



# NY - GEO 2024

APRIL 8-9 | ALBANY NY



# Review of Major Geothermal Drilling Techniques

**Moderator:** Brock Yordy / [The Developed Well Group](#)

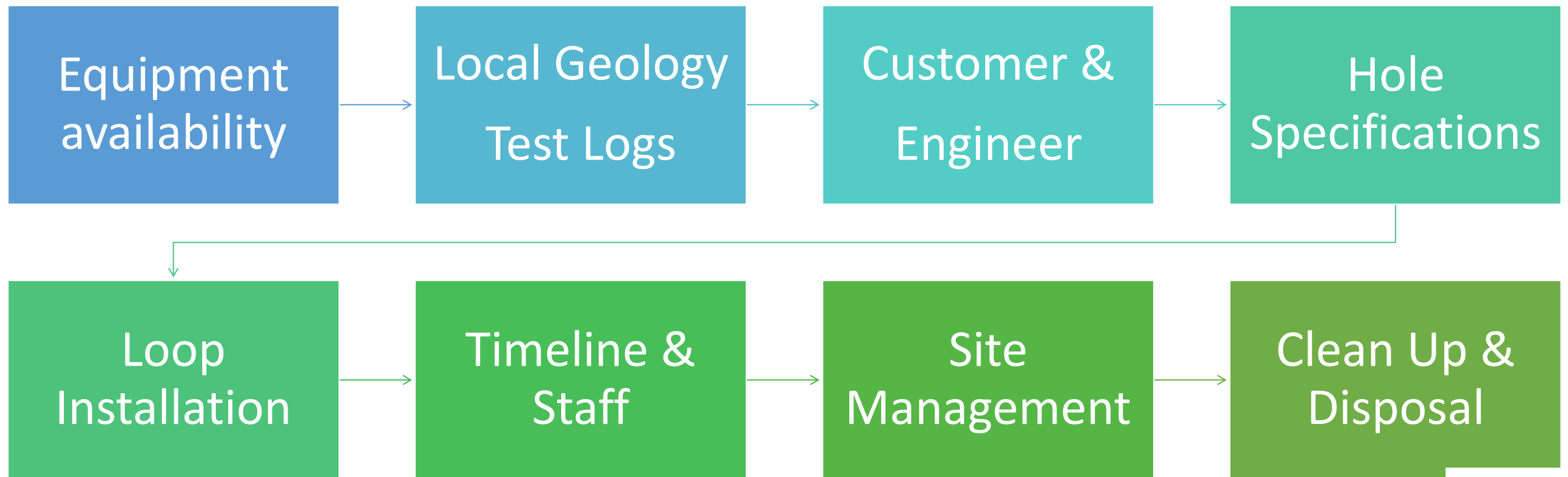
**Panelists:** Kim Ojanne / [Rototec USA](#) – DTH Small Footprint  
Dmitry Kuravskiy / [Celsius Energy](#) - Angled Drilling – DTH Hammers  
Derek McGladdery / [Derex Drills](#) - Dual Rotary  
Robert Meyer / [Thermex Geothermal Solutions](#)

**BUILDING ELECTRIFICATION @ 1:30 pm**

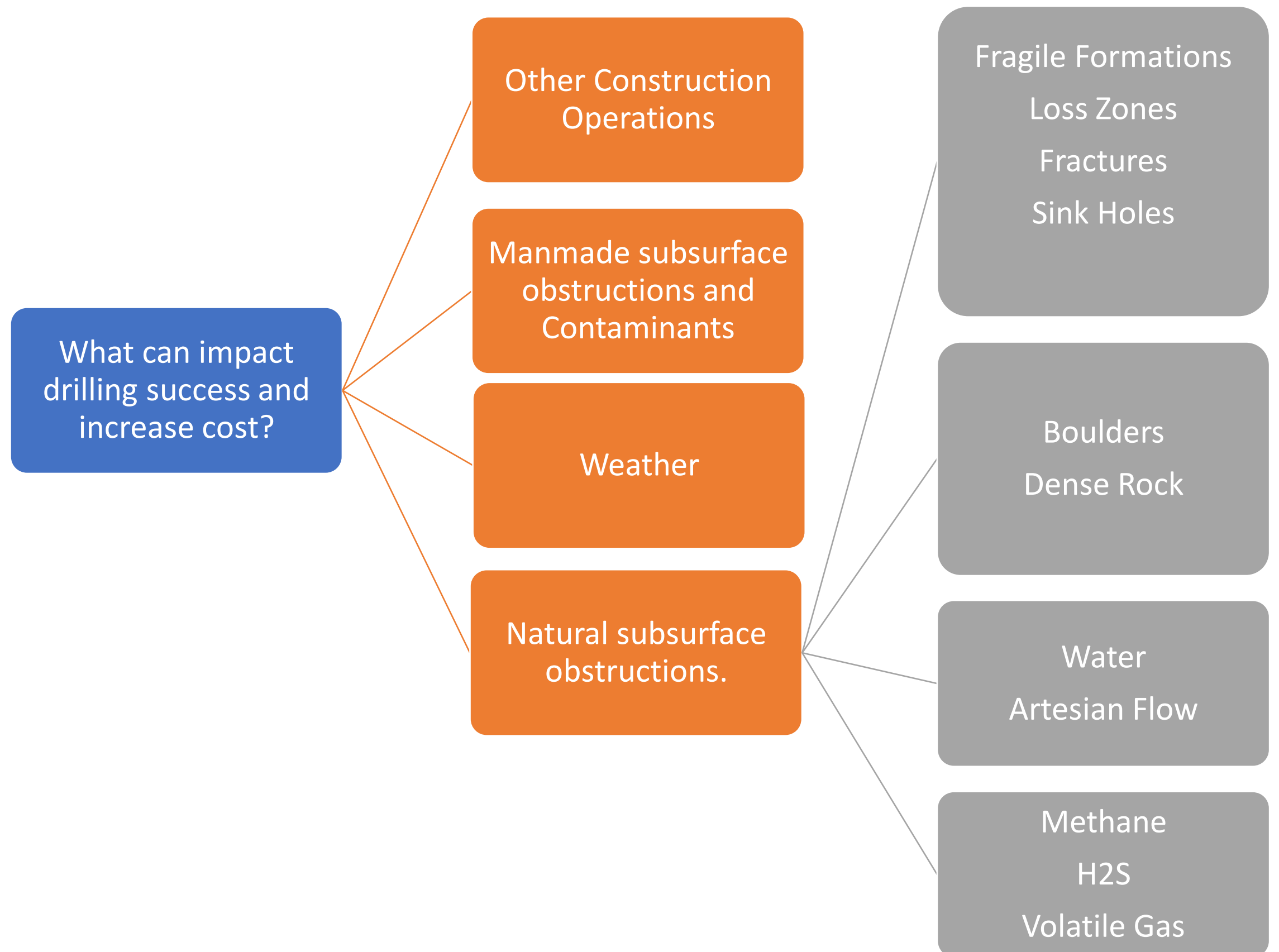




# Drilling Contractor Bid Process



# Project Impacts Delays & Change Orders



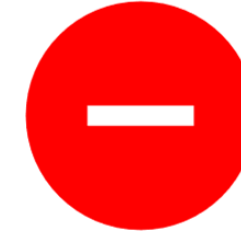
# Down-the-hole hammer drilling (DTH)



## Advantages of DTH

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- Efficiency: Fast method for drilling in hard rock
- Cost-effectiveness: Economical method for drilling in hard rock
- Versatility: Can be used in various types of rock formations
- Depth: Can reach greater depth than many other methods

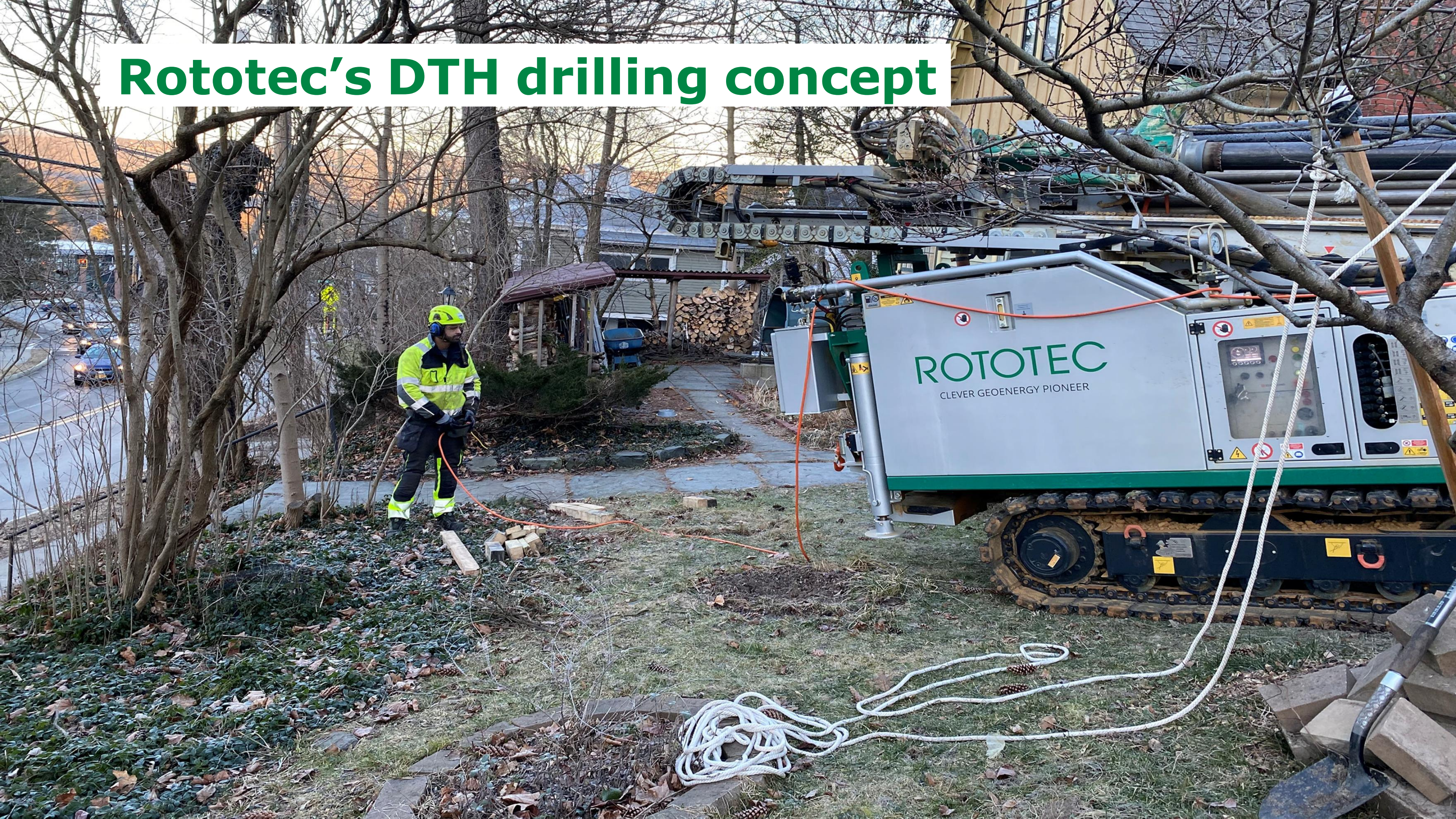


## Disadvantages of DTH

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- High energy consumption for drilling
- Less effective in very soft rocks
- CAPEX intensive compared to some other drilling methods

# Rototec's DTH drilling concept



# Rototec's DTH drilling concept in the future

- 1 First use of IoT in the Nordics
- 2 Using AI for driller education
- 3 AI can be used to analyse old data in preparation for the next project
- 4 We want to help the industry and want collaboration

# A Decarbonization Solution for Buildings



26 April 2023 | NY-GEO

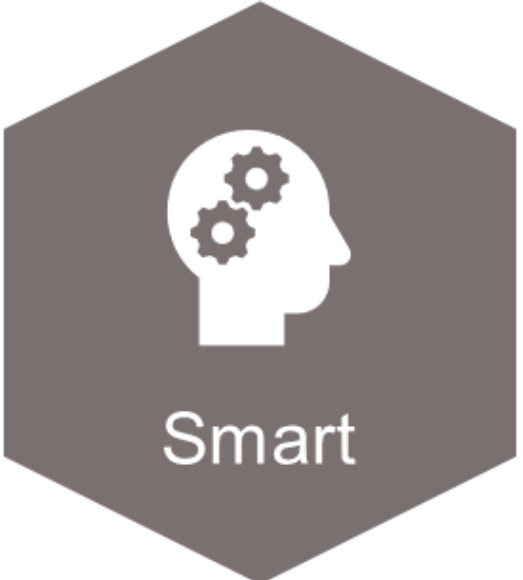
# Celsius Energy Benefits Beyond the Norm



200 ft<sup>2</sup> Land Impact  
Preserve Real Estate  
Retrofit Flexibility



CO<sub>2</sub> Reduction  
Energy Reduction  
No Heat Island



Optimized Design  
Digital Control  
Turnkey Solution



Invisible  
Quiet  
Resilient



30% Less Bores  
70% Less Piping  
40% Less OPEX

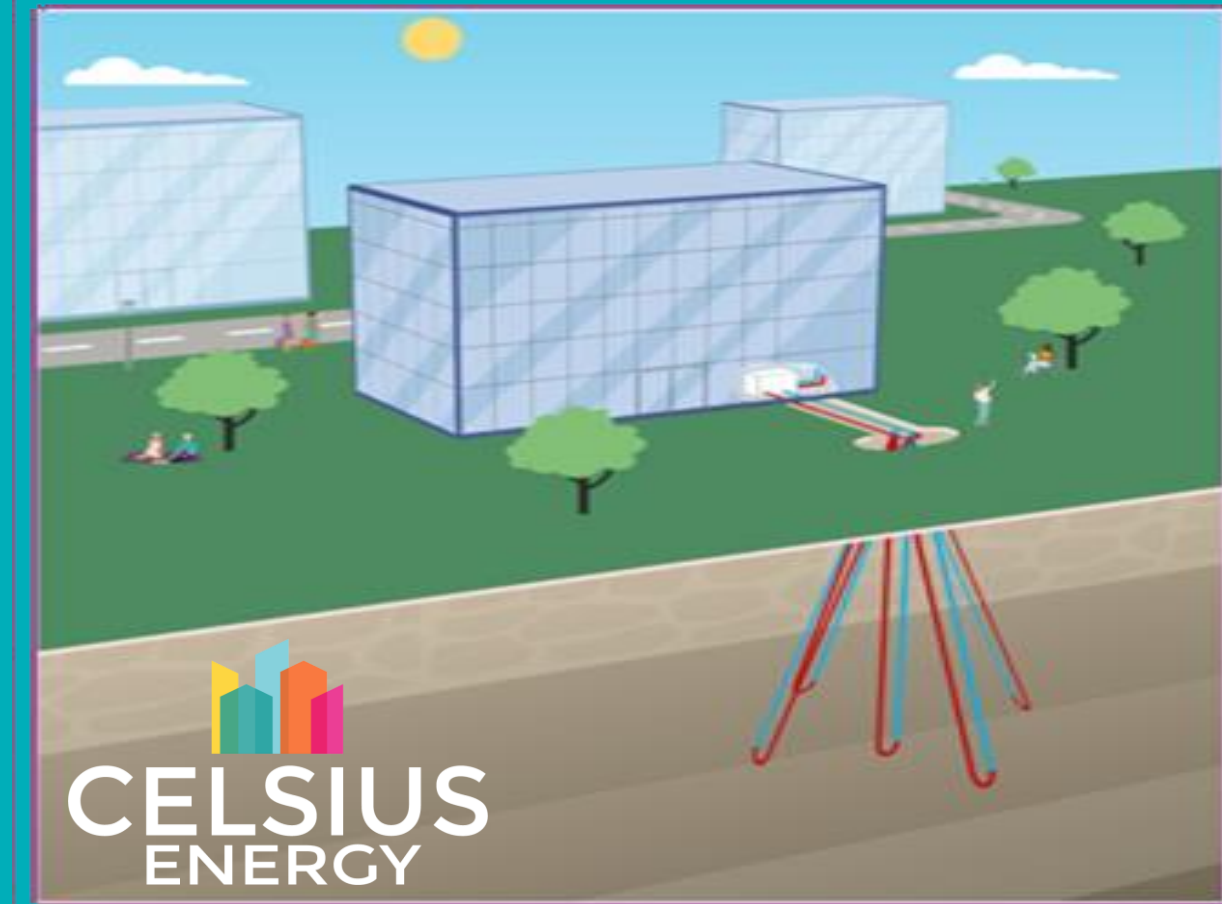
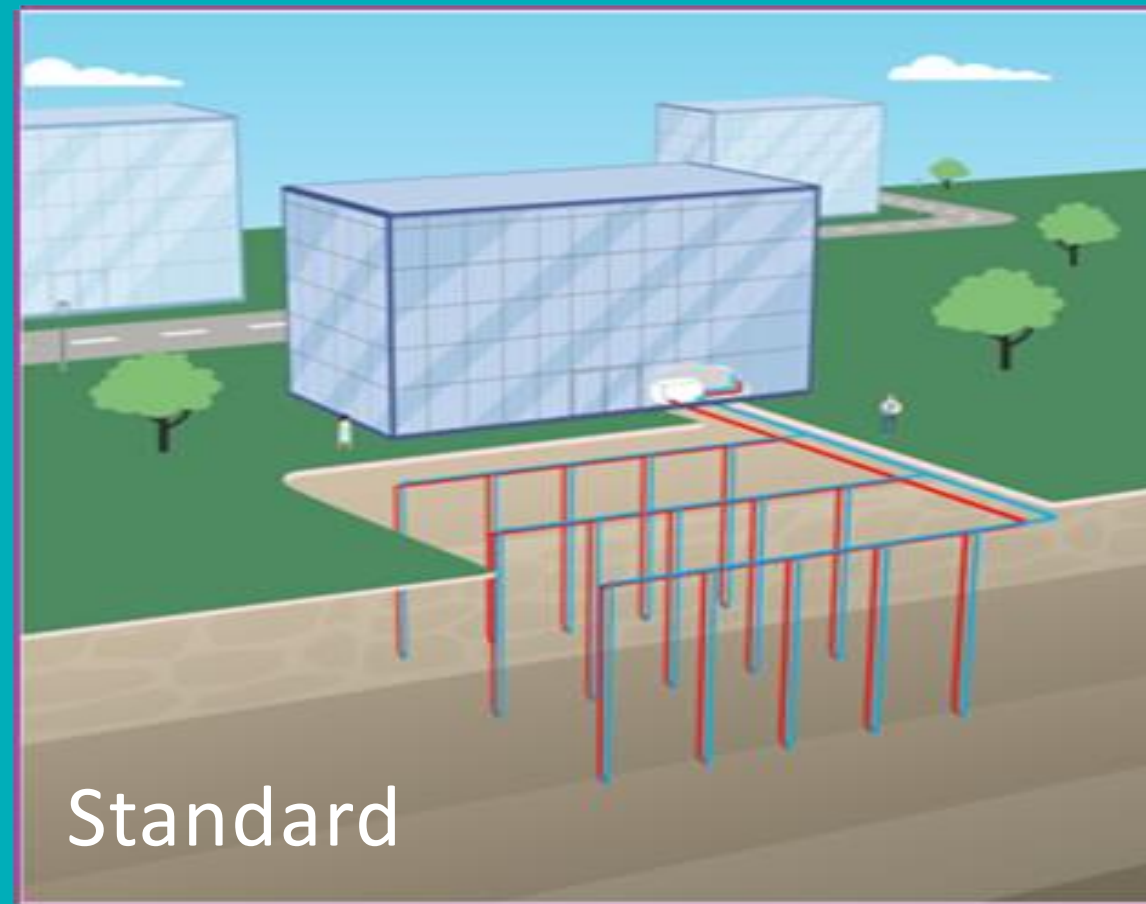


Single Building  
District  
Community



# Optimized Borehole Heat Exchanger

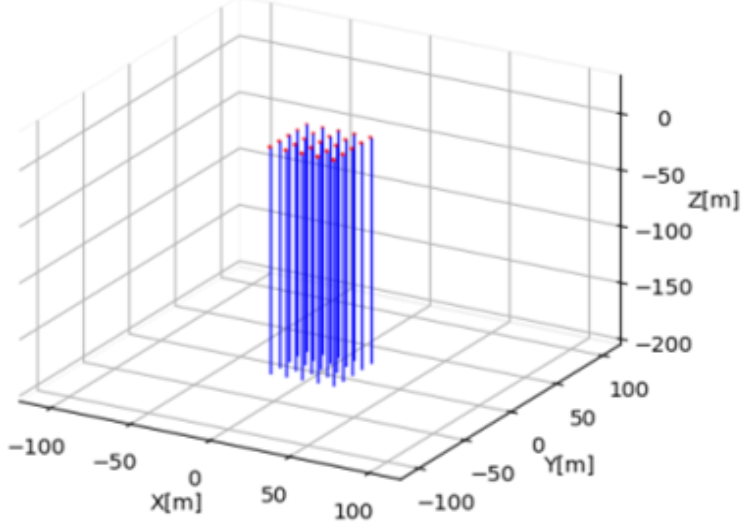
- Less wells
- Less horizontal piping
- Less site impact
- Preservation of real estate
- Flexible construction planning
- **COST EFFICIENCY!**



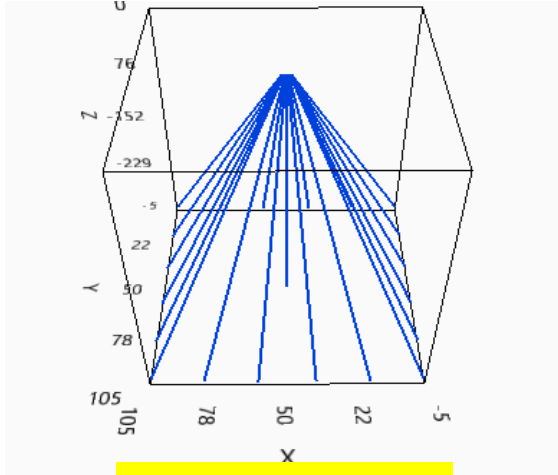
# Where CE makes a difference?

## Less Wells

24 wells @ 20ft spacing  
500ft TVD



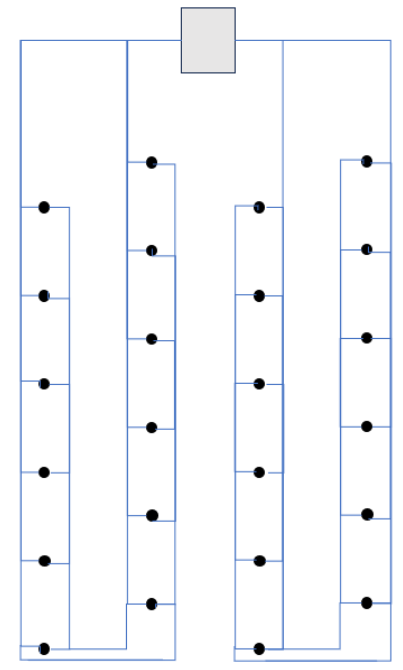
21 wells @ 50ft spacing  
500ft TVD



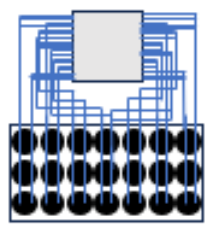
**-13%**

## Less Piping

1,244 ft piping



280 ft piping

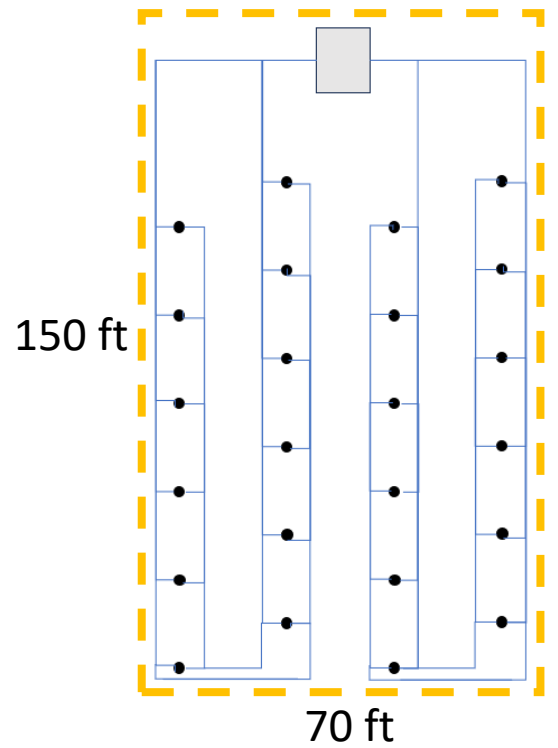


\* Not to scale

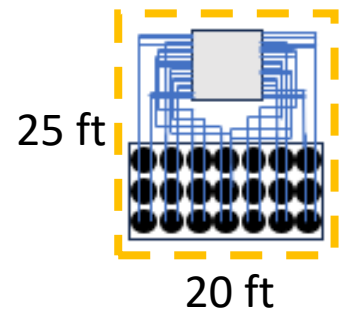
**-78%**

## Less Site Impact

10,500 sqft impact



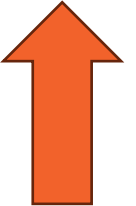
500 sqft impact



\* Not to scale

**-95%**

Vertical



1,700 MMBtu System



Inclined



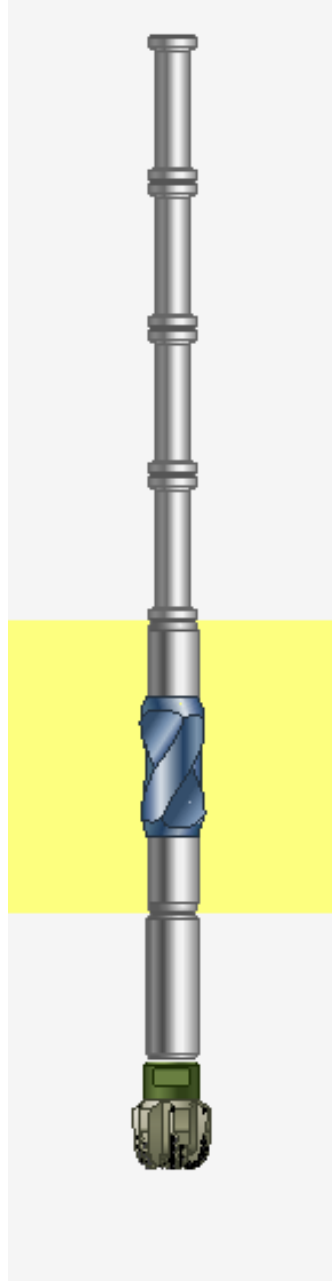
# How do we deliver

## Rig



- Double Head
- Pull back 30k+lbs

## Assembly



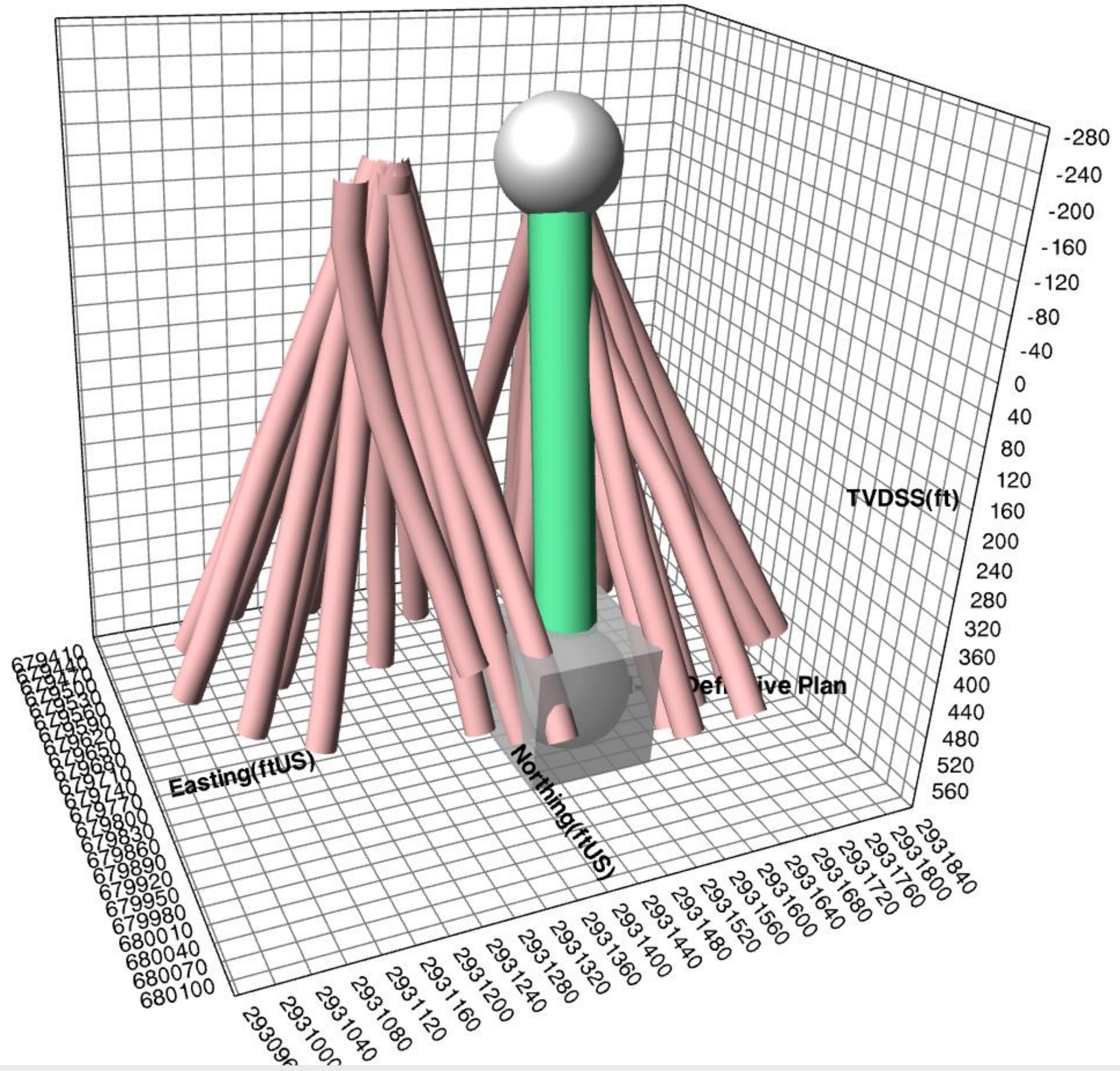
- ❑ Custom Bits
- ❑ Stabilization Assembly
- ❑ Design Software
- ❑ Drilling Geometry

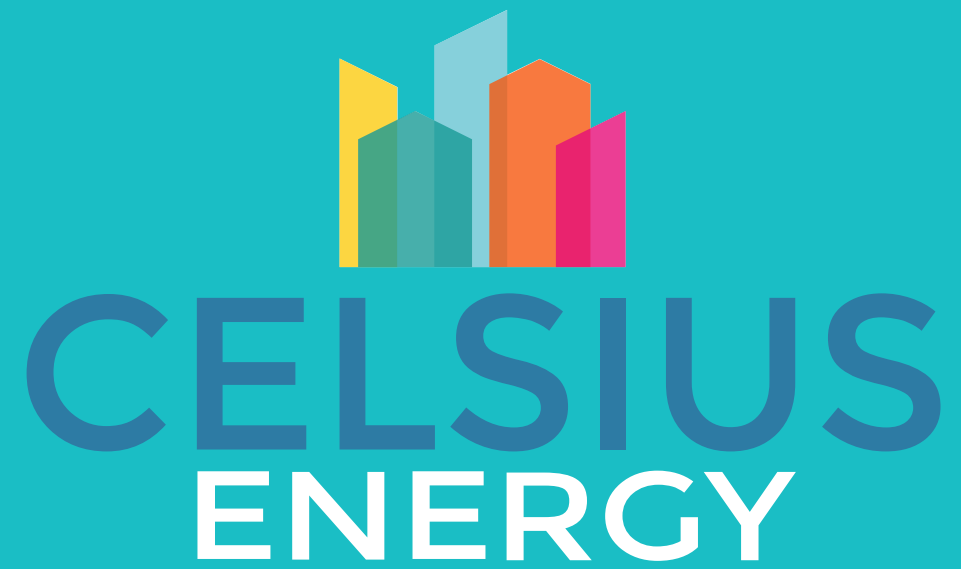
## Extra

- ❑ Cuttings management system
- ❑ High pressure grout pumps
- ❑ Custom reeling systems
- ❑ Fiber Acquisition
- ❑ Surveying capability

# Eversource Energy Networked Geothermal Pilot

Framingham, MA





Does your project meet one of these two criteria?

*Area > 10,000 Sq Ft*

Or

*Heating and/or cooling needs > 300 kBTU/Hr*

**LET'S LOOK YOUR PROJECT!**

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Cambridge, MA 02139

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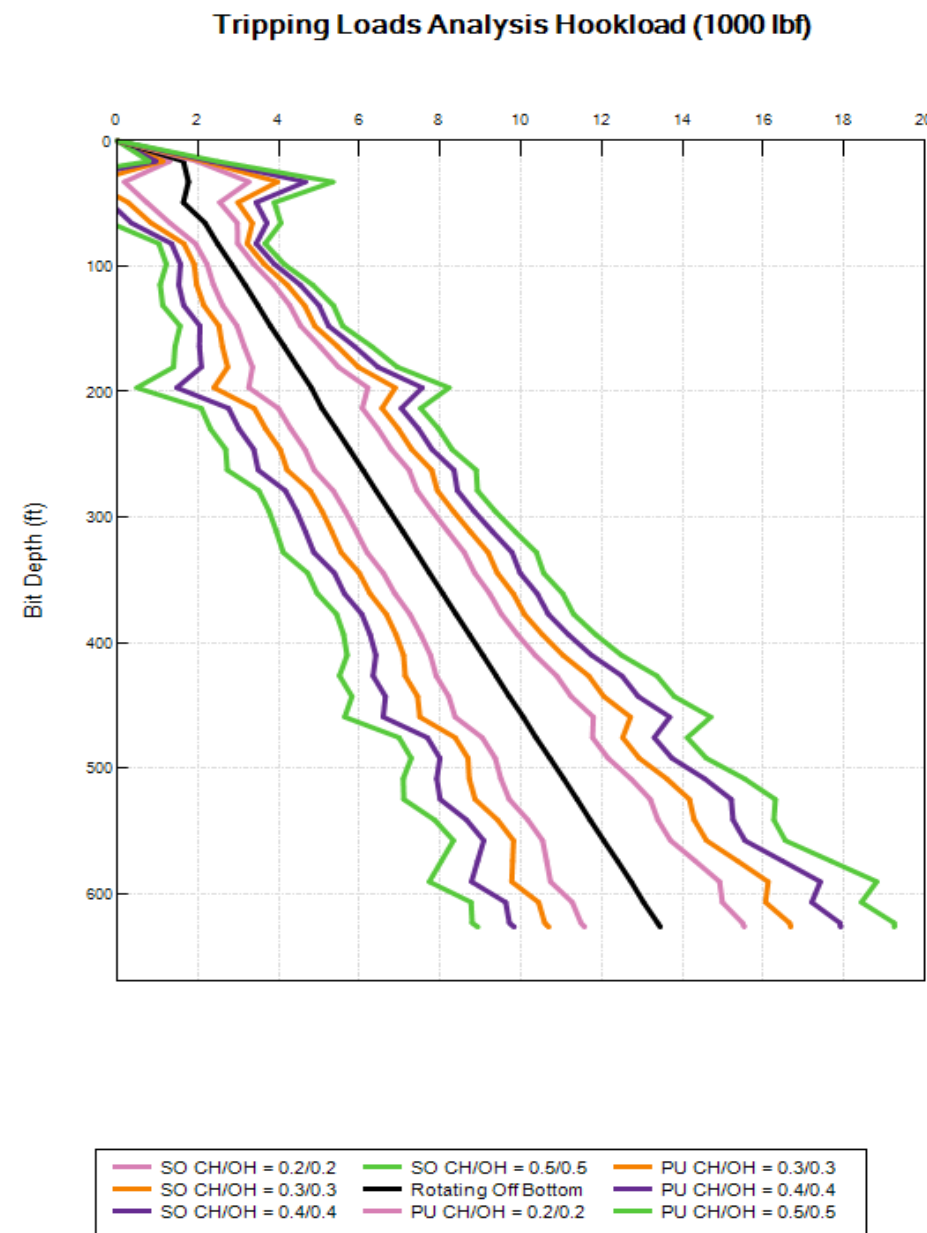
[celsiusenergy.com](http://celsiusenergy.com)

# Powered by the Earth



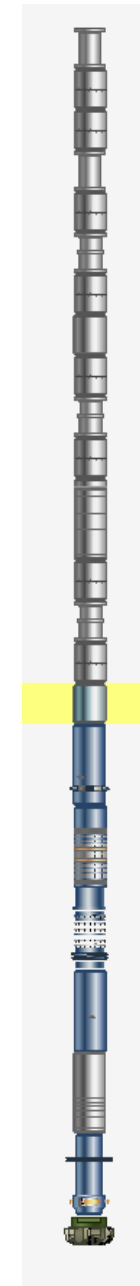
# Angled drilling price vs. challenges & requirements

## Why



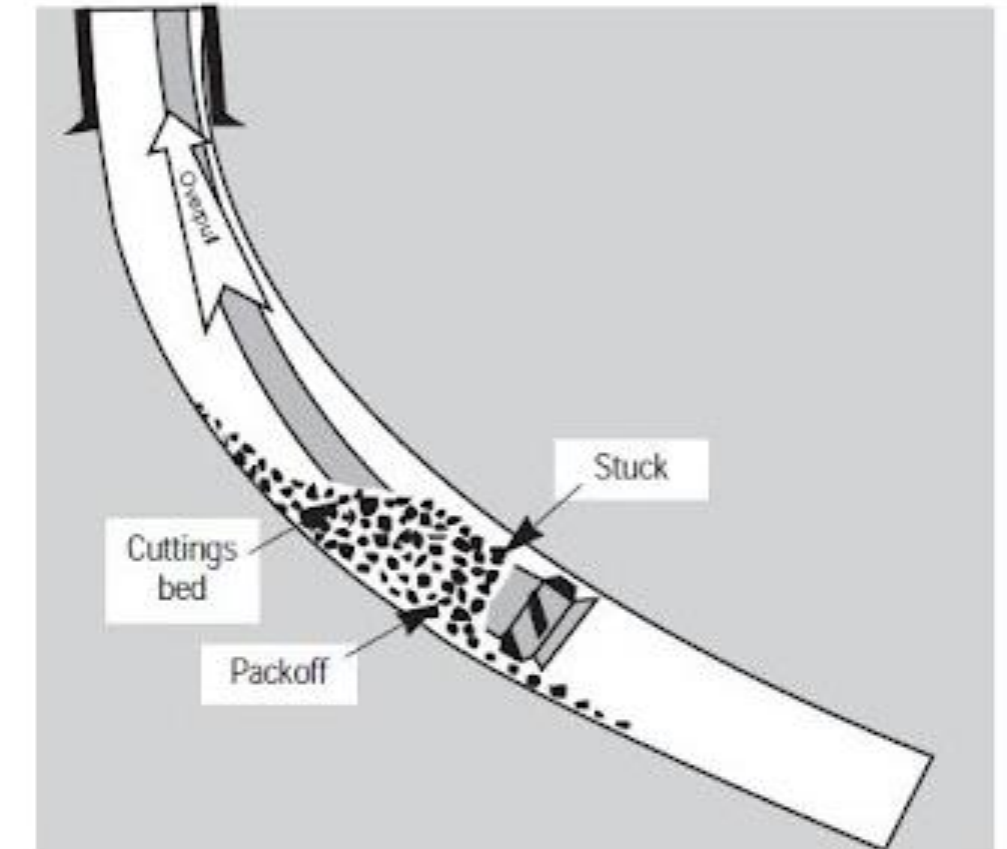
Drag Forces (Drilling & Completion)

## What



Complex BHA (Design & Delivery)

## How



Borehole Delivery risk







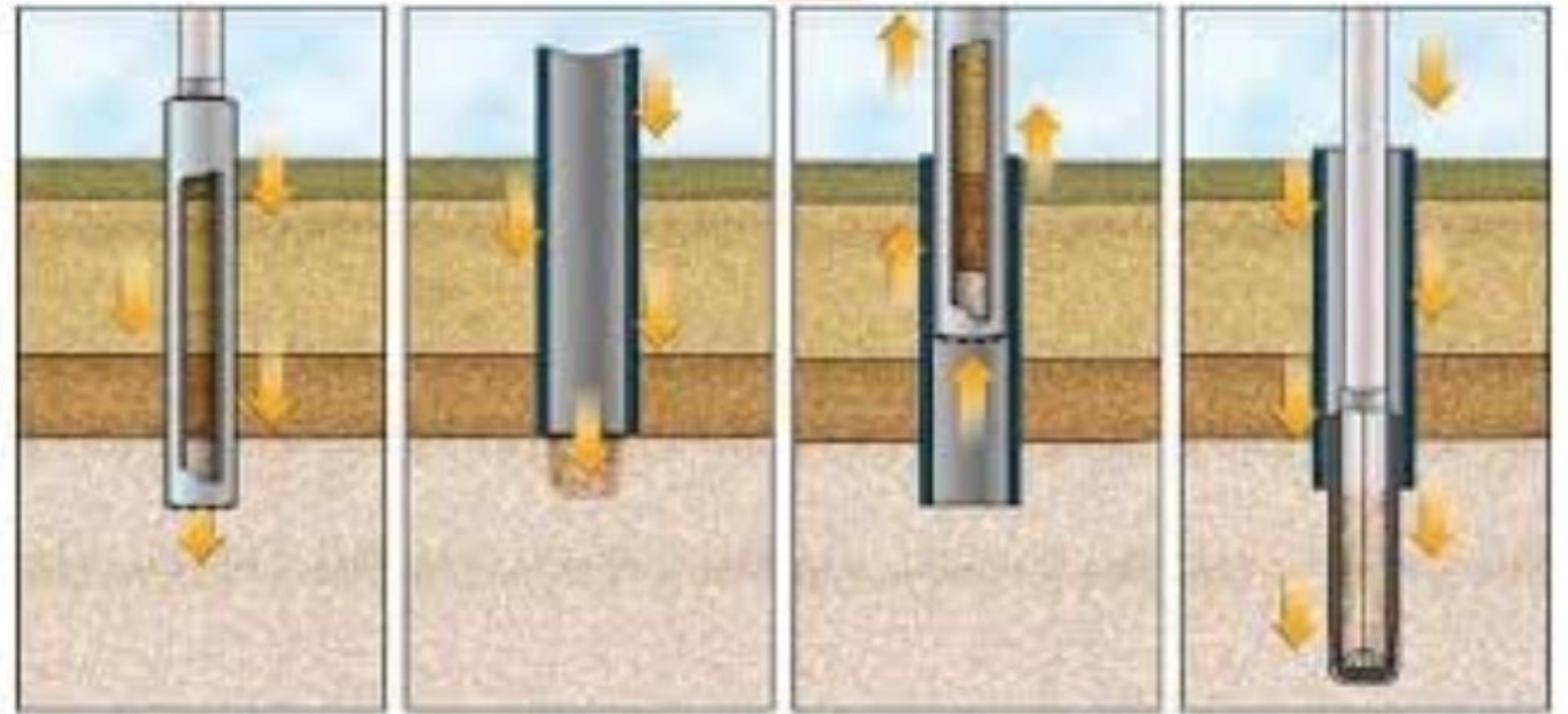


# THERMEX GEOTHERMAL

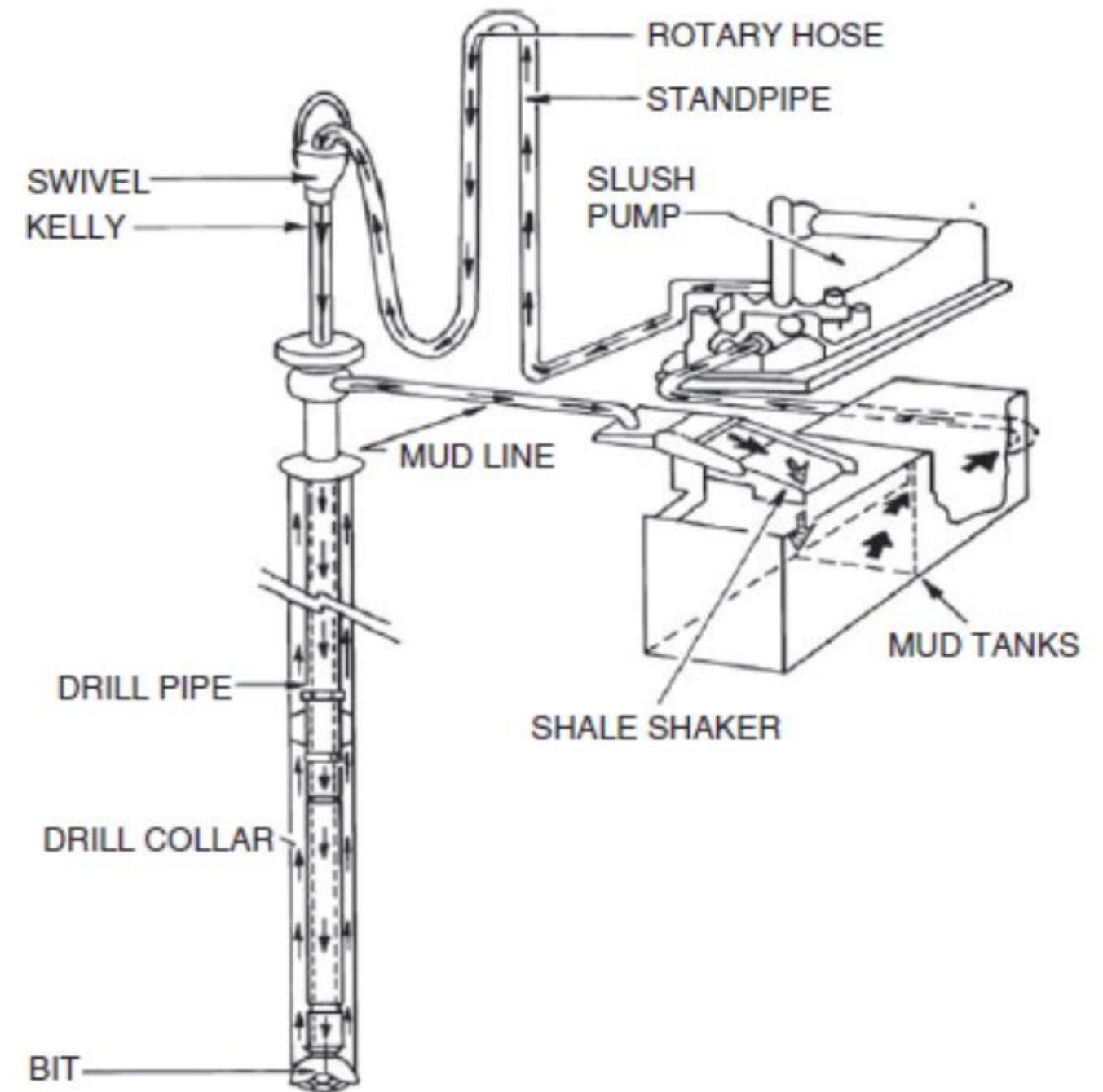
Sonic and Mud Rotary Drilling Overview



- High frequency vibration combined with a drilling fluid medium to cut through unconsolidated and consolidated lithologies
- Utilizes a series of core barrels and casing systems, can be advanced without coring in some lithologies and with some new tooling advancements
- Compact drilling location setup compared to other methods
- Moving between locations can be more difficult than other methods



- Rotational drilling method utilizing a water based drilling fluid medium
- Applicable in unconsolidated and consolidated lithologies
- Most effective in unconsolidated lithologies
- Requires some sort of fluids/solids separation system or settling pit/tank(s)
- Bit types, sizes, cutting configurations modified to suit lithology
- Very efficient when well executed



Ground Source Geothermal has the power to enhance economic growth, support energy independence, and improve the health and well-being of the American people.

Thanks

Brock Yordy

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