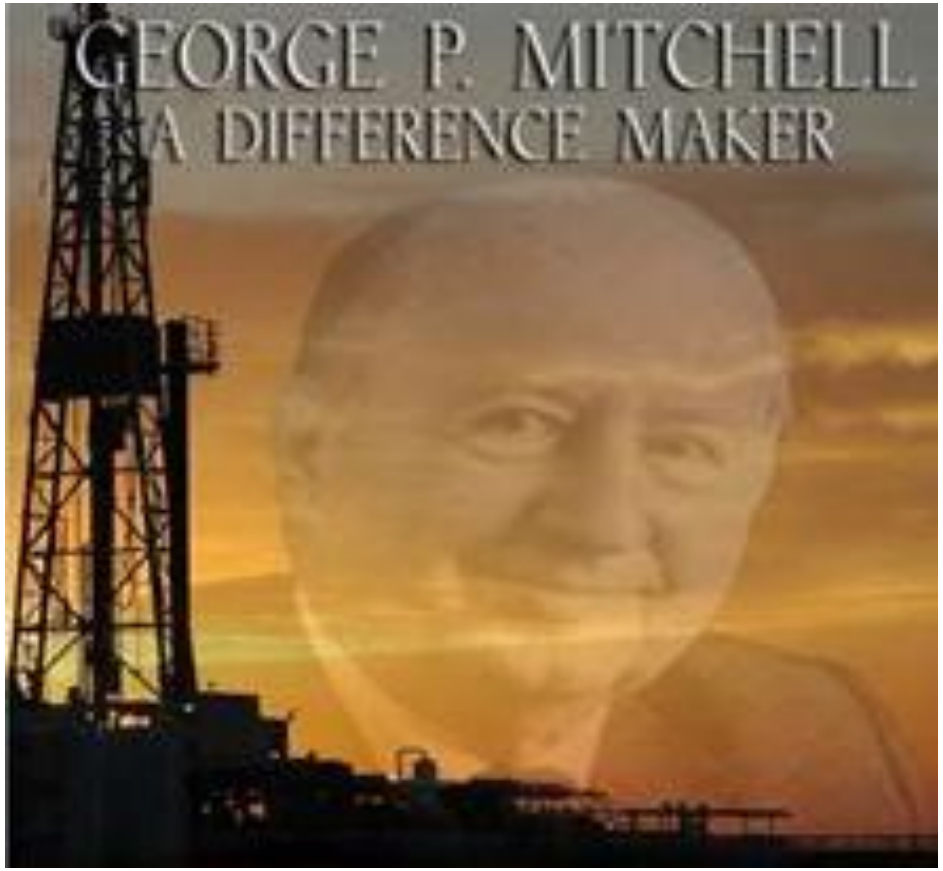
Challenging Conventional Wisdom - The Key to Achieving Transformational Change

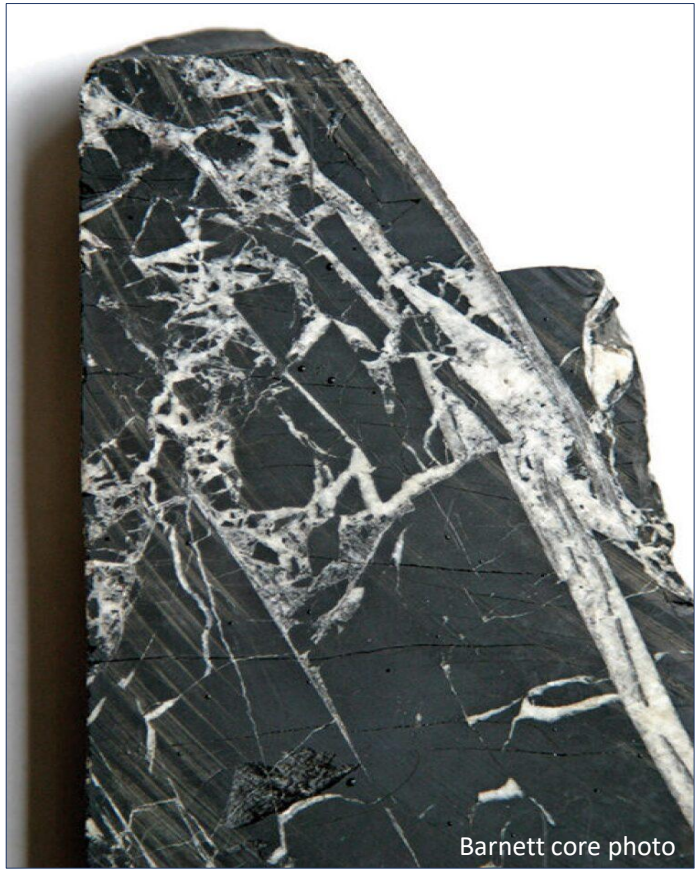
Greg Leveille

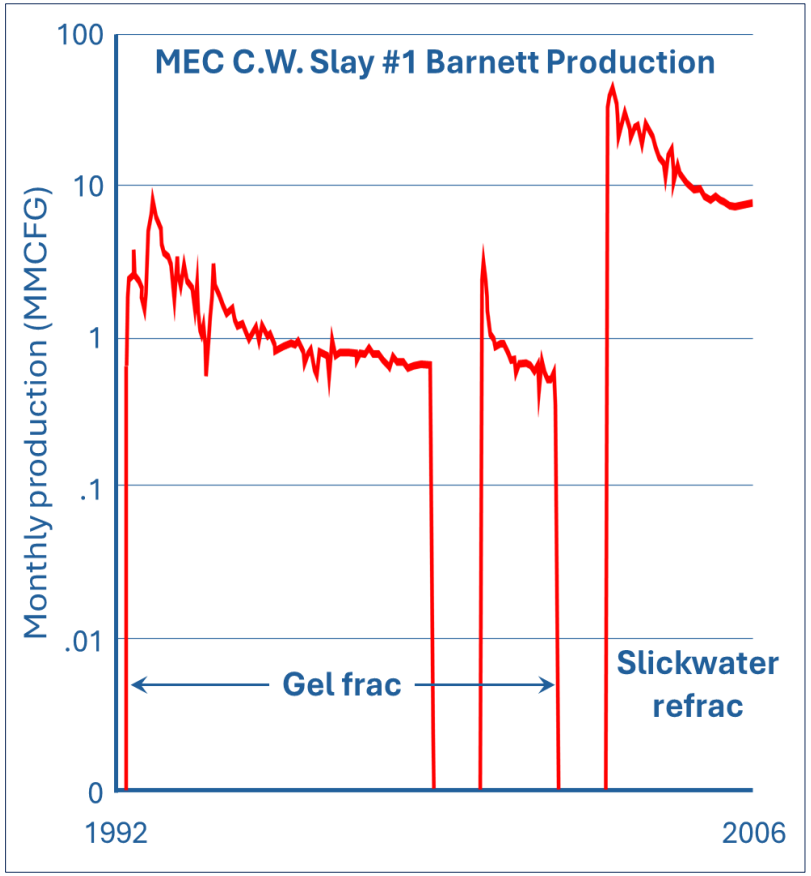
June 10, 2025

Picture from Fervo Energy's website

URTeC exists because George Mitchell challenged conventional wisdom







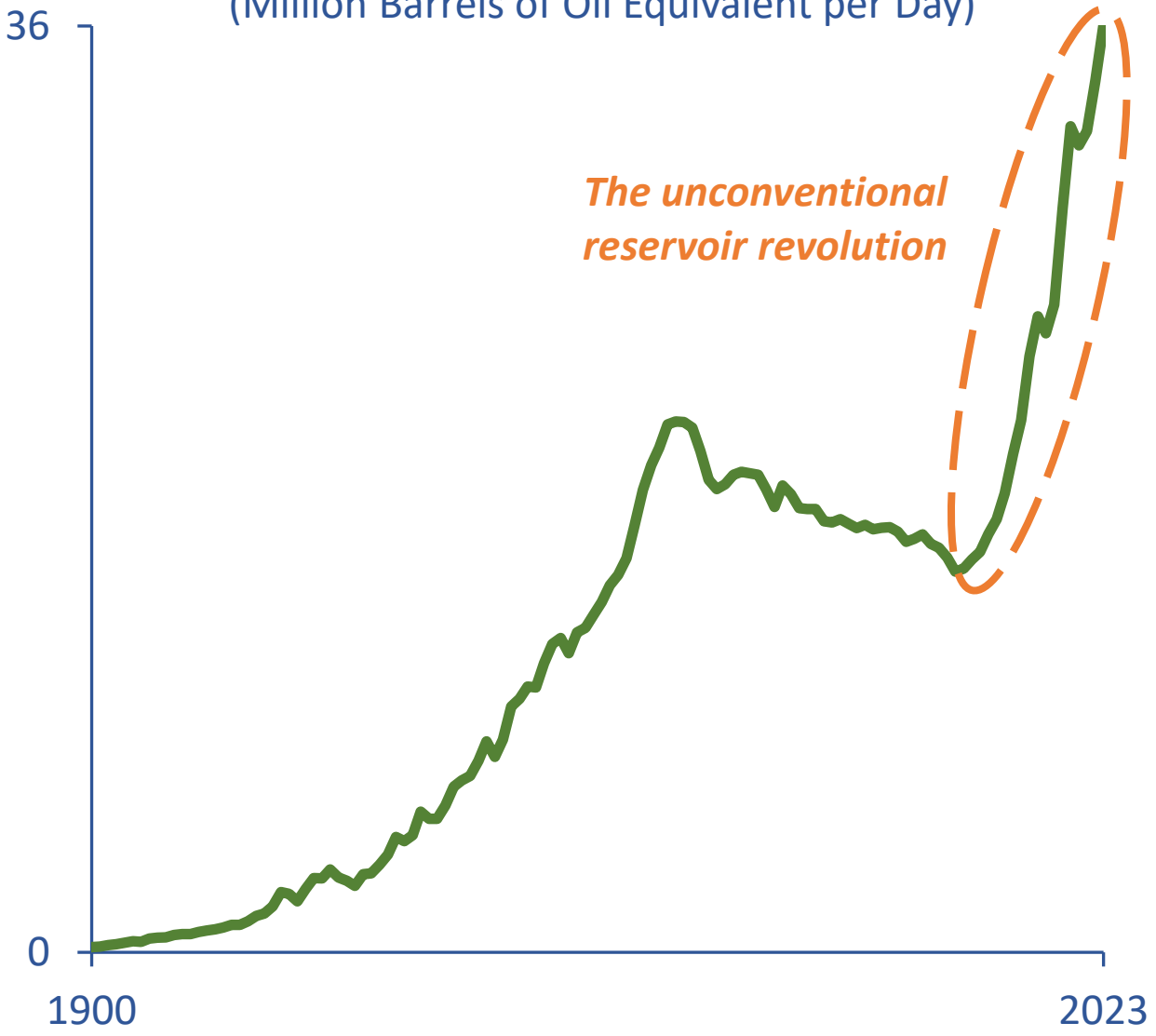
"As early as 1986, Mitchell had established, in the case of the Barnett, natural fractures were not a contributor to production… ***(which was a) conclusion in direct conflict with the prevailing models at the time"****.*

Core photo, production plot, and quote taken from JPT Article "George P. Mitchell and the Barnett Shale" October 31, 2013 (LINK); URTeC = Unconventional Resources Technology Conference

Challenging conventional wisdom changed the fate of America's O&G industry

U.S. hydrocarbon production

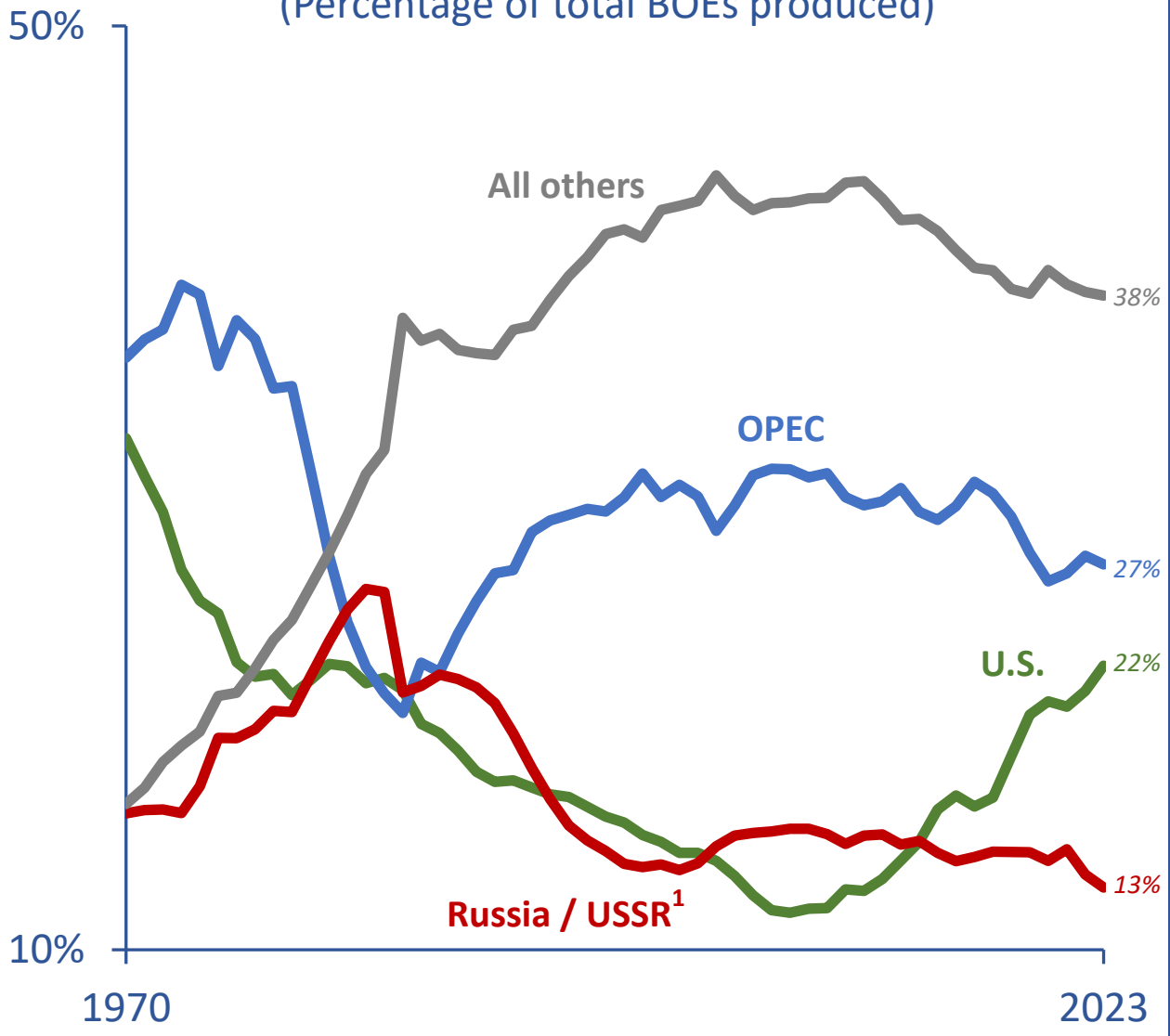
(Million Barrels of Oil Equivalent per Day)



Sources: U.S. EIA and Energy Institute websites

Global hydrocarbon production market share

(Percentage of total BOEs produced)

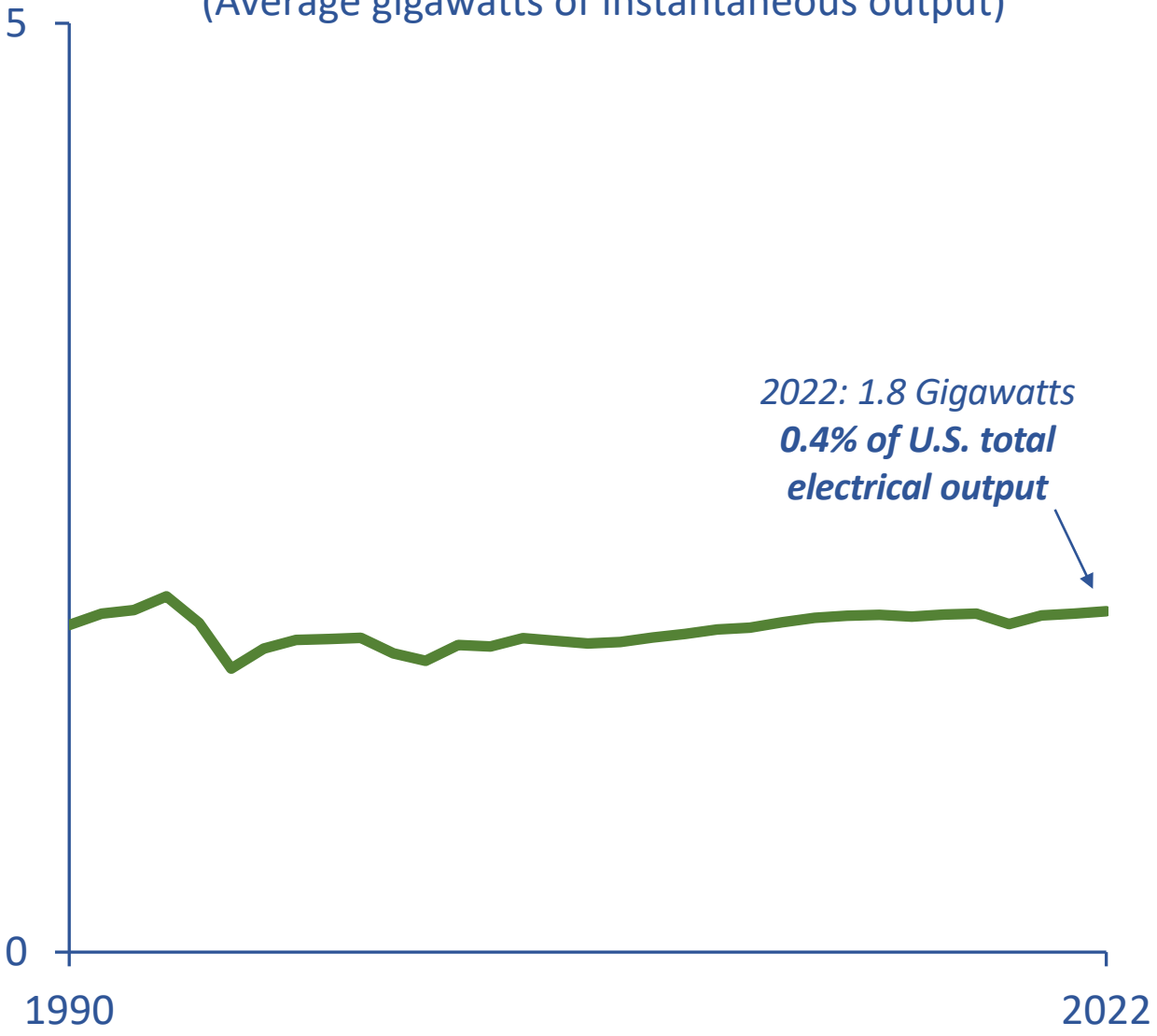


Source: Energy Institute websites; [1] USSR until 1985, Russia thereafter

Conventional wisdom pre-2021: Geothermal power isn't economically attractive

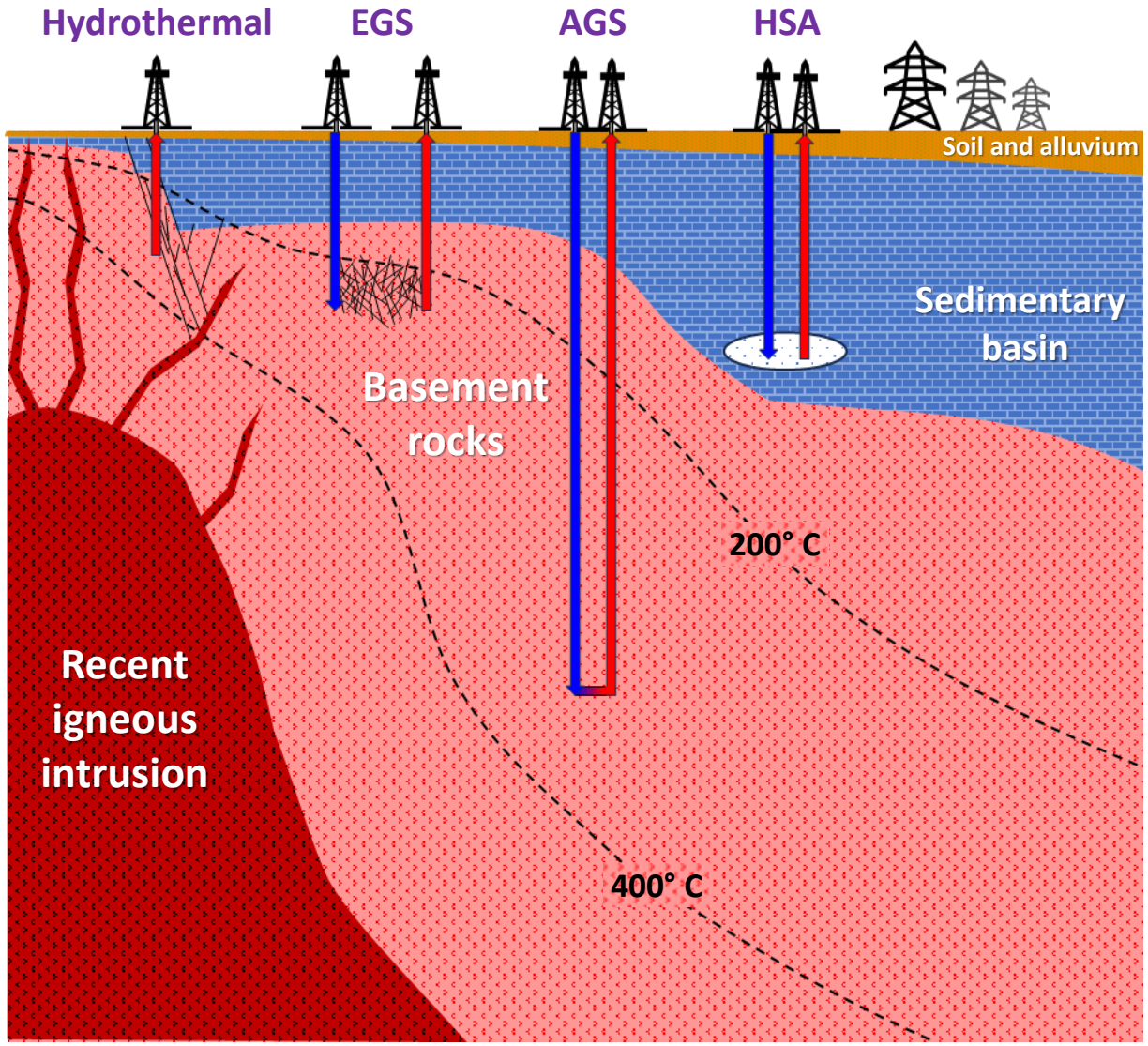
U.S. geothermal annual power production

(Average gigawatts of instantaneous output)



Sources: U.S. EIA

Geothermal power production development methods

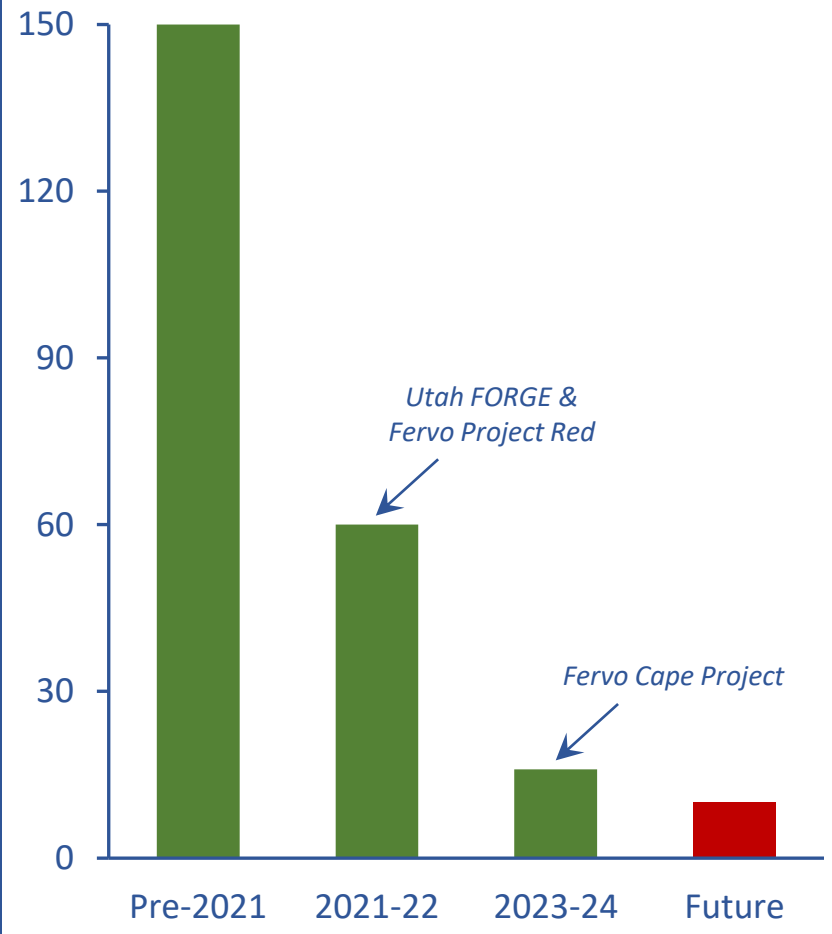


Cross section view; not to scale; depiction of geothermal systems greatly simplified; Hydrothermal = Extract hot fluid from natural permeability; EGS = Enhanced Geothermal Systems; AGS = Advanced Geothermal Systems; HSA = Hot Sedimentary Aquifers

Application of O&G technologies have delivered game changing results

Spectacular drilling performance improvements

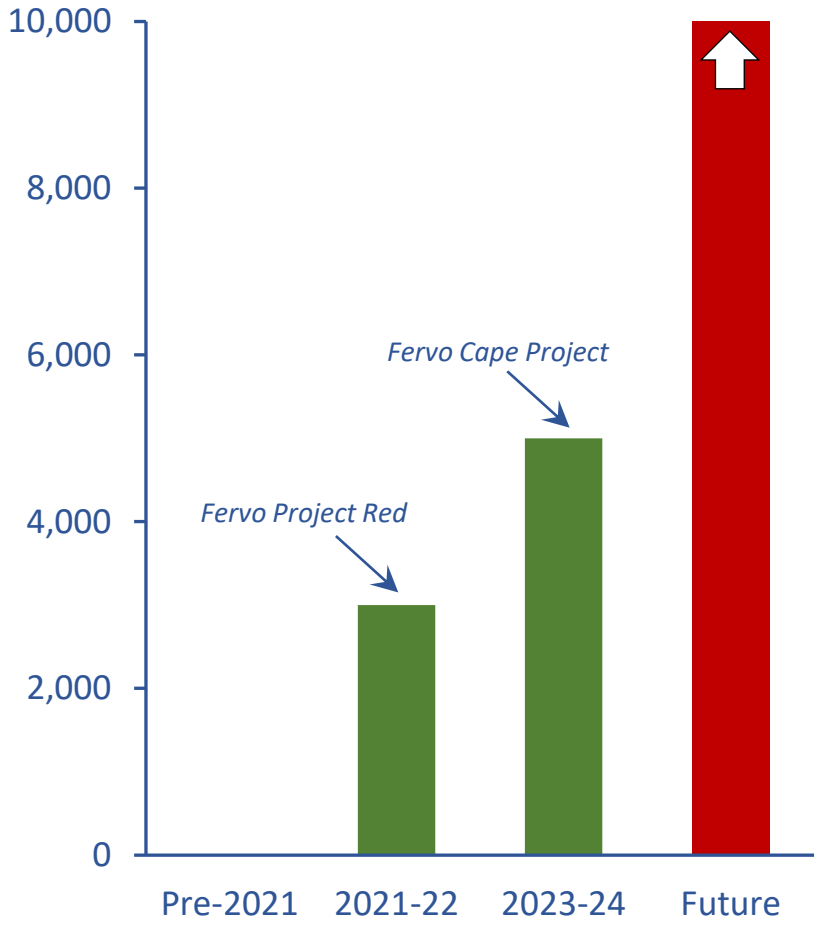
Drilling days to 12,000' MD (≈ 3,600 m)



Sources: El-Sadi et al, 2024, Review Of Drilling Performance In A Horizontal EGS Development; Winkler & Swearingen, 2021, Summary of Drilling Activities, Utah FORGE; MD = Measured depth

Ability to D&C horizontal wells in basement rocks

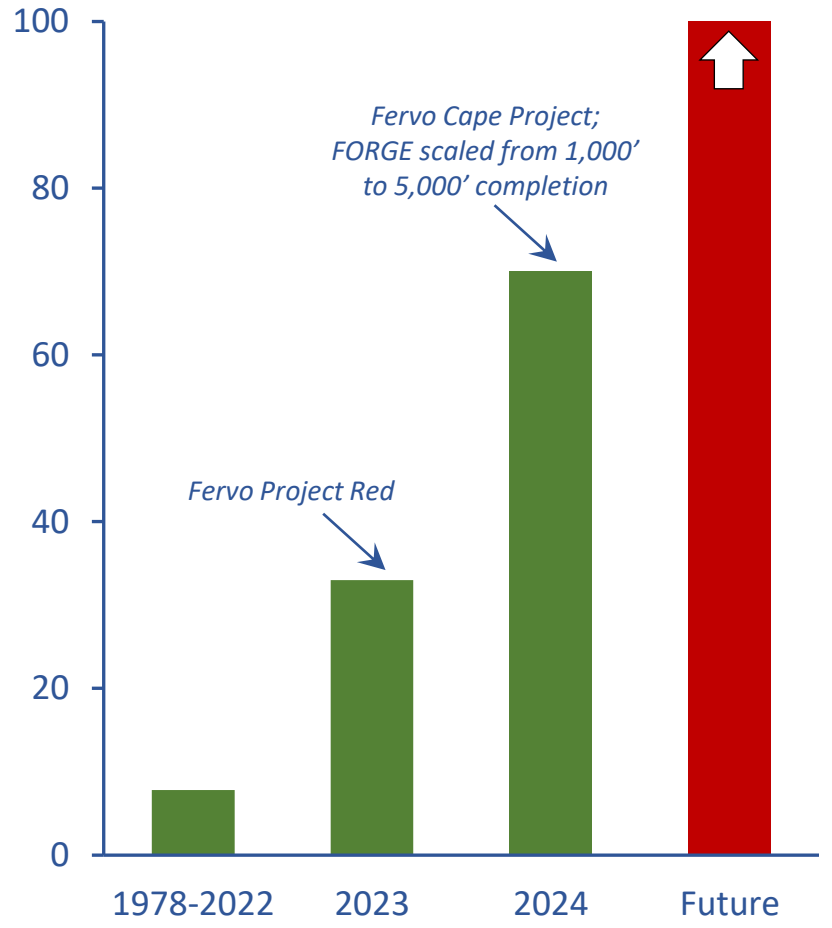
Lateral length (feet)



Note: For a well to be considered "horizontal", it needs to reach an angle of 80 degrees or higher. D&C = drill and complete

Near order-of-magnitude increase in per well production

EGS peak production flow rate (MBFPD)

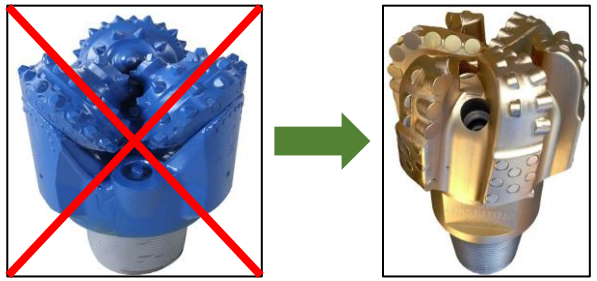


Note: 1978 – 2020 data from 11 projects, with the average peak flow rate shown (7,800 bfpd); range was from 2,700 to 16,300; MBFPD = thousands of barrels of fluid per day

Many technologies will look familiar to URTeC attendees, a few will not

Latest oil and gas drilling technologies

Drill bit design



Roller Cone **PDC**

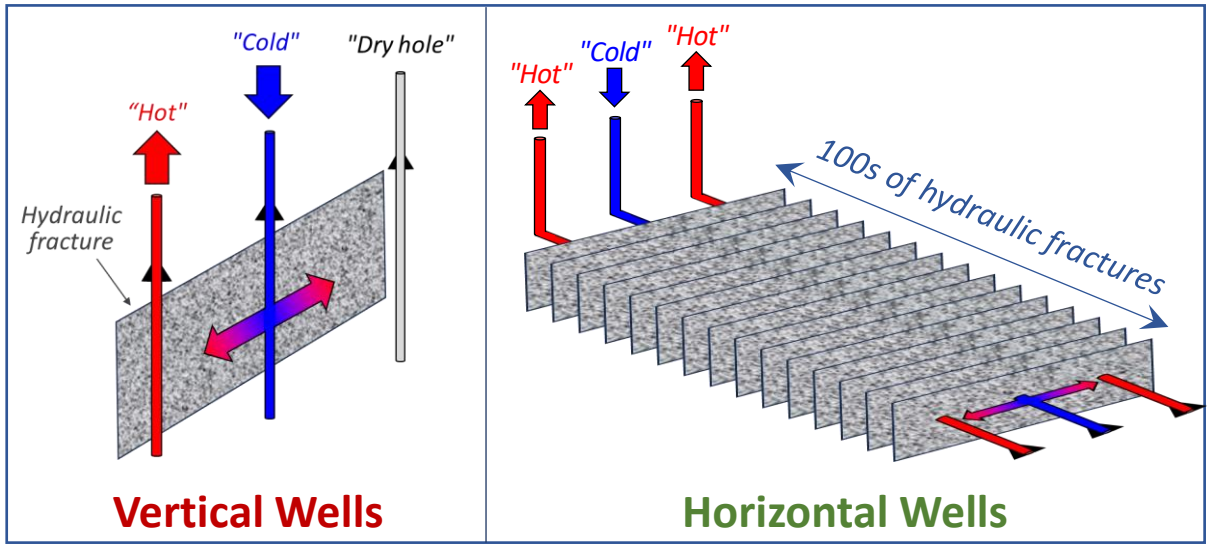
PDC = Polycrystalline diamond compact (bits)

Physics-based drilling

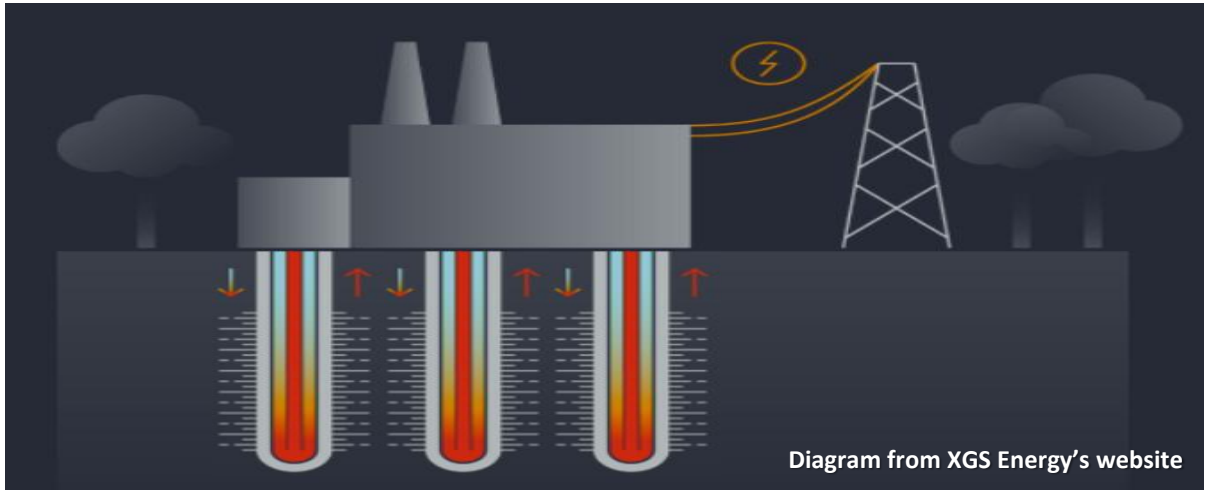
Fred Dupriest
& Sam Noynaert

Texas A&M University

Hydraulically fractured horizontal wells



XGS enhanced-conductivity injection/prod. well



My fellow panelists are leaders at operating companies who are making investments that challenge geothermal conventional wisdom

Alexandra Smith
Strategy Manager, Fervo Energy

Fervo Energy: Industry leading EGS company

Ghazal Izadi
Chief Operating Officer, XGS Energy

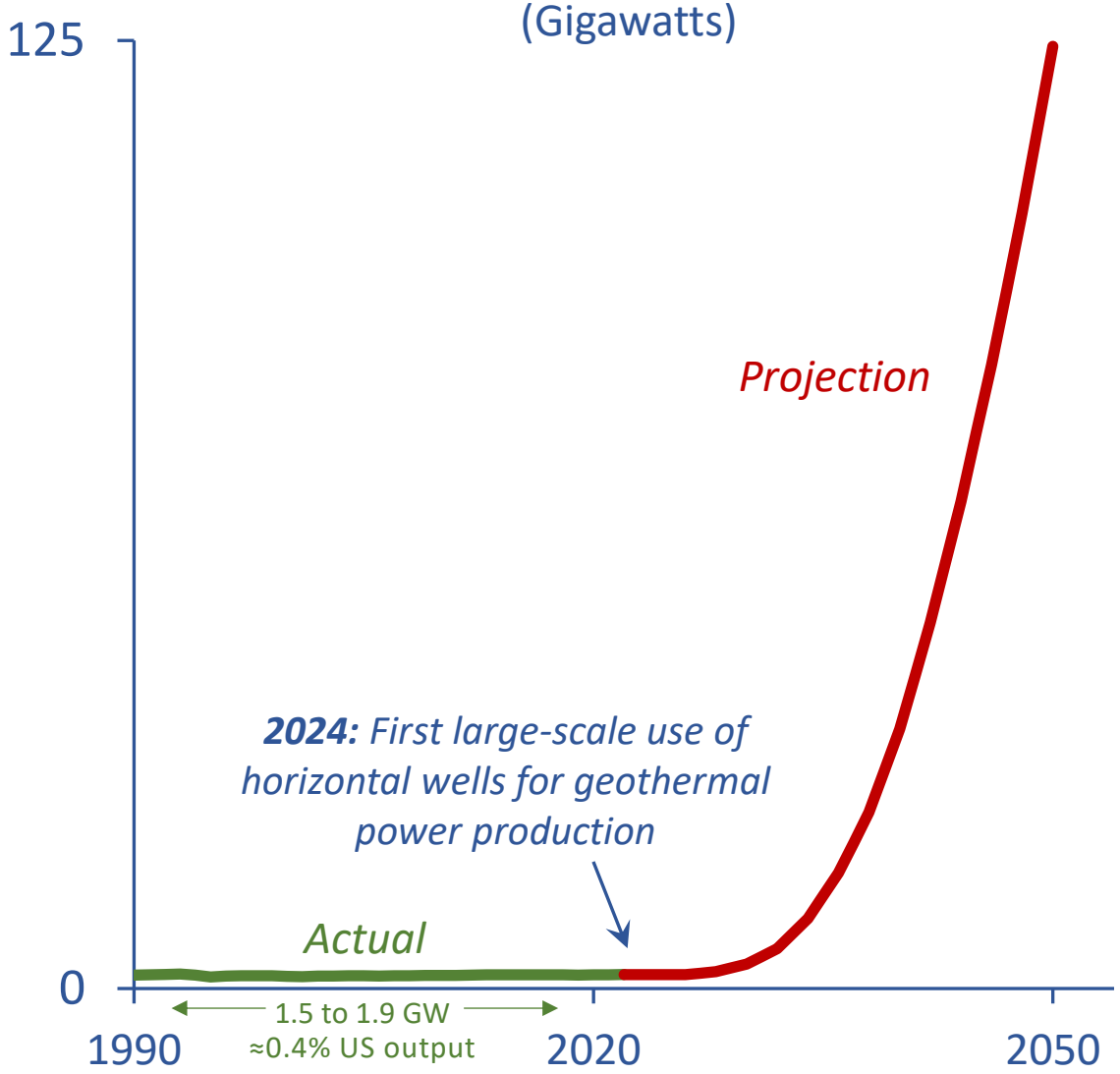
XGS Energy:
An AGS pioneer

Chris Bowie
Technical Lead - Devon Energy Ventures

Devon Energy: Largest O&G geothermal investor

By challenging conventional wisdom and deploying O&G technologies, geothermal operators are on the verge of delivering an energy breakthrough of enormous scale

U.S. electricity output from geothermal



Sources: U.S. EIA for 1990 to 2022; 2022 average output = 1.8 GW (0.4% of U.S. total); Author projection from 2023 to 2050

Fervo's Cape project will increase U.S. output by ≈ 25%

Areal photo of Fervo Cape Phase 1 project; April 2025. Picture from Fervo Energy's website

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A copy of this slide deck can be downloaded at:

https://tidalwavetechnologies.com/

Picture from Fervo Energy's website