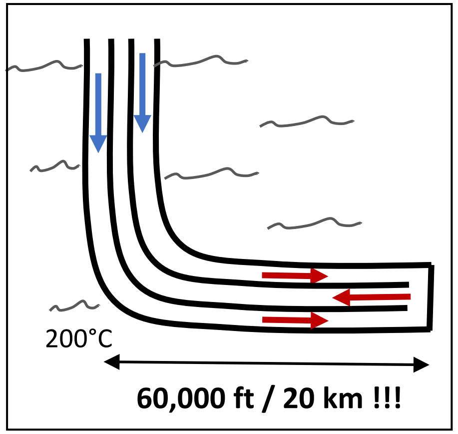
### Enhanced Geothermal Systems (EGS)
**Fracturing between wells**
**(DOE Forge / Fervo)**

- Multiple wells, more CAPEX
- Fractures must connect across multiple wells
- Water must disperse evenly across fractures
- High friction pressure pumping water through frac



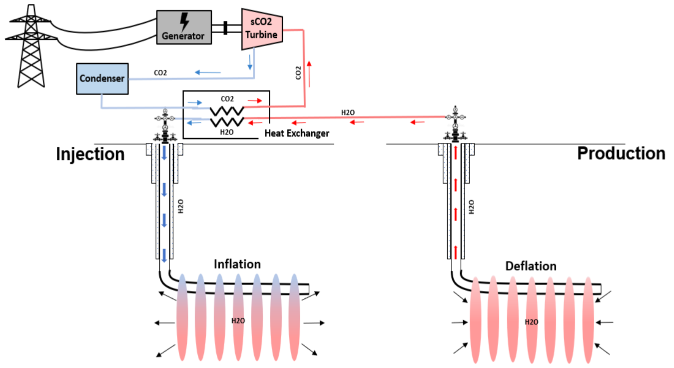

### Closed-Loop
**Pipes form an underground "radiator"**
**(Eavor / GreenFire)**

- Complex directional drilling, High CAPEX
- Requires tens of kilometers of well length for sufficient surface area




### Sage Geosystems HeatCycle

- Less CAPEX
- Only company to harvest both pressure and heat, resulting in an increase of 25-35% in net power
- Only company that operates above frac opening pressure, meaning even fluid dispersion and lower friction pressure
- Only EGS company centered around single well (all others use injector-producer pairs)



# Importance of Pressure Component of Enthalpy

Enthalpy = Internal Energy (Heat) + Pressure x Volume

$$H = E + PV$$

**97% of H**

**10% *Conversion Efficiency (ORC)**

**"E" Contribution to H**

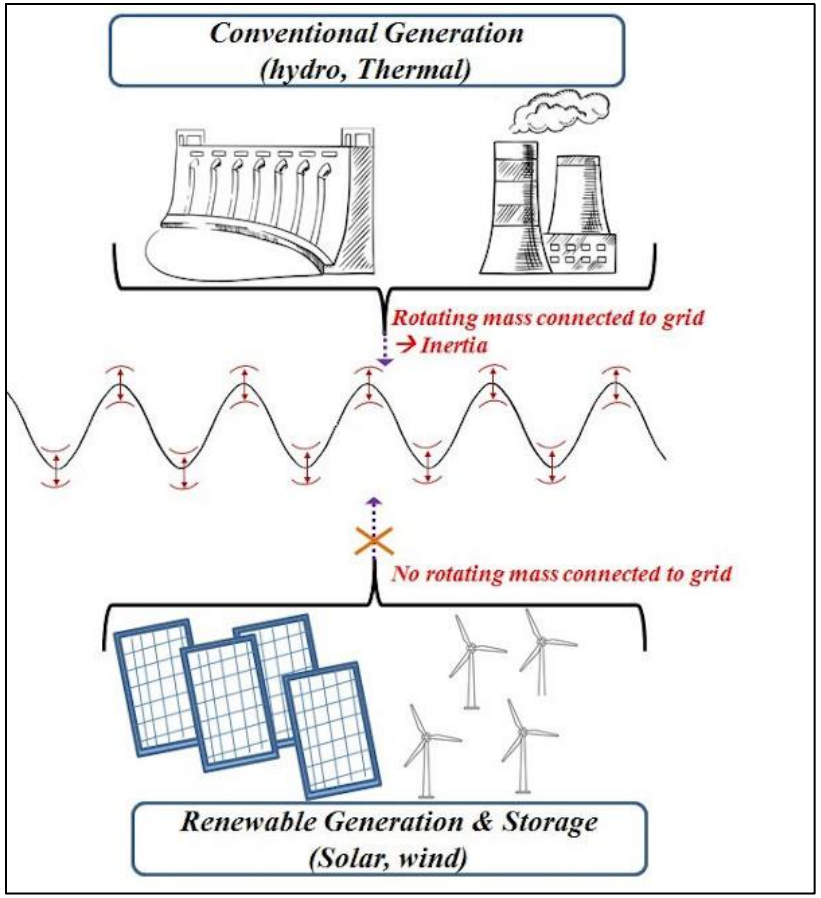
**3% of H**

**90% *Conversion Efficiency (Pelton)**

**"PV" Contribution to H**

* To electricity

# We Can Provide Inertia to the Utility Grid




*Reference: Gupta, Vishu et al. Brief Understanding of Inertia in the Smart Grid, Its Challenges and Solutions, November 2020.*

- **Grid Stability** - Inertia is a stabilizing force that keeps the utility grid stable when electricity supply and demand fluctuate.
- **Rotating Equipment** - Inertia is primarily provided by large rotating equipment such as generators in coal and/or combined cycle gas power plants.
- **Solar/Wind Impact** - Solar and wind energy sources don't possess the same mechanical inertia as rotating generators, so inertia is lost when solar/wind replace natural gas and coal.
- **Sage's Technologies** - Our energy storage and geothermal baseload technologies use rotating equipment and will help stabilize the grid by replacing inertia lost with solar/wind.

# Induced Seismicity / Frac Operations Footprint

## There is a low risk of induced seismicity with Sage's EGS technologies

- **Low-rate gravity frac** - Use low pump rates to allow heavy frac fluid to work through gravity fracturing.
- **Zero voidage** - On whole, we do not add or subtract fluid from the subsurface during cyclic operations once the frac network is created.
- **Avoid natural faults/fractures** - Unlike O&G and most geothermal designs, we seek low permeability rock and avoid natural faults/fractures, the main source of induced seismicity.
- **Small lateral reach** - We do not connect wells in the subsurface, resulting in a much smaller lateral extent as compared to 2-well EGS.
- **Utilize small rig pumps** - Rig pumps are used for gravity fracturing operations versus a traditional frac fleet, which can destroy local roads.