SUSTAINABLE DESIGNS:

GEOTHERMAL ENERGY NETWORKS

SIERRA CLUB
FLORIDA CHAPTER

egg geo
Defining the Future of Geothermal

Main Website

st.petersburg

Our Beginnings in the World of Geothermal

The trades are a multigenerational passion for the Egg family. Raised on a Route 66 ranch, Egg Geo President Jay Egg developed an early foundation in mechanical craftsmanship, building his first lawn mower at age ten, then rebuilding his grandmother's Dodge 318 V8 1964 Station Wagon at twelve years old .

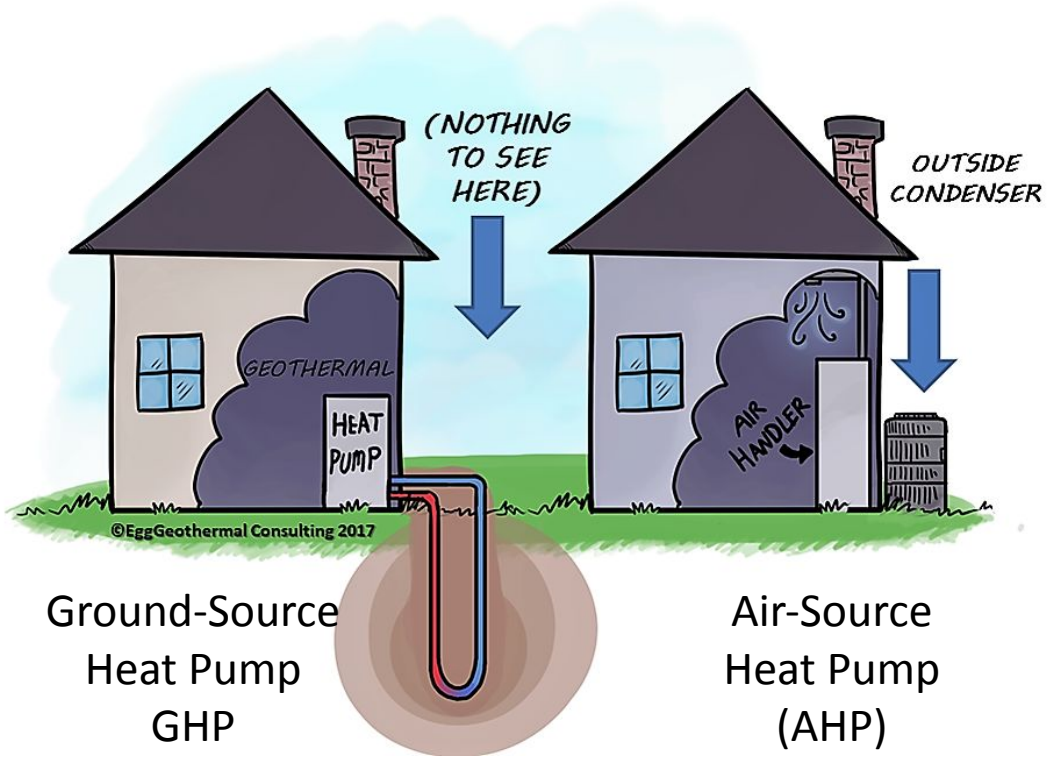
After four years as a U.S. Navy nuclear power engineer, he applied his hands-on experience across various trades before founding his own Design Build Mechanical firm in Pinellas County in 1990

Both Air Source & Ground Source Heat Pump are All Electric

They use renewable energy (from the air & the earth) to help heat and cool buildings

Nothing outside

Both use “Renewable Energy”



Ground-Source Heat Pump GHP

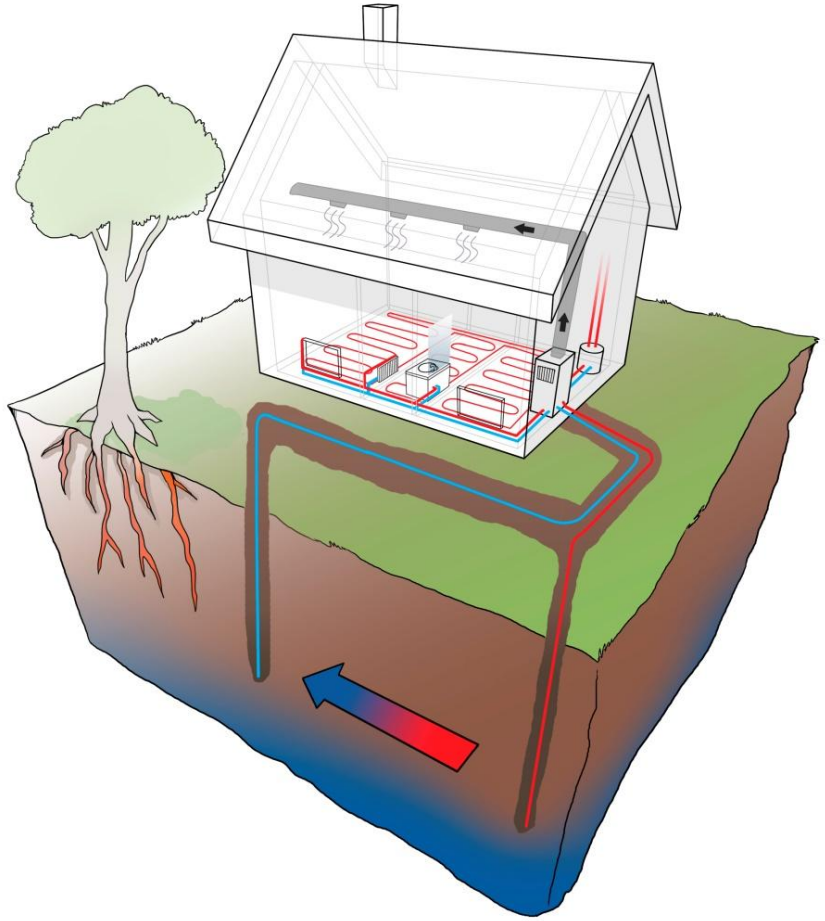
Air-Source Heat Pump (AHP)

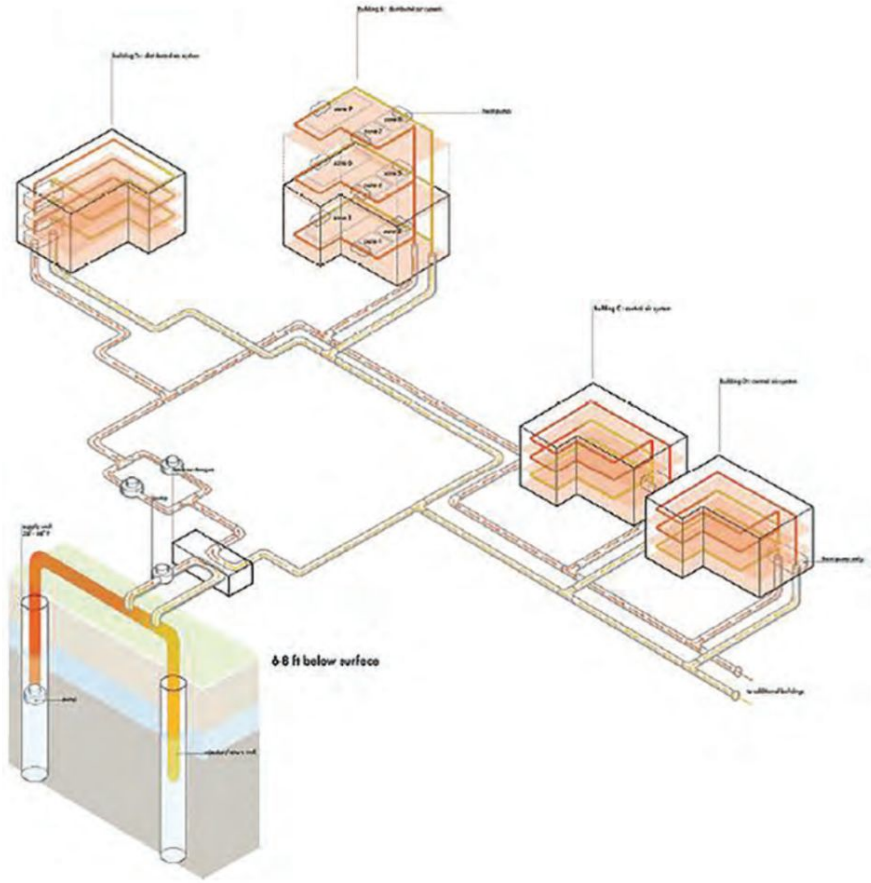
Remote Outside Condenser

Mimi grew up with the geothermal industry as a core part of her family's foundation, first learning about the technology in 2010, when Jay was approached by McGraw Hill to write “Geothermal HVAC Green Heating and Cooling”.

She formally entered the field by stepping into the role of Social Media Marketing Head, then became the Executive VP of Marketing at Egg Geo. Additionally, Mimi is pleased to write for industry news and media leaders, such as PHCP Pros, AHCR News, The Driller, and many other publications.

The Non-Consumptive Well Doublet, AKA: “Pump And Dump” Aquifer Thermal Energy Transfer (ATET)

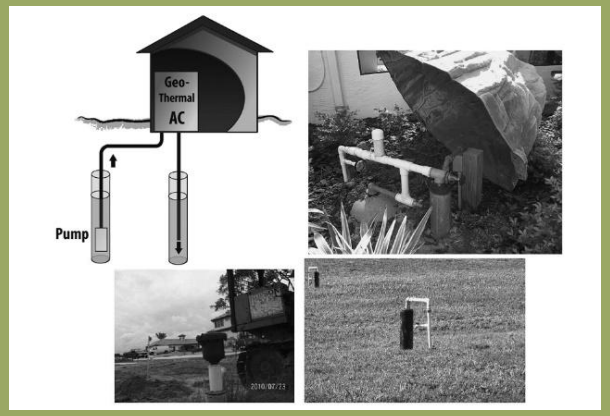


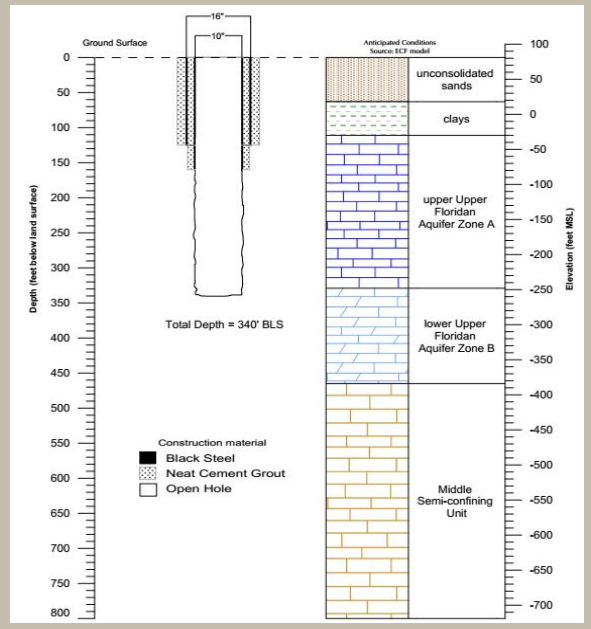


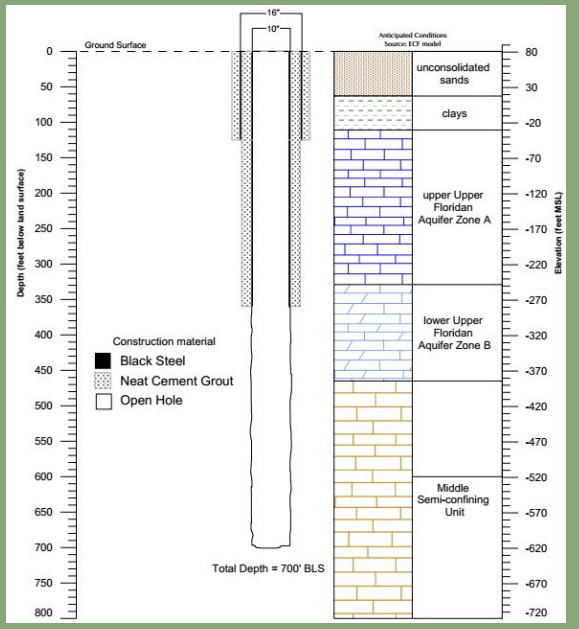
Class V Wells

- **The Sustainability Secret:** Instead of just pulling water out of the ground, we "borrow" it, use it to cool the building, and then use the injection well to put it right back into the same aquifer it came from.
- **Eco-Friendly**: This keeps the water levels in the earth balanced and sustainable.
- **The Trade-off:** While these are incredibly powerful for cooling large buildings in humid areas, they require much more engineering and careful planning than a standard closed-loop pipe system.

Open Loop "Pump-to-Injecti on" = Aquifer Thermal Energy Transfer (ATET) or Storage (ATES)



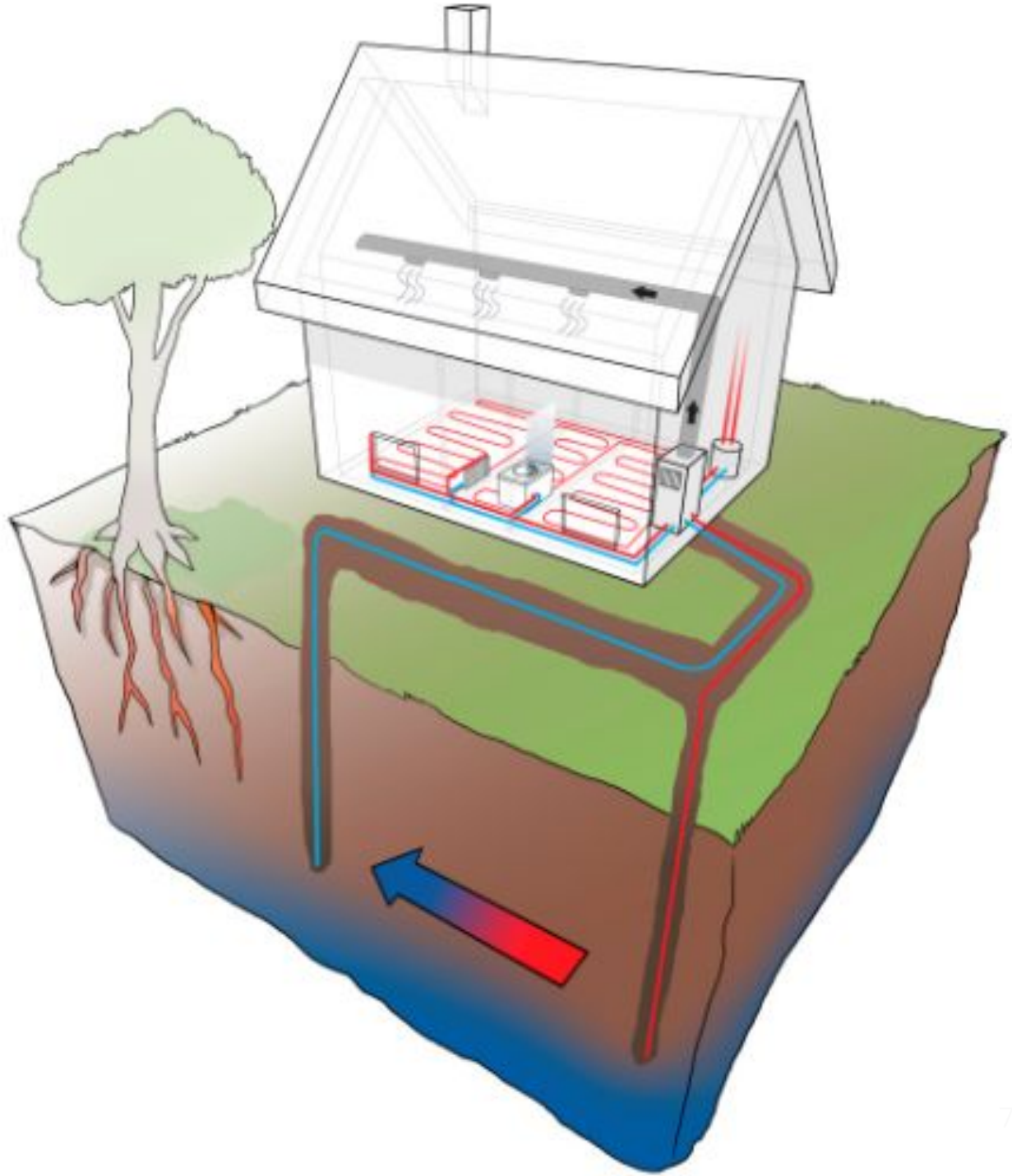




Typical Geothermal Applications Provide Benefits & Eliminate Problems

Reasoning for All-Inside Geo HVAC Unit:

- No outside noise
- No exposed associated circuits
- No exposed refrigerant lines
- No cooling towers
- No disconnects outside
- No condenser farms
- No injuries
- No vandalism



Various Types of Geothermal Heat Pumps (GHPs)

We no longer need one giant, messy machine. By using a "team" of small, stackable units, we can provide total comfort, from your shower to your swimming pool, using a fraction of the space.

Pool or Dedicated Hot Water GHP; (water-to-water GHP)

Vertical GHP (water-to-air GHP)

Modular & Stackable GHPs

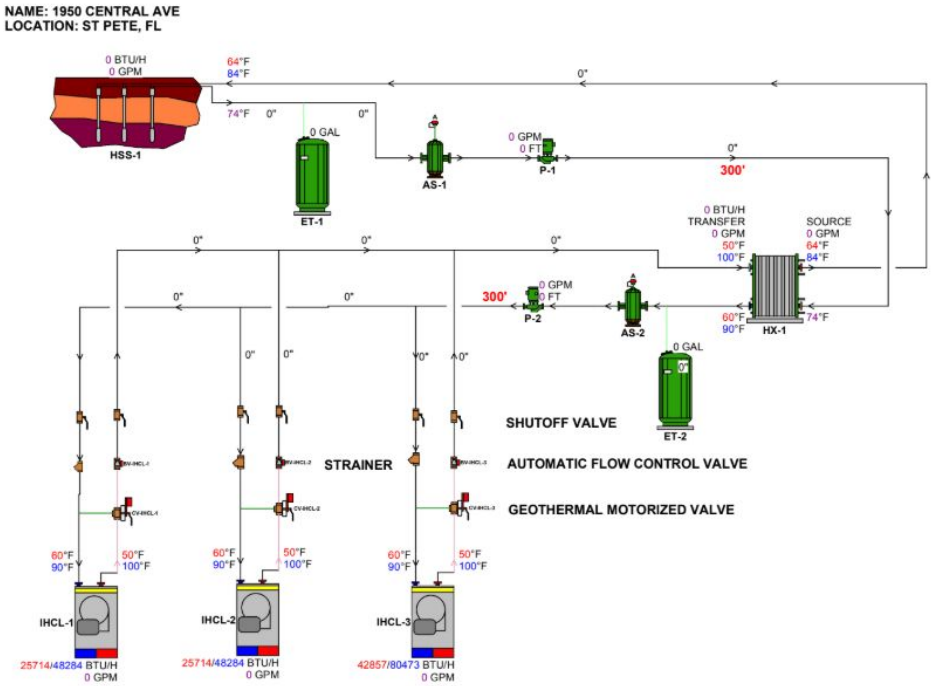
Modular & Stackable GHPs

Pool or Dedicated Hot Water GHP; (water-to-water GHP)

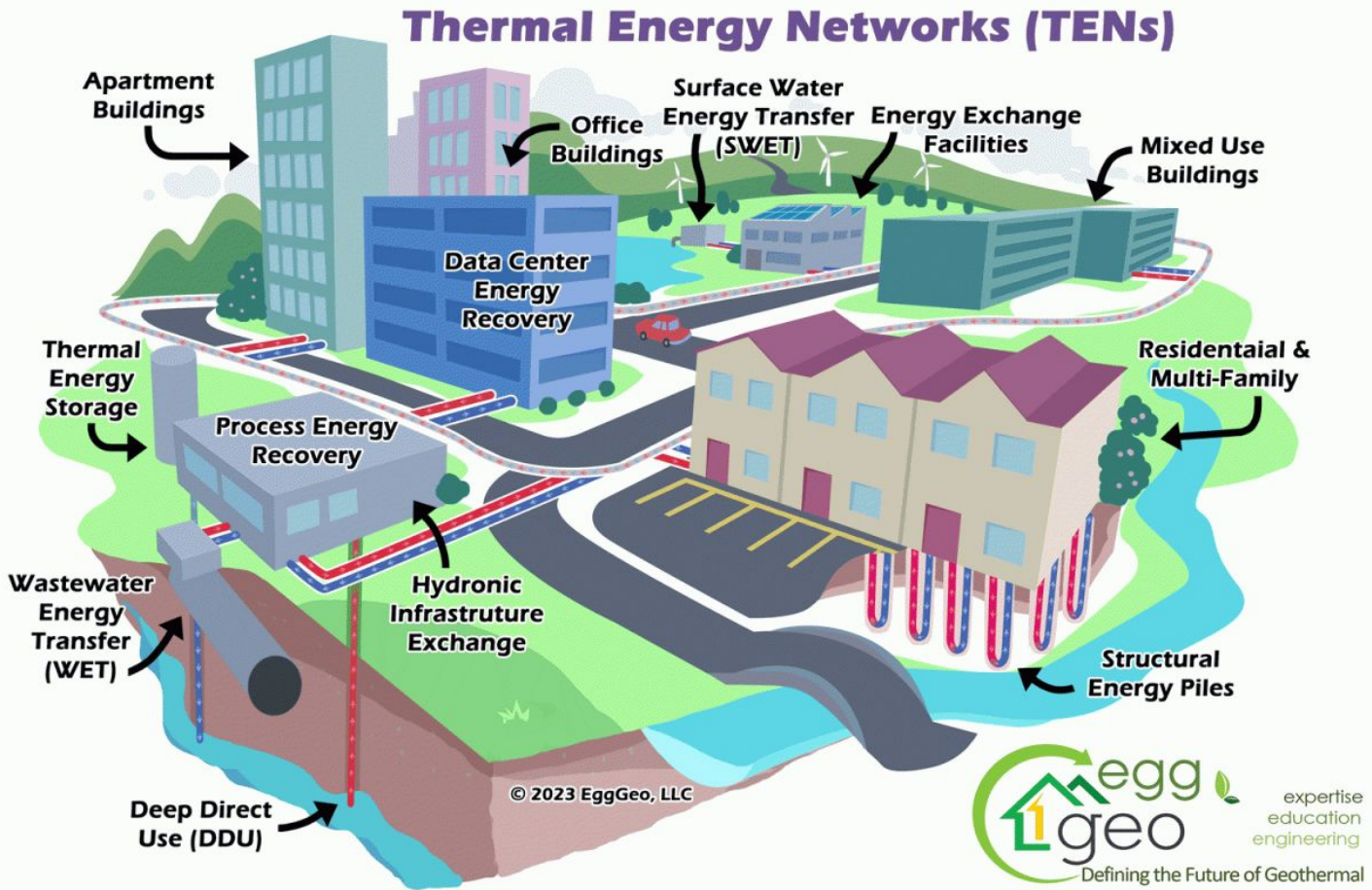
Horizontal; GHP (water-to-air GHP)

Legacy Asset: 1950 Central Avenue

St. Pete's first commercial Net Zero building. Highlight the **100% utility offset** and how the system outlasted the anchor tenant (Sierra Club) while remaining in Net Zero status.



Rethinking the Grid – Thermal Energy Networks (TENs)



Thermal Energy Networks, or TENs, are a shared infrastructure that connects diverse building types into a single ecosystem

We harvest "waste" heat from one source—like a data center that needs cooling—and deliver it to a neighbor who needs heating—like a residential home or a school.

Tampa Church Example: 70 Years Geothermal Exchange

If you ever encounter doubt about how long this technology lasts, look at this church in Tampa, FL.

The building itself was constructed in 1909, but the geothermal story began in 1949. That is when they installed their first ground-water sourced chiller.

See the clean, indoor environment that protects the equipment from the Florida humidity and salt air, which would have rotted a standard outdoor unit in a fraction of the time.

By choosing the ground as our heat sink, we are creating a system that can outlast the people who installed it. This church is the living definition of a "Legacy Asset."

It’s Simple and Successful

Because the "exchange" infrastructure (the underground wells) was still healthy, we didn't have to start from scratch. We simply swapped out the old 1949 equipment for modern, high-efficiency Geothermal Heat Pumps (GHPs).

100% Inside: The Secret to Longevity

By keeping the units in a climate-controlled mechanical room, we protect the sensitive electronics & compressors from the brutal Florida elements – heat, humidity, and salt air.

Asset Protection: Security & Peace of Mind

In urban environments, outdoor HVAC units are targets for copper theft, vandalism, and accidental damage. They are also at the mercy of storm damage and hurricanes.

Public School Geothermal Central Energy Plant

Replacing a Boiler & Chiller System

Public schools are ideal candidates for central geothermal plants. By replacing aging boiler and chiller systems, we create a safer, healthier learning environment for students while significantly reducing the long-term tax burden for the entire community through lower energy bills.

911 Emergency Operations Center & Public Safety Complex

By using Ground Water Exchange, we have moved the entire thermal process underground and inside. This facility remains fully operational and independent of a vulnerable outdoor cooling towers

Designed to withstand a Category 5 hurricane is blowing outside, the dispatchers inside remain cool and focused because their "heat sink" is safely protected by 100 feet of earth.

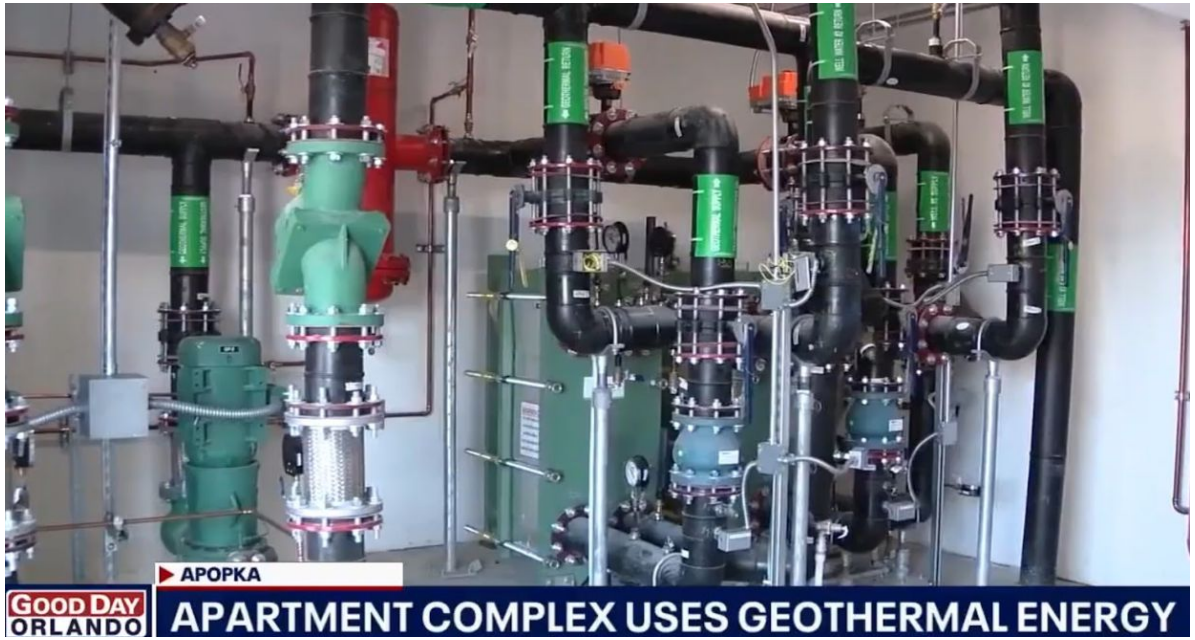
Disney’s Grand Floridian Geothermal Exchange

Disney’s Grand Floridian Geothermal Exchange Video

At Disney’s Grand Floridian Resort, we utilize the Seven Seas Lagoon as a giant "thermal battery."

By installing large-diameter piping and specialized exchange plates directly into the lagoon, we can provide carbon-free heating and cooling to the entire resort campus.

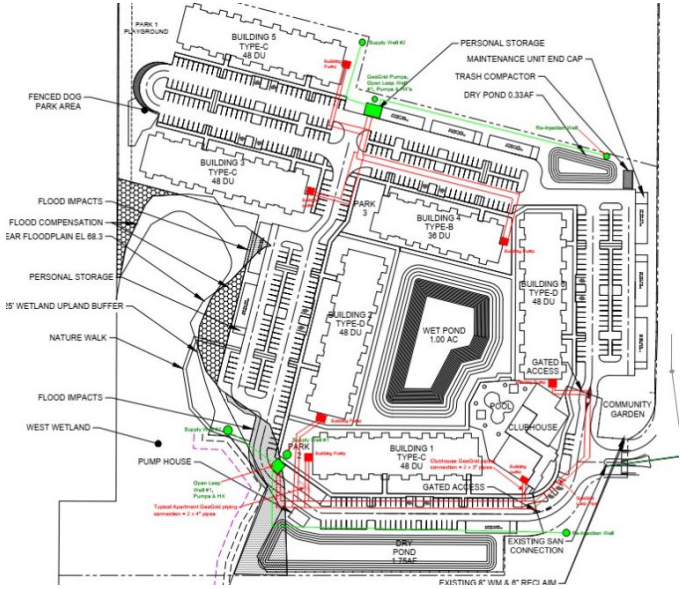
Together with Egg Geo’s design & consulting service, this project reflects the visionary work of Val Usle, Disney’s former Director of Sustainability Worldwide.



Residential Networks:

Avian Pointe

Residential GeoGrid Network located in Apopka, Florida.



- Project is includes 276 high-density residential units.
- The GeoGrid is a centralized Thermal Energy Network (TEN).
- A centralized Geo-Grid provides relief to the electrical grid.
- Achieve efficiency by sharing energy and reducing peak demand.

The Municipal Blueprint: Rochester, MN

- Secured $8M+ win using IRA "Direct Pay" incentive.
- The system delivers $900,000 in estimated annual savings.
- Rochester's municipally-owned utility is a proven blueprint.
- This success highlights St. Pete’s potential for geothermal networks.

Grid Resilience: Chattanooga, TN EPB Power (TVA)

This geothermal energy network avoids **14.5 MWe** in electrical grid upgrades.

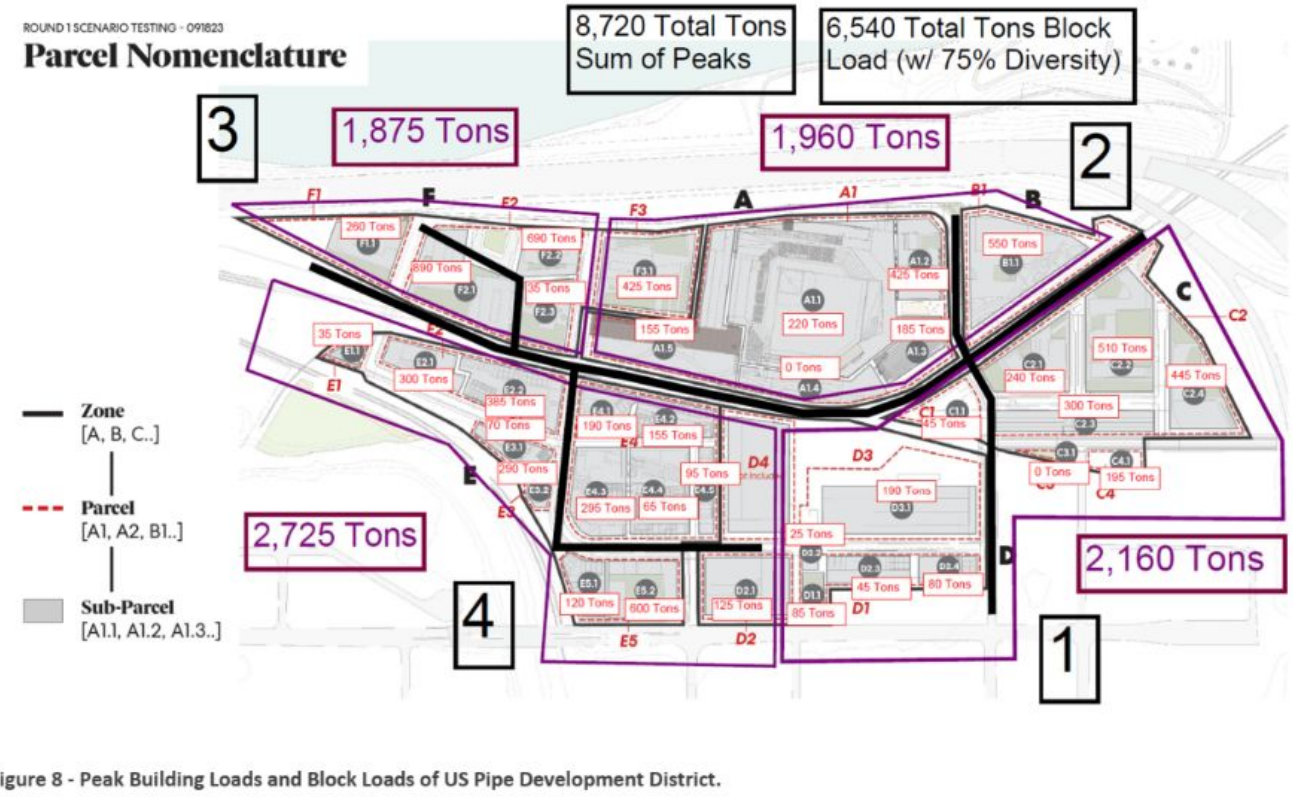
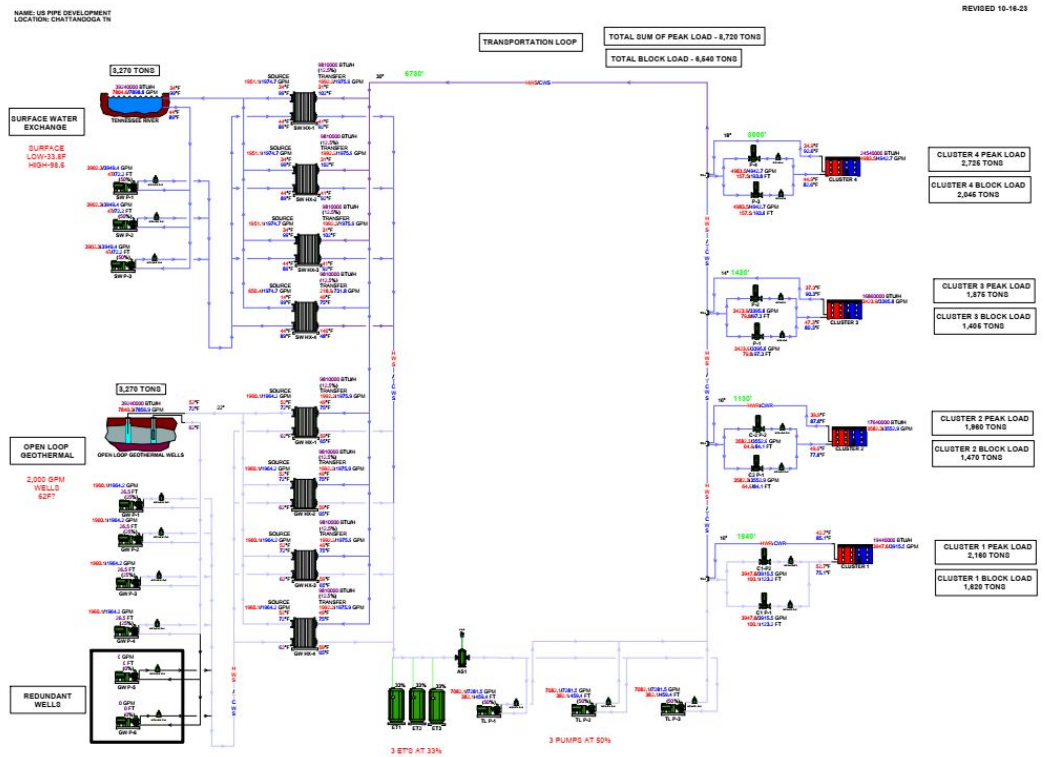


Figure 8 - Peak Building Loads and Block Loads of US Pipe Development District.



Creation of Thermal Energy Networks (TENs)

We can pull 125 tons of transfer from Supply and Injection Wells, another 125 from Closed Loop Wells, more from Surface Water, and even tap into a Water Treatment Facility.

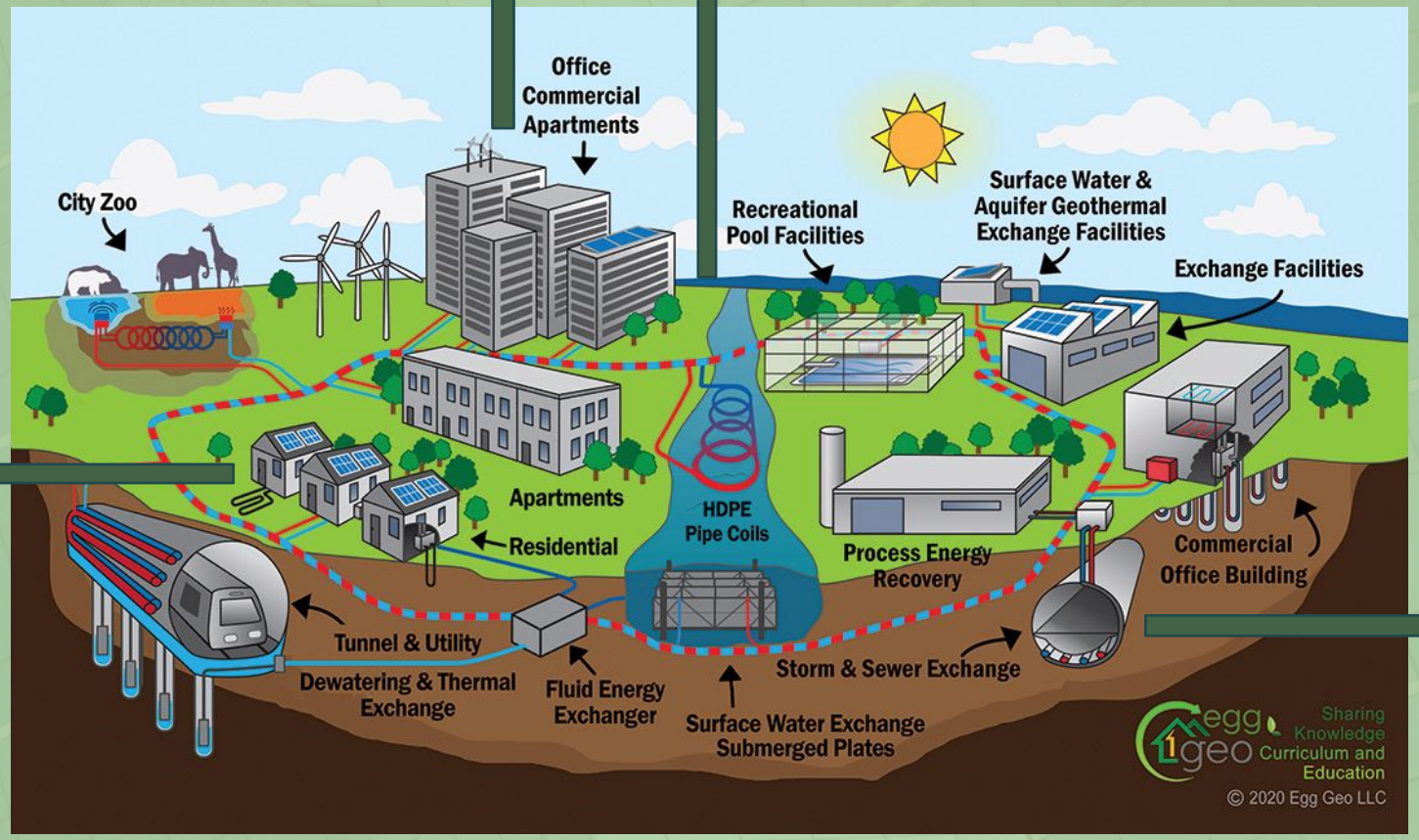
This is where the real "utility-scale" work happens. To move this much energy, we need high-performance, large-diameter piping infrastructure.

When you combine those diverse sources with the horizontal piping, you get a Thermal Network that can serve an entire community.

Diverse Thermal Sources

Office buildings and data centers reject heat all year long. In a TEN, that "rejected heat" becomes a valuable commodity for the rest of the network.

Surface Water: We use nearby rivers or lakes as massive thermal reservoirs.



We can link residential homes, retail centers, and recreational facilities

Wastewater Energy Transfer (WET): We extract heat directly from the sewers.

Improving Power Usage Effectiveness

Improving PUE

Using aquatic features as a heat sink drastically improves PUE by eliminating the energy-intensive chillers required for traditional cooling.

Energy Savings:
Eliminates or highly reduces the energy consumed by chillers.

High Quality Water for Cooling:
Avoids scaling and biofouling.

Waste-Heat Utilization:
Efficiently repurposes waste heat to create eco-heated lagoons that can be enjoyed year-round, without additional energy.

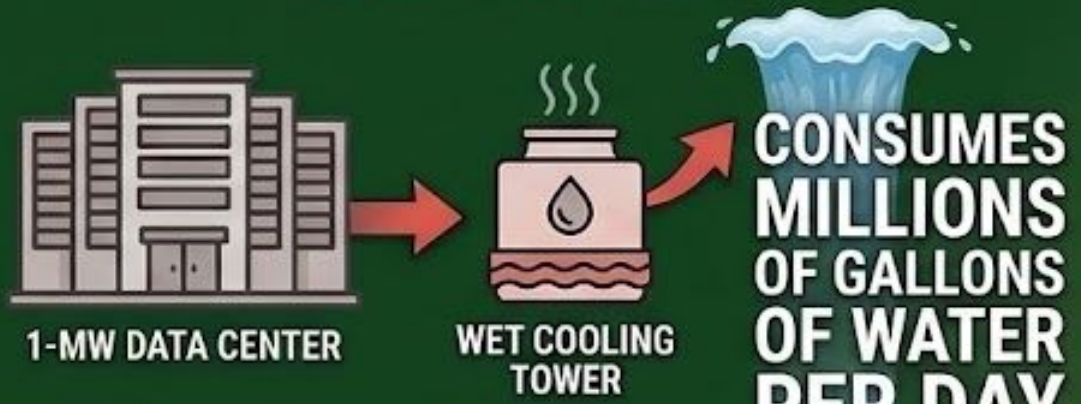
Carbon Credits and Incentives:
Access to potential carbon credits and incentives.

Enhanced Power Usage Effectiveness (PUE):
Drastically improves PUE metrics for more sustainable operations.

Facilitated Project Approvals:
Eases the approval process for data center projects by demonstrating a commitment to sustainability.

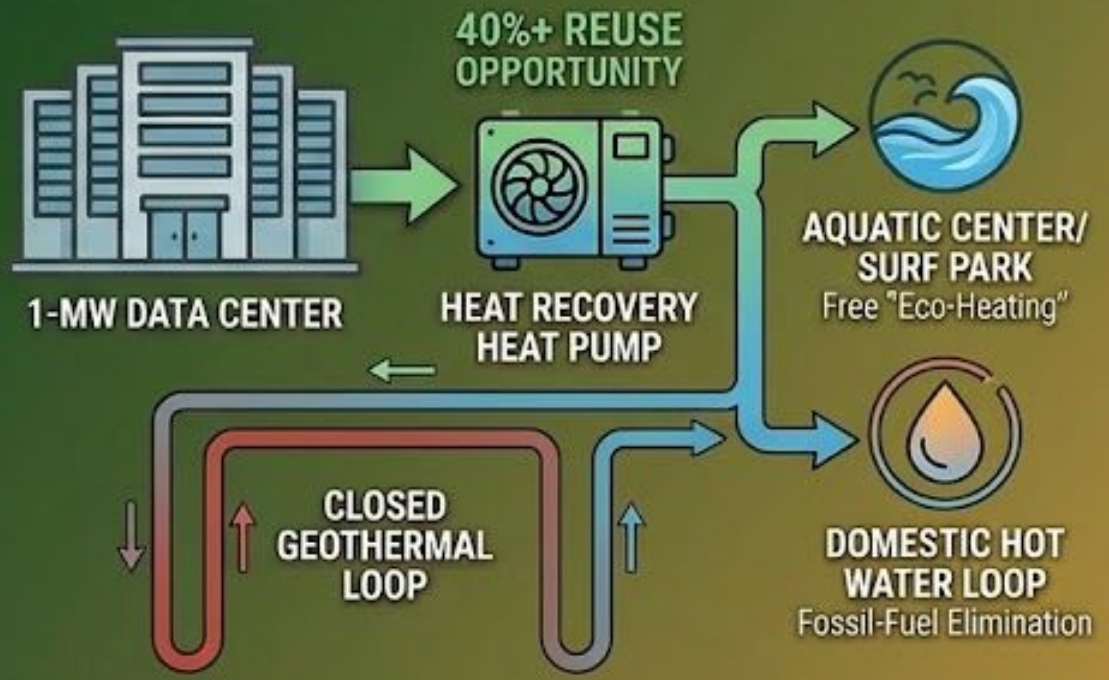
REIMAGINING DATA CENTER COOLING: WET TOWERS VS. THERMAL NETWORKS

THE WET COOLING TOWER DILEMMA: THE WATER CONSUMER



Traditional systems are increasingly unsustainable and resource-intensive

THE THERMAL ENERGY NETWORK (TEN) SOLUTION: THE WATER CONSERVER



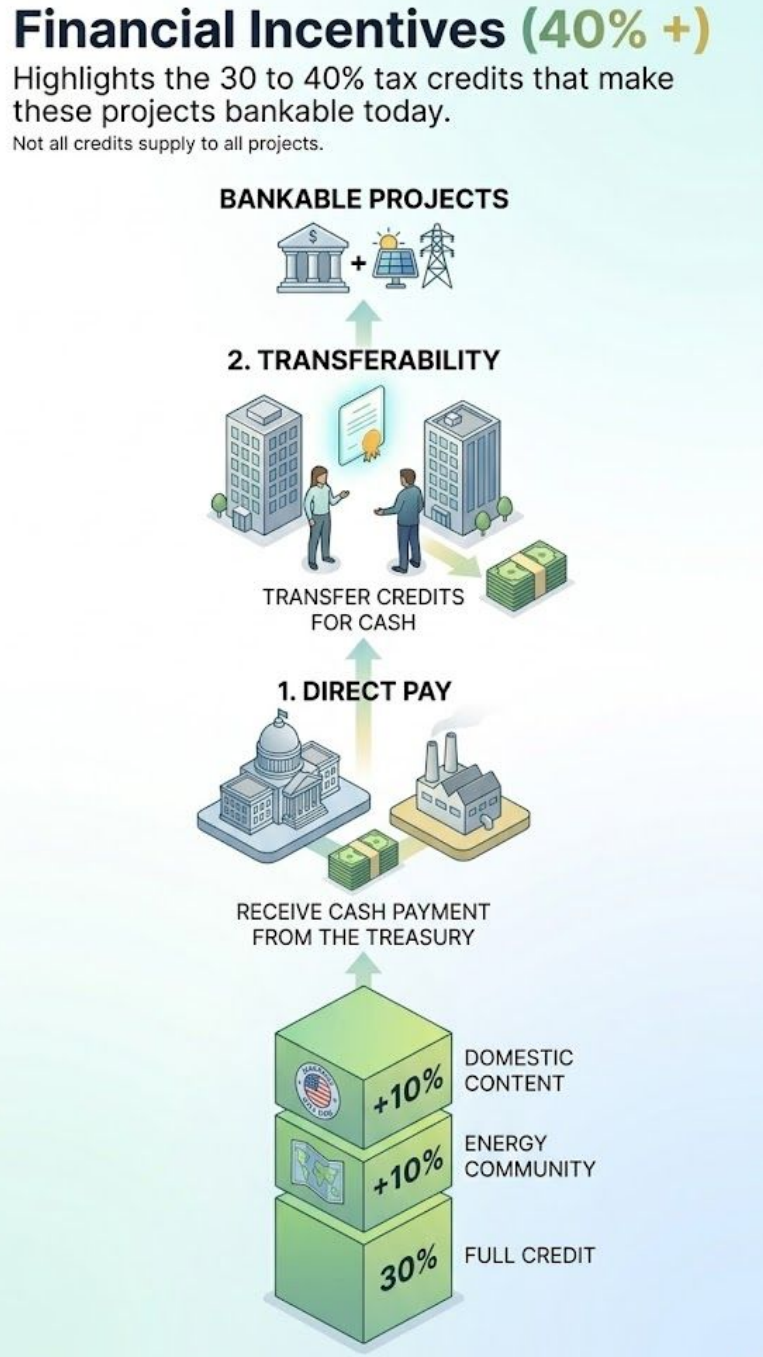
POWER PRESERVATION: High Grid Capacity	Power Vulnerability
ASSET SECURITY: Protected All-Inside	Vandals & Weather Target
ECO-SYMBIOSIS: Sharing is Conserving	Burning is Evaporating

TENs create symbiosis by matching a heat source to a thermal sink, eliminating evaporation and fossil fuels

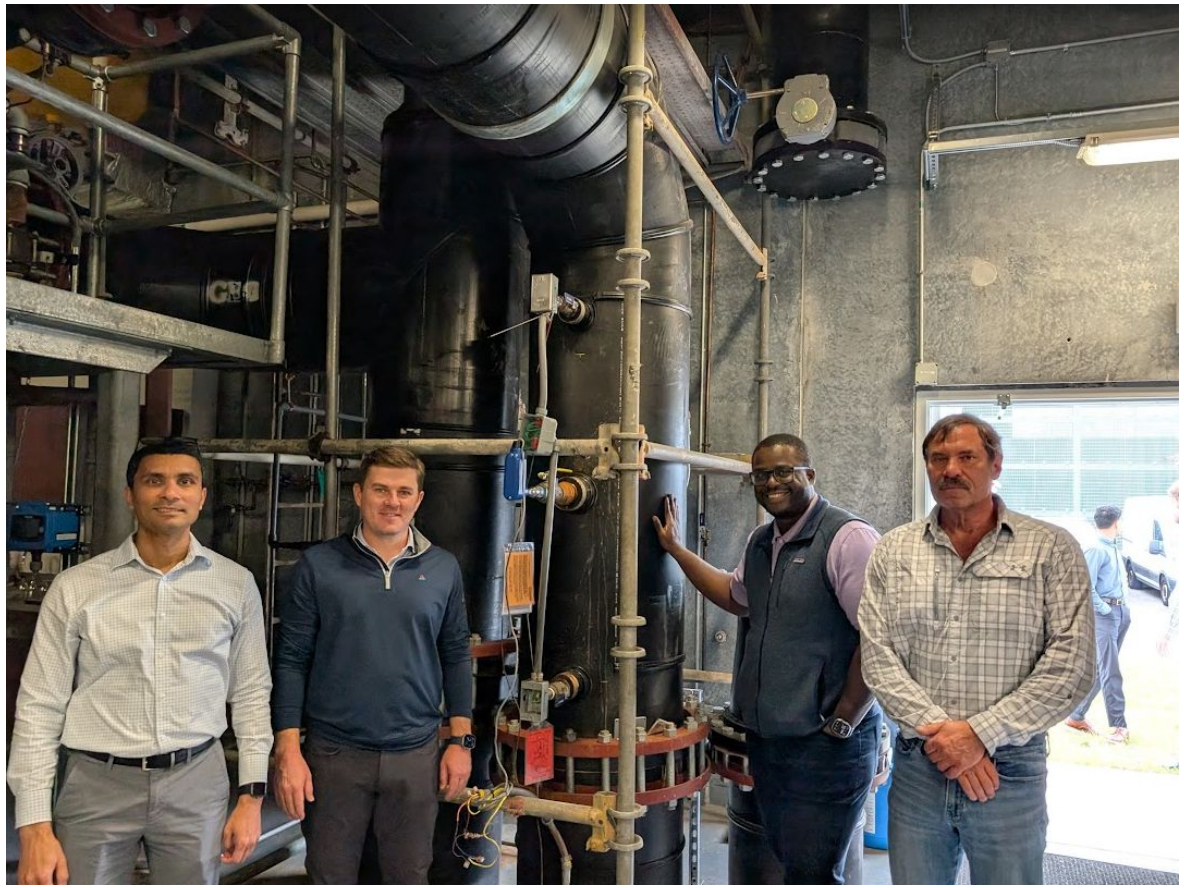
Financial Incentives

We can understanding the ROI of geothermal not just through energy savings but through direct monetization of tax credits.

- Look at the 30% Full Credit cube at the base of our stacked blocks. This represents the basic geothermal investment tax credit (ITC), which provides a massive 30% credit of the eligible project cost.
- We prioritize the use of U.S.-sourced geothermal components and equipment. By utilizing domestic steel, iron, and other key materials, we are eligible for a full 10% credit bonus.
- The "Energy Community" adder applies to projects located in communities heavily impacted by the decline of traditional fossil fuel energy industries (e.g., areas with high concentrations of coal-fired power plant employees). By placing geothermal in these exact locations, we qualify for another 10% bonus.
- For public power entities, nonprofits, and other specialized groups, we can understanding that we utilize the definitive "Least Energy Path." In these cases, the developer matches the source (credit) with the sink (cash).



Engineering Q&A: The Technical Gauntlet

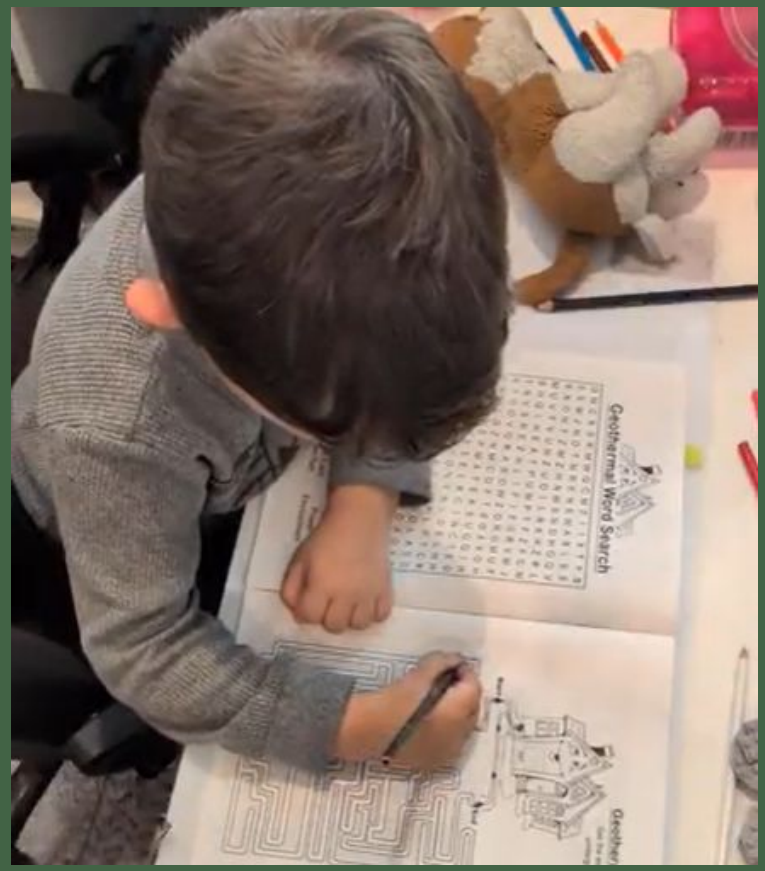


Egg Geo Team Guided Tour for Southern Company Energy Executives
Pinellas County Safety Complex. Emergency Services Building

Our Dedication to Education

The rising generation's interest in geothermal is vital to achieving our goals; saving the earth, and leading the vital effort to establish energy equity.

This is a vital act of stewardship, providing the foundation they need to unify the industry and scale thermal energy networks for the future.



The geothermal industry is a true beacon of sustainable innovation, unlocking the Earth's own natural, constant heat to provide reliable, baseload energy.

This incredible sector doesn't just offer an inexhaustible, clean power source; it drives circular economies by turning thermal waste into valuable community assets, creating thousands of green jobs, and significantly reducing carbon footprints.

Diversity, fresh perspective, and an influx of young and excited minds will continue to push this industry into the geothermal renaissance.

egg geo

Kids Corner

Defining the Future of Geothermal

Questions?

Scan the QR code to access a list of resources including contact information, LinkedIn pages, Websites, and more!

Get Involved!

Consider mentoring students and supporting the GEO@MIT work.

Use the free resources on the Egg Geo Kid's Corner page.

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