Transporting Geothermal Heat to Condition Buildings

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Introduction

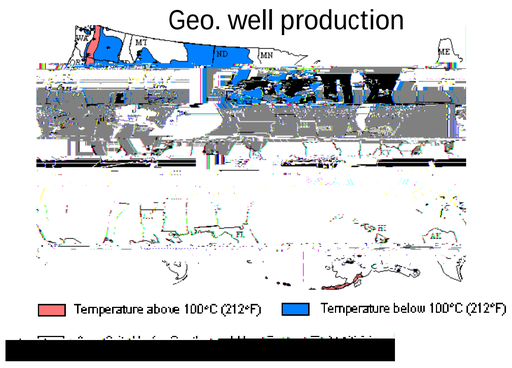
- To overcome the barrier of distance between resources and demand, this project designs and evaluates innovative technologies to transport geothermal energy.
- A screening tool is being developed to quickly evaluate the economic performance of new technologies under user-defined geothermal resource and demands.
- 24% of U.S. primary energy is used for heating below 120°C (248°F), mostly met by electricity and natural gas.
- US low-temperature geothermal resources (<90°C/194°F) have potential to provide 42,600 MW_{th} heat; less than 2% of this has been installed.
- In addition to hydrothermal resources, 25 billion barrels/year of geothermal fluid (mostly water) at 80 t150°C are co-produced at oil and gas wells in the US (DOE 2015).

Highlights

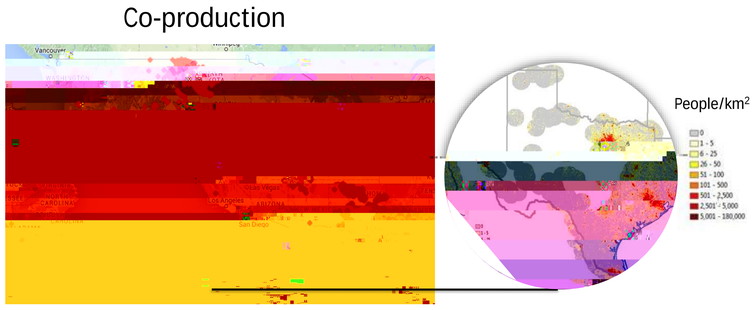
Method

- Review available low-temperature geothermal resources

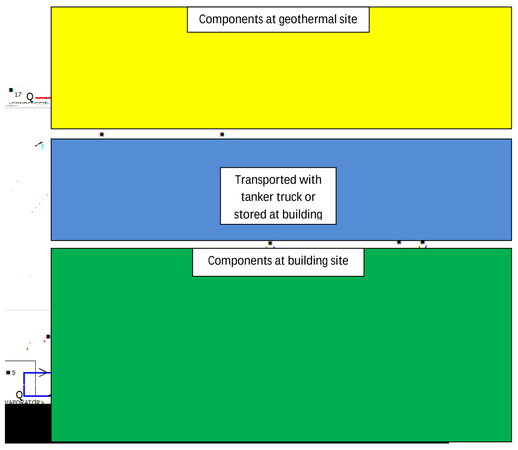
Geo. well production

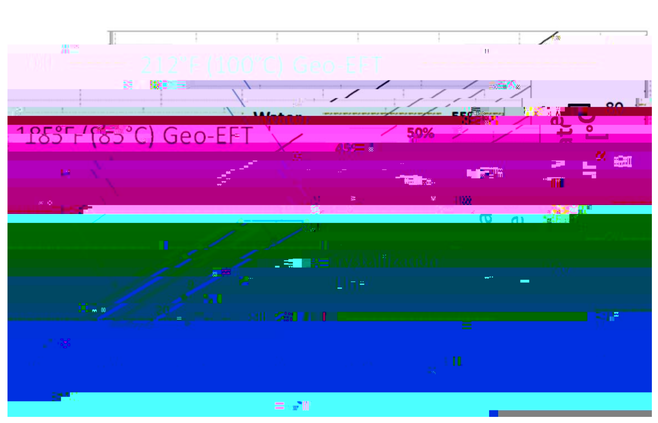


Co-production

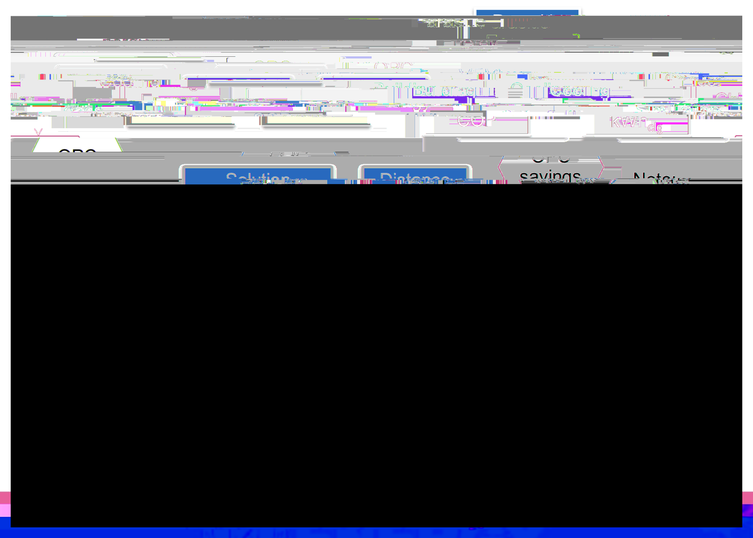


- Design proposed system for target commercial buildings



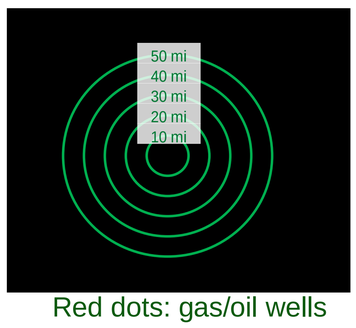


- Economic analysis

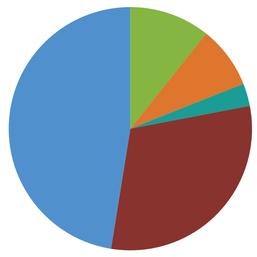


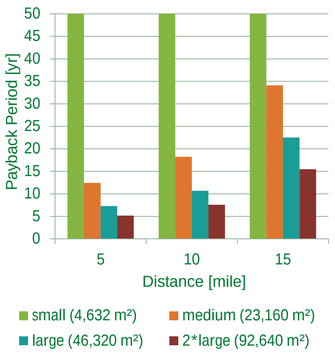
Case Study Results

Case study of proposed system in Houston, TX office buildings: promising results



Red dots: gas/oil wells





Technical challenges:

- Maintain vacuum at components
- Reduce required volume of absorption working fluid
- Design of two new semi- } ‰ v U - ^ Z• }œŒ{ ‰ š] } v • Ç • š u • ^ ~ Z) Œ Á Œ U
- Adapt to varying production and sparse distribution of geothermal resources

- The proposed two-step geothermal absorption (TSGA) technology has potential to utilize low-temperature geothermal energy to provide space cooling to buildings at some distance from the geothermal resources.
- It can reduce fossil fuel consumption, peak electric demand, and avoid us421(pe5n9r4t>>