



Darlene Adkins
Owner
KMS Heating and Air



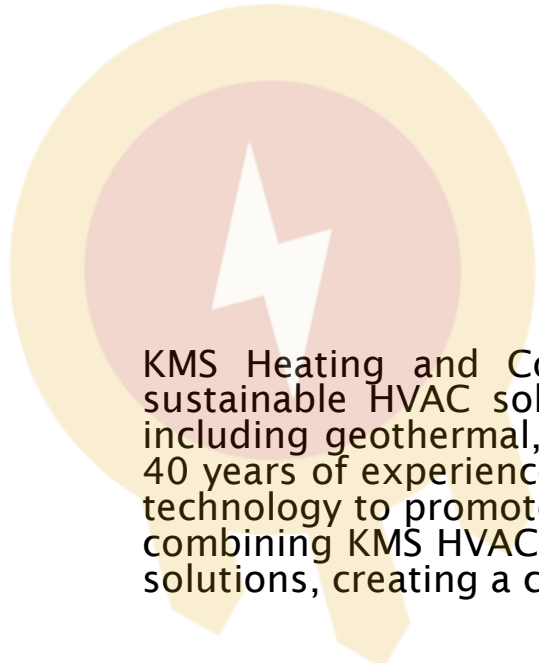
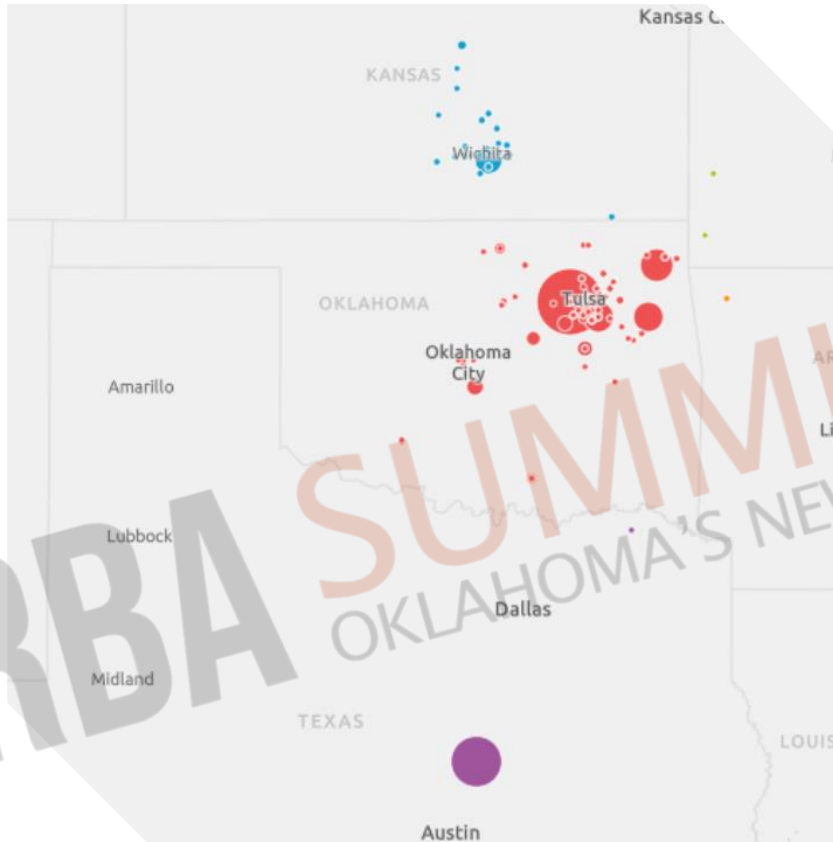
Jamie Patton
Estimator
Environmental Loop Service



Catalin Teadoriu
Mewbourne Chair
University of Oklahoma



Mike Eros
Chief Geoscientist
Sage Geosystems



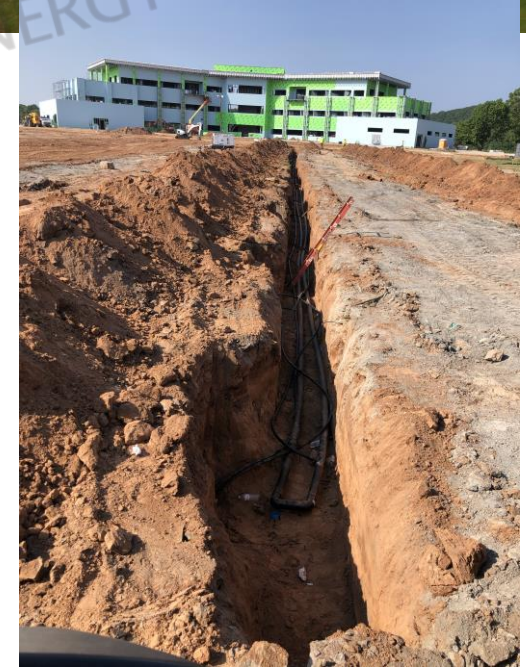
TRBA SUMMIT
OKLAHOMA'S NEW ENERGY ECONOMY

KMS Heating and Cooling (KMS HVAC) and Environmental Loop Services (ELS) both excel in providing sustainable HVAC solutions, with KMS HVAC specializing in a wide range of heating and cooling systems, including geothermal, and ELS focusing exclusively on geothermal heat pump systems. KMS HVAC brings over 40 years of experience in delivering high-quality HVAC services, while ELS leverages its expertise in geothermal technology to promote energy efficiency and environmental sustainability. Together, we integrate seamlessly by combining KMS HVAC's broad service offerings and customer-centric approach with ELS specialized geothermal solutions, creating a comprehensive and sustainable approach to modern HVAC needs.

WEBCO LEADERSHIP SAND SPRINGS

Stands out as a commercial application of geothermal systems FOR 72,000 sq ft, focusing on energy efficiency and sustainability.

Successful installations by Webco have proven the viability and advantages of geothermal HVAC systems in diverse environments.



163 WELLS, - 400' DEPTH - ENHANCED GROUT

ROGERS STATE UNIVERSITY - CLAREMORE, OK



NETWORK OF UNDERGROUND LOOP

TWO PUMP HOUSES SERVICES SYSTEM OF MULTIPLE BUILDINGS

325 WELLS, 400 FT DEPTH

EST \$2.27 M IN ENERGY SAVINGS OVER 5 YEARS

INCORPORATES EFFICENCY MEASURES WITH LIGHTING, PLUMBING CONTROLS, AND WINDOWS

BUILDINGS SERVED BY SYSTEM (TO DATE)

- INNOVATION CENTER
- PREPARTORY HALL
- MEYER HALL
- BAIRD HALL
- CENTENNIAL CENTER
- UNIVERISITY VILLAGE
- HILLCAT ATHLETIC CENTER

Large-scale district application of geothermal technology in an educational institution, aiming to provide a model for other universities to follow.

DESIGN-BUILD RESIDENTIAL NEW CONSTRUCTION TULSA, OK



- Single-family Home Built In 2021.
- 16,624 Square Feet, With 7 Bedrooms And 8 Bathrooms.
- Lot Size 6.30 Acres
- Upscale Housing In The Tulsa Area, Reflecting The City's Growth And Development.
- 80 Ton Water Source Heat Pump
- Geothermal Design Includes
 - Spa And Pool Heat
 - Pool Deck Radiant
 - Driveway Snow Melt
 - Heating And Cooling



EAST CENTRAL ELECTRIC COOPERATIVE OKMULGEE, OK



Another testament to the growing adoption of geothermal technology. Their new headquarters boast a state-of-the-art geothermal HVAC system that uses ground source heat pumps to regulate temperature efficiently. This system not only enhances energy efficiency by operating at up to 350% efficiency but also significantly reduces operational costs and environmental impact by lowering greenhouse gas emissions. Additionally, the cooperative supports the installation of geothermal systems through rebates and incentives, making sustainable choices more accessible.

17 WELLS

6800 FT BOREHOLES - DRILLED AND GROUTED

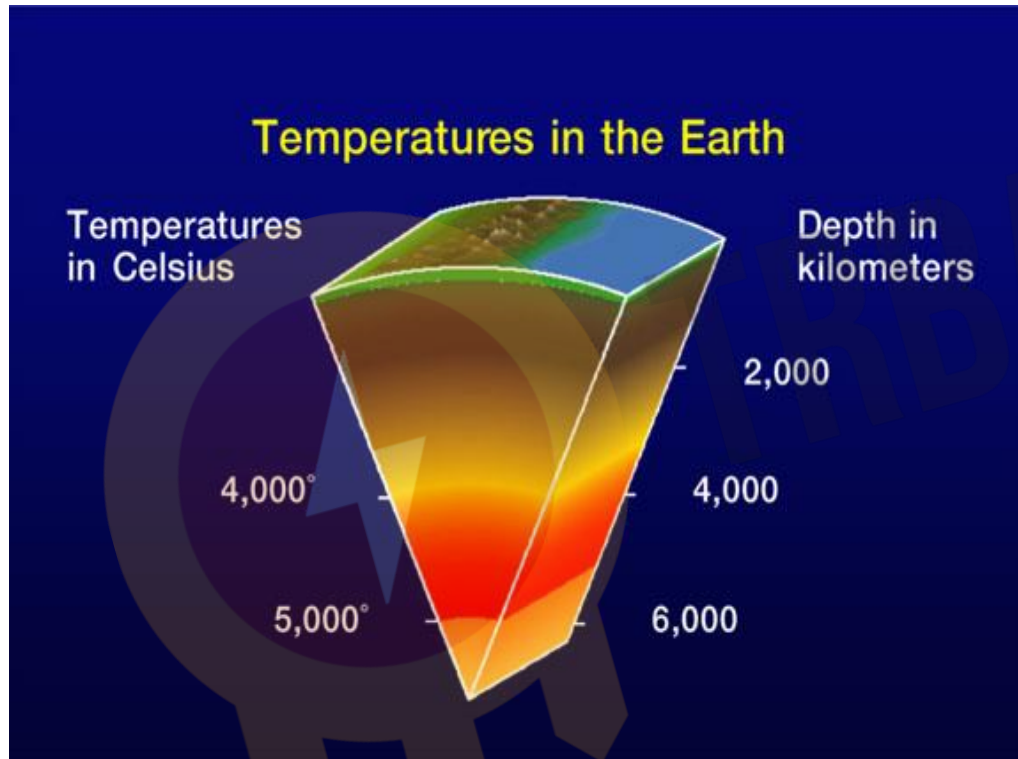


Catalin Teodoriu
Mewbourne Chair
University of Oklahoma

Catalin Teodoriu is a Professor at The University of Oklahoma, Norman, Oklahoma. Until 2015 he was head of the Sub-department for Drilling Technology, Completion and Workover at Clausthal University of Technology. Between 2006 and 2009, he was an assistant professor at Texas A&M University, teaching courses on drilling topics such as Drilling Engineering, Introduction to Drilling Engineering, Completion and Workover, and Advanced Drilling Engineering. He now serves as an adjunct assistant professor in the Harold Vance Department of Petroleum Engineering at Texas A&M University and as adjunct professor at the Oil and Gas University of Ploiesti in addition to his position in the Mewbourne School of Petroleum and Geological Engineering at OU.

He has more than 15 years of experience in the petroleum industry and academia, with key qualifications and research in drilling and production equipment, drilling technology, integrated computer aided analysis, well completion, testing of OCTG, design of downhole and surface equipment, software development, EOR and geothermal wells, and in the design of laboratory specific equipment (i.e. high pressure testing, large scale testing equipment for multiphase flow and drilling process simulation). He is specialized in developing new threaded connections for OCTG as well as expert on drilling problems and failure analysis. At OU he is building a unique testing facility for threaded connections and OCTG under complex loads.

Geothermal everywhere, anywhere and beyond

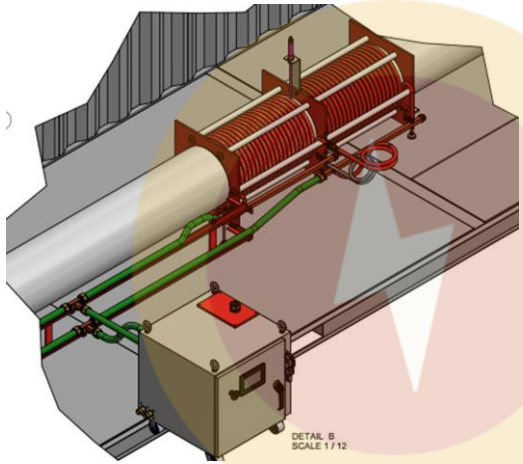
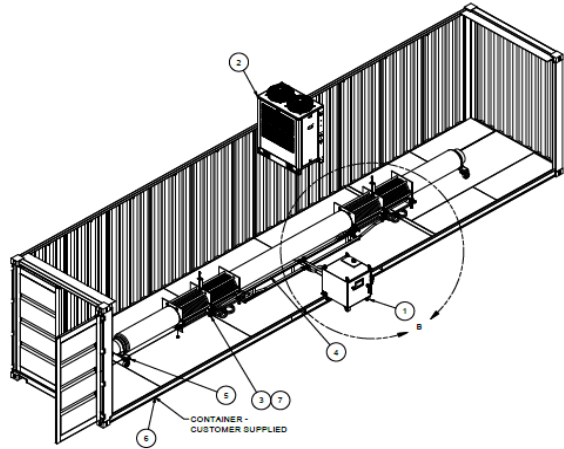


Earth's cooling process is very slow

Temperature of mantle has decreased by 300-350 °C in 3 billion years, remaining at ~4000 °C at its base

99% of Earth is hotter than 1000°C

99% of the 1% is hotter than 100°C



Schematic view of the induction heating unit and induction coils, courtesy of Interpower



- A unique full size testing setup is currently under development at the University of Oklahoma.
- Downhole components up to 18 inches and 30 ft long can be tested at simulated temperature conditions exceeding 250°C. In long run, the setup allows upscaling to reach eventual 500°C.
- With this project, we intend to enable effective zonal stimulation in geothermal conditions >200°C with the incorporation of all metal sealing systems for the various components in the wells.

Dr. Ramadan Ahmed
 Dr. Ahmad Ghassemi
 Dr. Catalin Teodoriu

FORGE 1: > \$3MM federal funding for OU
 FORGE 2: > \$3MM federal funding for OU

RURAL ENERGY PILOT PROJECT

Pawnee County, OK

REPP Components



Smart Sensors and Smart Thermostats



150kw Solar Garden



Solar Certifications



Geothermal



Ev Chargers



35kw Electric Battery Storage



Greenhouse

Taking Applications For Individuals to Be Solar Certified!

The Pawnee Nation College is a partner to the REPP and is looking to send 8 people to Washington State to become certified in solar installation and construction. There is on the job training, great job opportunities and potential business opportunities from this! Email Alex or visit our website

Clean Energy

Revolutionizing Pawnee

Transform Pawnee into a clean and sustainable community.

PROJECT DETAILS

- Total Project Cost \$2,650,488
- Federal Funding \$2,000,000
- Timeline 36 Months
- Matching Funds
- \$395,178 Cash
- \$255,310 In-Kind

PROJECT PHASES

- Community Scale Solar Garden
- Geothermal Project
- Battery Storage System
- Electric Charging Stations
- Educational Meetings and Workshops
- Renewable Energy Certification
- Institutional Partnerships
- Weatherization Planning
- Cooperative Business Modeling
- Published Case Study

PARTNERS

- Pawnee Nation College
- Pawnee Nation Housing Authority
- Indian Electric Cooperative
- University of Oklahoma
- Tribuquent





Mike Eros
Chief Geoscientist
Sage Geosystems

Geoscientist and technical team manager with research, project development and operational experience in the startup, corporate, non-profit and public sectors. Mike has organized and led multi-disciplinary projects focused on geothermal energy generation and subsurface energy storage, power purchase, carbon capture, conventional and unconventional oil and gas, and paleoclimate research, working in the USA and internationally. Mike is a licensed professional geoscientist in Texas (MSc, P.Geo.) with a passion for innovations in affordable energy, public policy, low-carbon energy solutions, science education, and local non-profit arts volunteering.

Sage Geosystems: Energy Storage & Geothermal

- Start-up founded in 2020 focusing on both energy storage & geothermal baseload
- First commercial 3MW energy storage facility to be commissioned Dec. 2024



SAGE GEOSYSTEMS™



Sage
Geosystems
Pelton turbine

*3MW Storage plant co-located with
San Miguel Electric Co-op Inc.
(SMECI) lignite coal plant
(Christine, TX)*



Investors

CHESAPEAKE
ENERGY

NABORS

VIRYA LLC

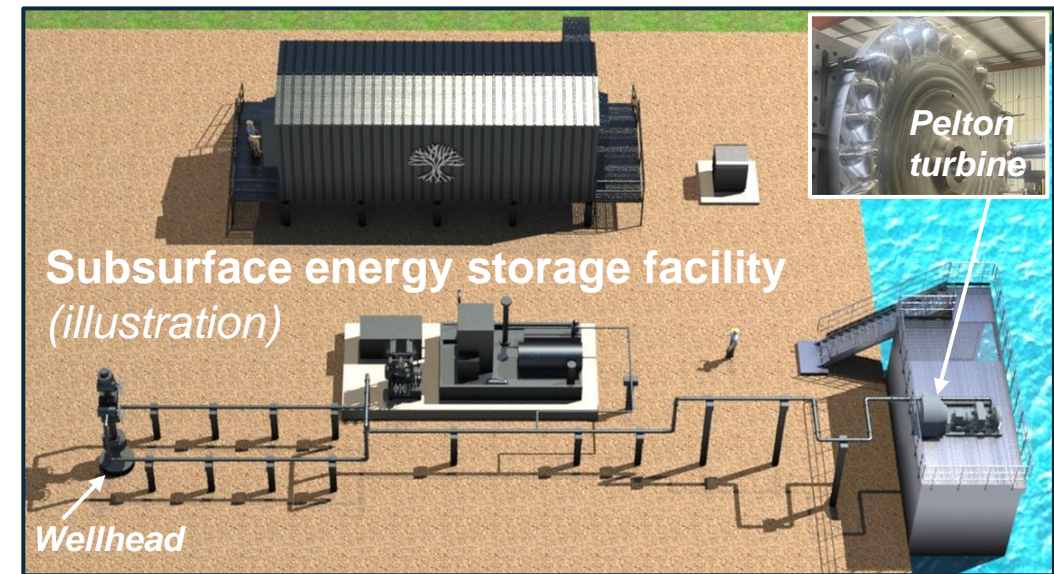
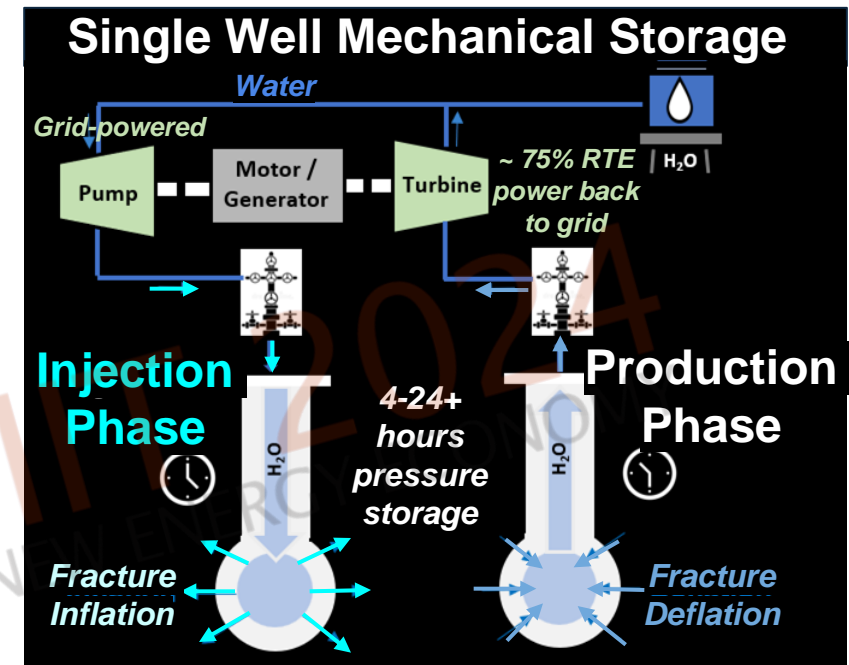
GEOLOG

HELIUM-3
VENTURES

AIC
HOLDINGS

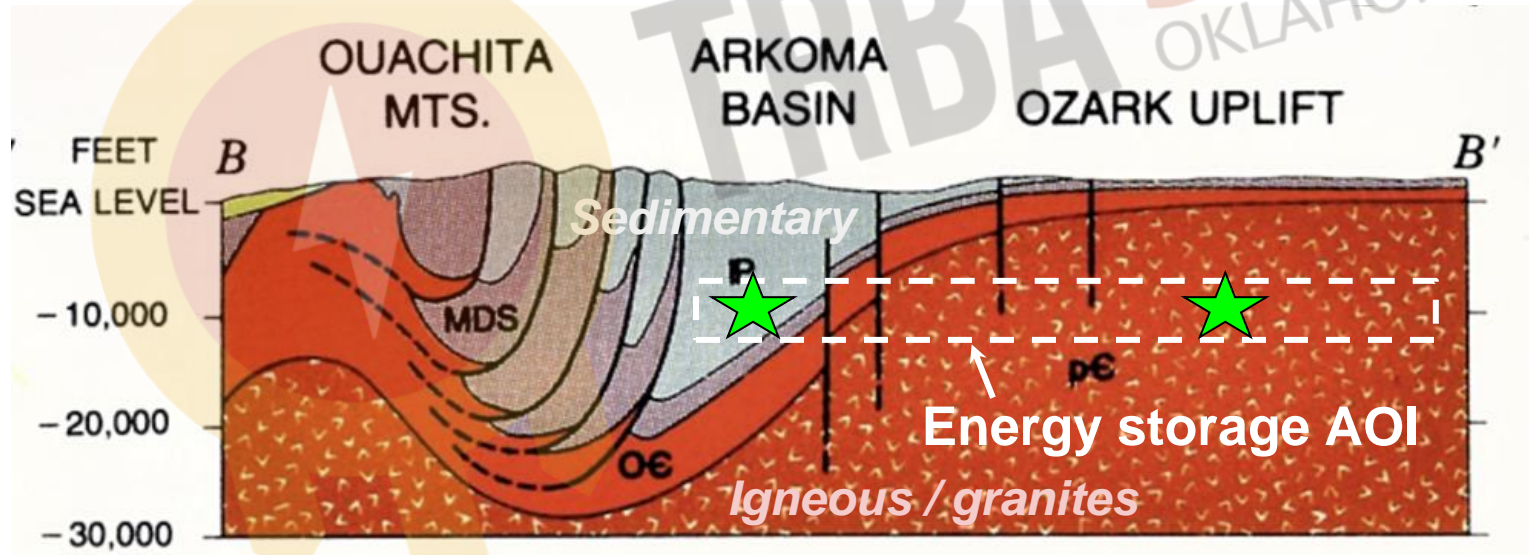
Walk and Then Run: Energy Storage & Geothermal

- Subsurface pumped hydro power AKA “Earth storage”
- Vertical drillwell, vertical stimulations from ~8-12,000’ TVD
- 3-400 MW+ capacity, long-duration (4-24+ hours)
- Wells and facility utilize off-the-shelf equipment
- Store power from wind, solar, or the grid to move to a time of day w/ higher demand
- *Next Steps: Drill deeper, add heat for geothermal power: South TX (2025+)*

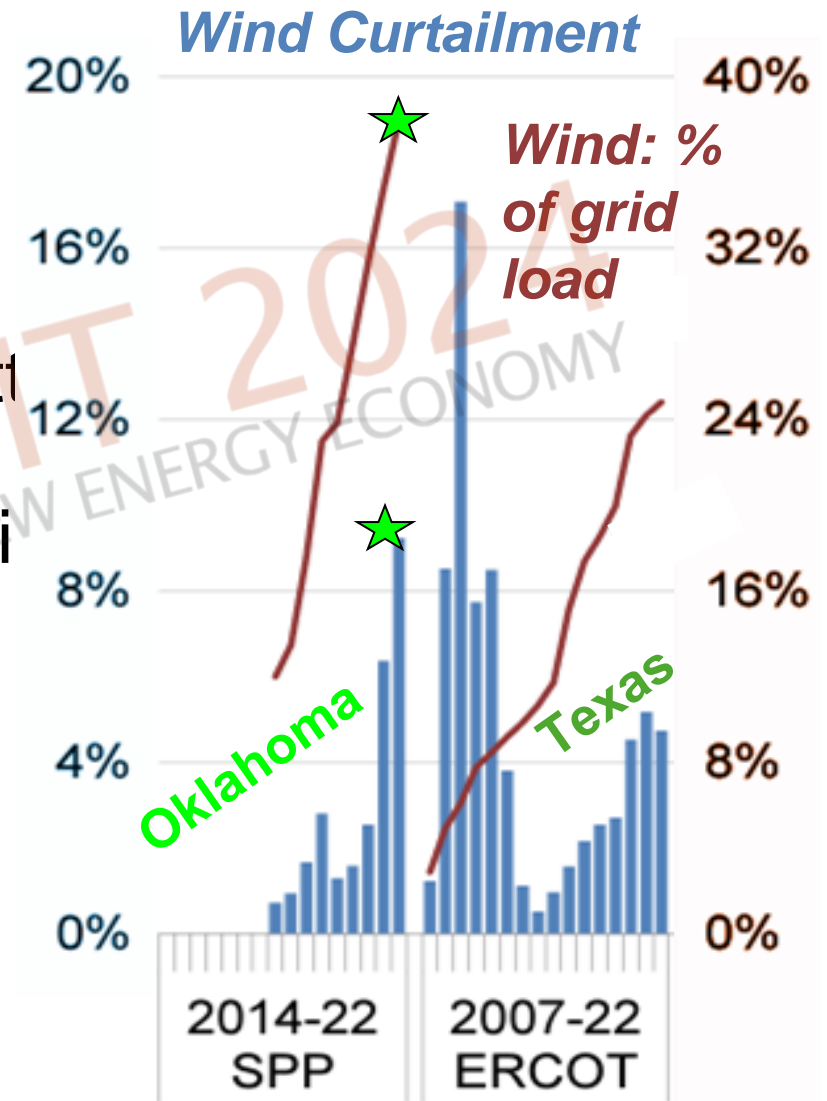


Sage Geosystems: Oklahoma Energy Storage

- Rising need for storage given increased intermittent and curtailed power
- Abundant energy potential in subsurface statewide



Source: Oklahoma Geological Survey



Source: Wiser et al. (2023) DOE La Based Wind Market Report