# Energy Exchange℠

## CONNECTING THE FUTURE

AUGUST 2-6, 2021

# Geothermal Energy Overview and Opportunities for Collaboration

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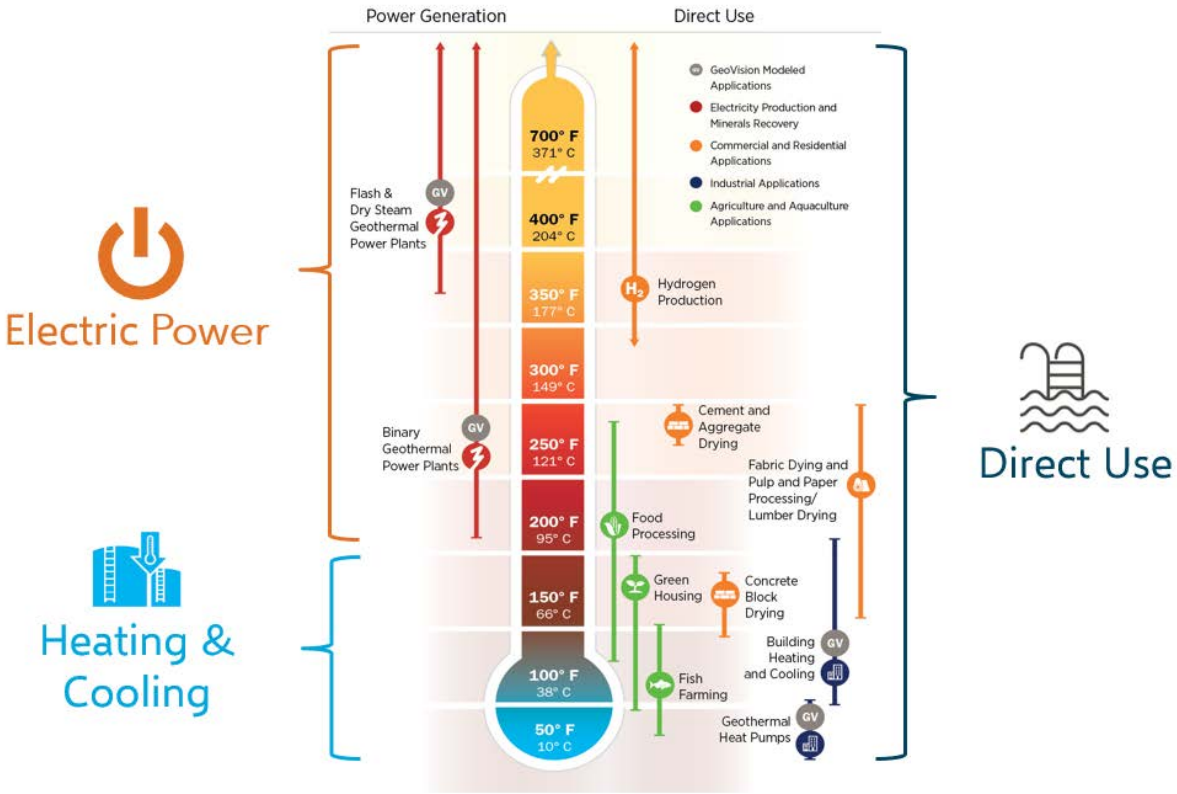
# Geothermal Energy: A Renewable Powerhouse



# Geothermal Energy: A Renewable Powerhouse

- **Carbon-free** renewable energy
- **Efficient** heating and cooling
- **Thousands of valuable energy sector jobs**
- **Opportunities for urban and rural communities**
- Improves **resilience** and **grid stability**
- Potential **domestic supply of critical materials**

# Carbon-free Renewable Energy

## Biden/Harris Administration Climate Goals

- Net-zero-emissions power sector by 2035
- Economy-wide net-zero emissions no later than 2050

### Electric sector

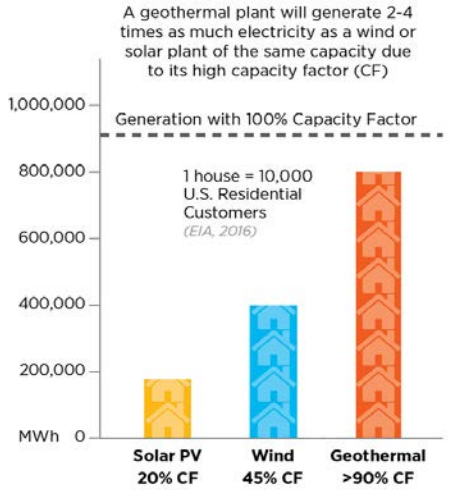
- 516 MMT of avoided $CO_2e$
- 8% of ALL U.S. generation by 2050

### Heating & cooling sector

- 1,281 MMT of avoided CO2e
- 23% of U.S. heating & cooling market by 2050

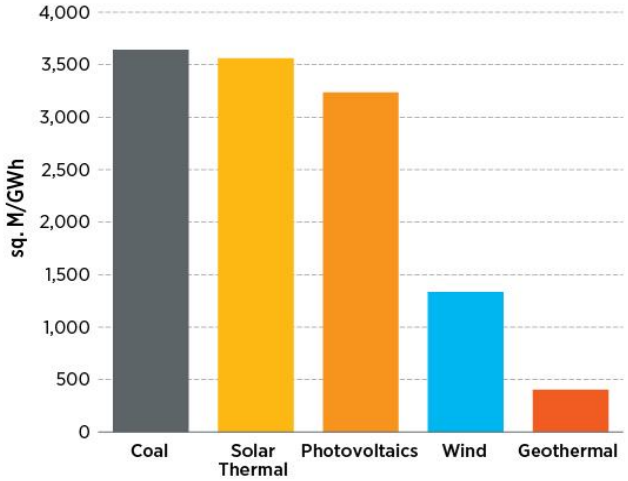
**Emissions Reductions =** removal of 26 million cars per year

# Carbon-free Renewable Energy



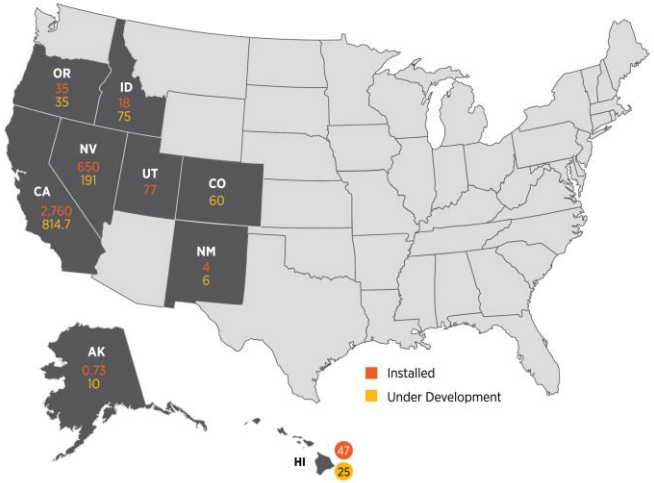

Geothermal power plants provide flexible dispatchability to integrated grid systems. High capacity factor enables optimal baseload energy output.

Geothermal is a remarkably efficient, space-saving source of power, with a physical footprint far smaller than other energy sources.

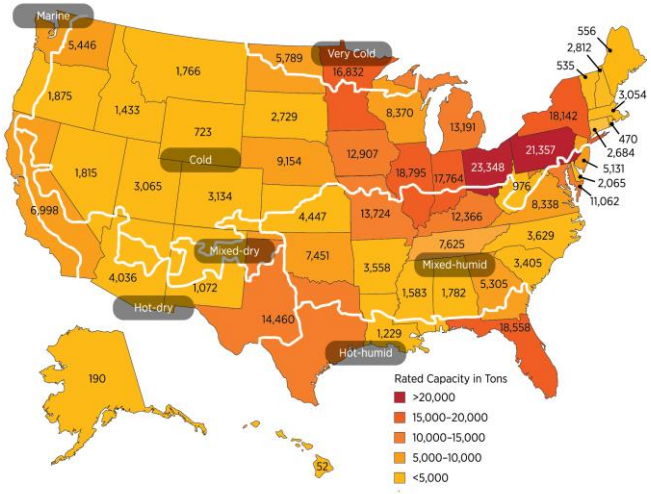


# Current U.S. Geothermal Deployment

Geothermal Installed Capacity, 2019




Geothermal Heat Pump (GHP) Shipments through 2009

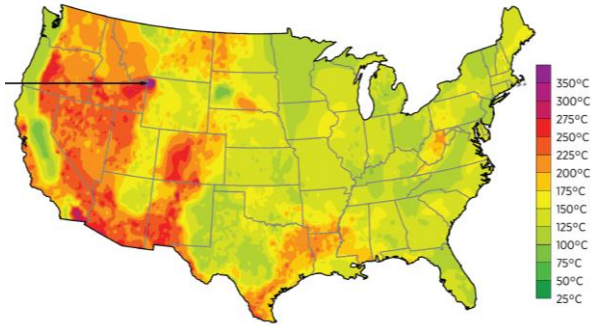



- Current installed capacity is 3,673 MWe centered primarily in CA and NV.
- Installed capacity represents around 2% of total renewable generation and 0.4% of total national generation.
- GHPs are deployed in all 50 states serving around 2 million U.S. households.
- 23 total commercial district heating systems currently operate in the U.S.

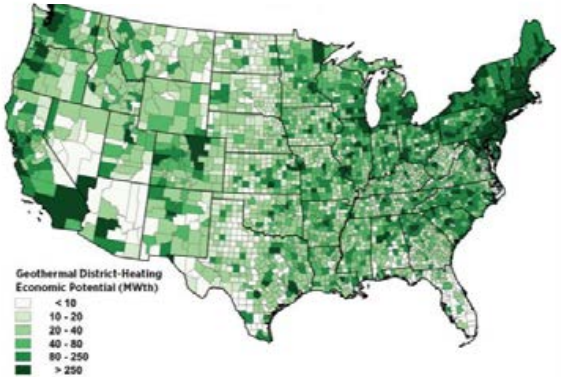
# Geothermal Deployment Potential Snapshot

The Federal Government's energy use in 2019 was **889 trillion Btu**, 0.9% of the end-use energy consumed in the U.S. Of 7,000+ federal facilities, approximately 450 campuses make up over **75%** of total energy use.

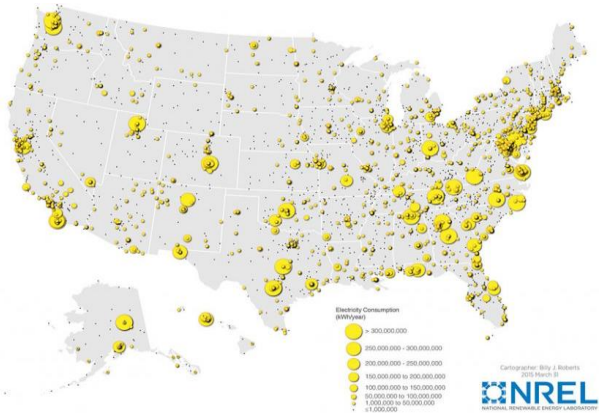
Temperature at 7 km Depth




Geothermal District Heating Economic Potential, 2050




Geographic Distribution of Energy Consumption at Federal Facilities



# Federal Partnerships for Geothermal Installations

# Partnership Motivations

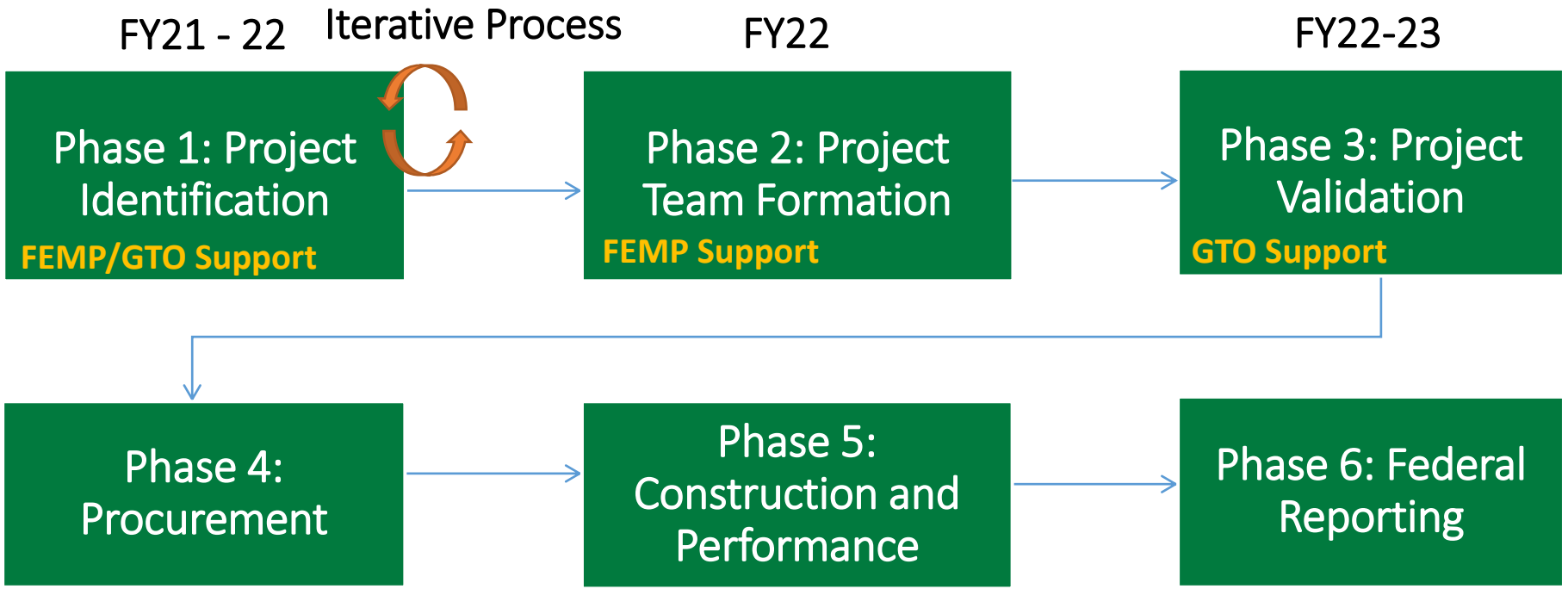
## Objective

Demonstrate the potential of geothermal heating and cooling systems to significantly contribute to meeting 2035 and 2050 decarbonization goals.

## GTO and FEMP Benefits

- Directly advances Program strategic goals (e.g., GTO MYPP, federal compliance with E.O. 14008)
- Partnership leverages each Program's strengths
- Deploying geothermal market-ready tech to spark momentum in meeting decarbonization goals
- Federal government leads by example on decarbonization strategies

# Federal Distributed Energy Project Implementation Process



# FY21 Partnership Focus and Scope

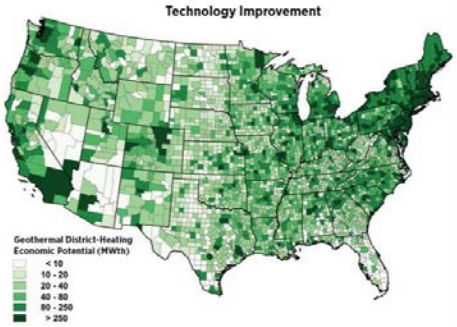
Phase 1: Identify Federal sites that are strong candidates for geothermal energy

→

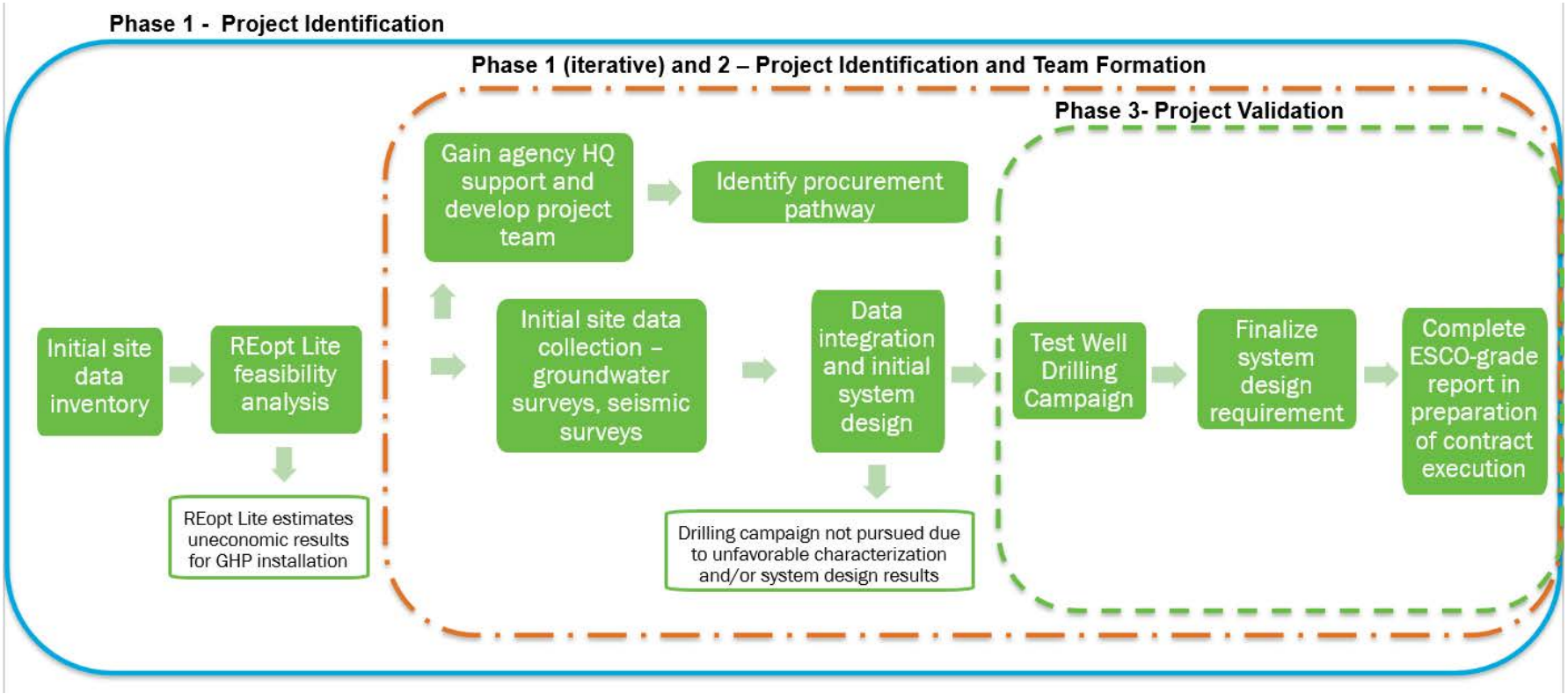
Stakeholder identification and coordination through FEMP's Renewable Energy Working Group

→

Use REopt Lite geothermal heat pump (GHP) model for initial suitability screening



# Geothermal Feasibility Assessment Framework



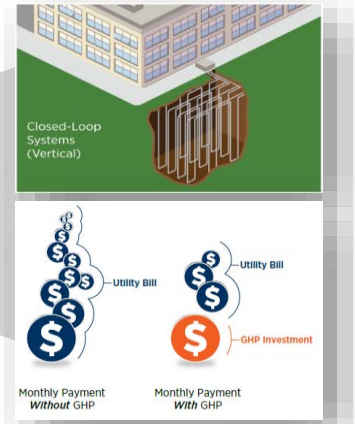
# From Screening to Deployment by FY23

**FY21 - 22** — **Iterative Process** — **FY22** — **FY22-23**

**Phase 1: Project Identification**
FEMP/GTO Support

**Phase 2: Project Team Formation**
FEMP Support

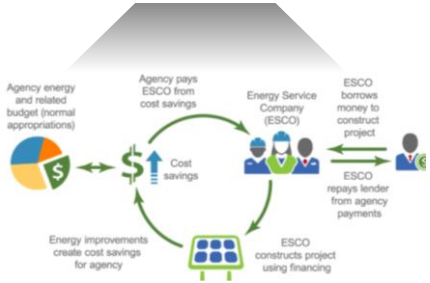
**Phase 3: Project Validation**
GTO Support




**Phase 4: Procurement**

**Phase 5: Construction and Performance**

**Phase 6: Federal Reporting**

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# Partnership Next Steps

✓Screen existing federal sites with sufficient datasets (FY21)

✓Develop project teams and plan site characterization activities (FY22)

✓Identify additional federal sites to screen (budget dependent) (FY22)

# Thank you.

**Interested to learn more? GTO is actively looking to develop partnerships to deploy more geothermal at Federal sites!**

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**FEMP Contact: rachel.shepherd@ee.doe.gov**

GeoVision Report can be found at:
https://www.energy.gov/eere/geothermal/downloads/geovision-harnessing-heat-beneath-our-feet