



The Case for Geothermal: *How It Works & How To Pay For It*

By: Matt Tokarik & Michael Schierl
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FITZGERALD INSTITUTE
FOR REAL ESTATE



Speaker Introductions



Matthew Tokarik, P.Eng., M.A.Sc., President of Subterra Renewables

Matthew is a professional engineer who works with Subterra Renewables, a renewable energy developer who designs, builds, owns, and operates geothermal heating and cooling systems across North America, with the goal of significantly reducing greenhouse gas emissions and ultimately reaching Net-Zero building operation. Matthew received his Bachelor of Science (BSc) from the University of Alberta and went on to earn his Master of Applied Science (M.A.Sc) in Building Science from Ryerson University. Previously he has worked with design firms to develop strategies for building energy and carbon emission reduction for new and existing buildings. Matthew is a Sessional Instructor at Toronto Metropolitan University and McMaster University. He also sits on Canada GBC's Zero Carbon Building Standard Steering Committee.

Additionally, Matthew has been cited as a geothermal and sustainable building expert in the Corporate Knights, Sustainable Proptech Canada Report 2023, Business Focus Magazine, and Yale Climate Connections.

Michael J. Schierl, J.D., Partner at Croke Fairchild Duarte & Beres, Founder of Julius Capital

Michael is a Partner at Chicago-based Croke Fairchild Duarte & Beres, where he serves as the Chair of the Public Finance group and the Co-Chair of the Nonprofit Advisory practice. Croke Fairchild acquired Michael's law firm, Immaculata Law Firm, in January of 2024.

Mr. Schierl is also the Founder of Julius Capital, where he has been designing and implementing innovative funding solutions for non-profits for over 30 years, providing well over \$1.0 Billion of funding. His clients include Dioceses, parishes, schools, universities, foundations, housing, evangelization and clean-energy organizations.

A graduate of Harvard Law School and the University of Notre Dame (PLS Great Books Program '84), Mr. Schierl is consecrated to Our Lady and a member of the Militia Immaculata, founded by St. Maximilian Kolbe. Mr. Schierl serves on the Advisory Board of the Fitzgerald Institute for Real Estate at the University of Notre Dame.



Problems: Rising Costs and Environmental Concerns

Increased Electrical Demand = Rising Costs

- Nationwide forecast of electrical demand has shot up from 2.6% to 4.7% growth over the next five years¹
- Electricity prices rose by an annual average of 7% from 2021 – 2023, and are projected to continue to rise²

Environmental Concerns In the Building Sector

- Buildings contribute 40% of carbon emissions globally and up to 60% in cities.
- Annual atmospheric carbon dioxide emissions has risen to more than 35 billion tons
- Increased emissions and associated global temperature increase has led to increase in catastrophic weather events

Footnotes:

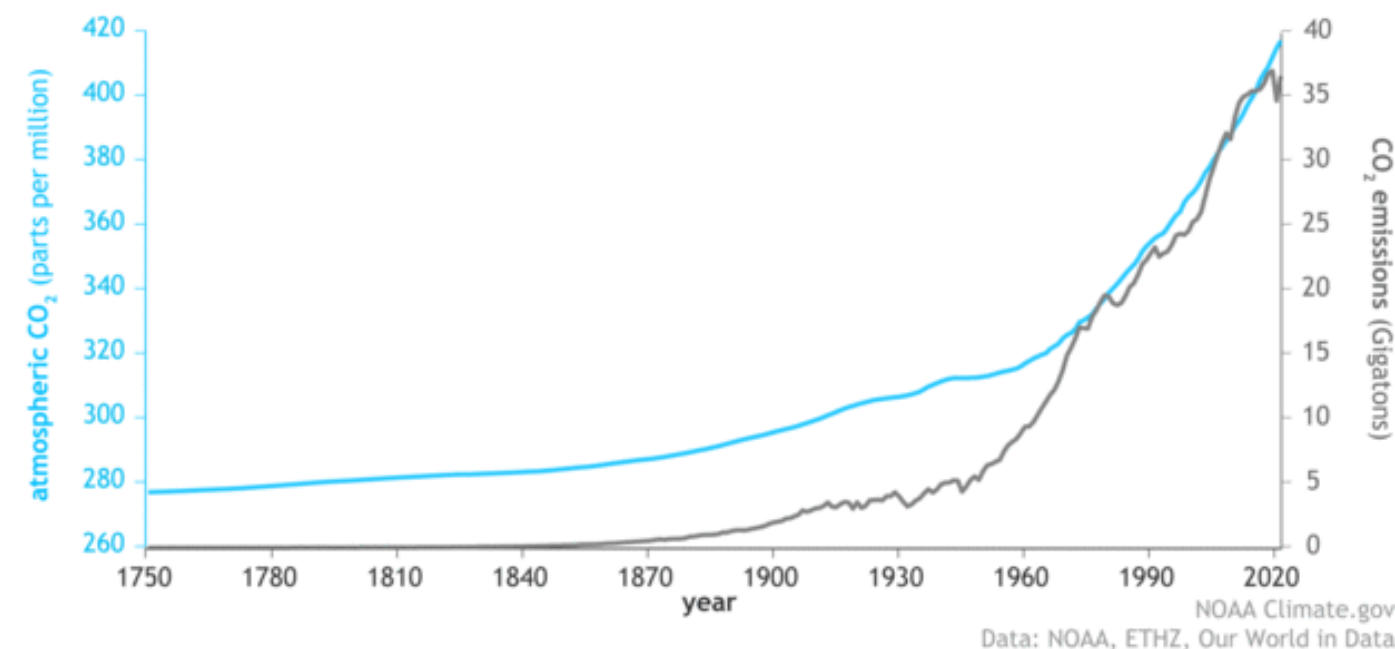
¹ Wilson et al., “The Era of Flat Power Demand is Over”, *Clean Grid Initiative*. Grid Strategies, 2023. pg. 3

² U.S. Energy Information Administration *Short-Term Energy Outlook*, August 2024, pg. 12

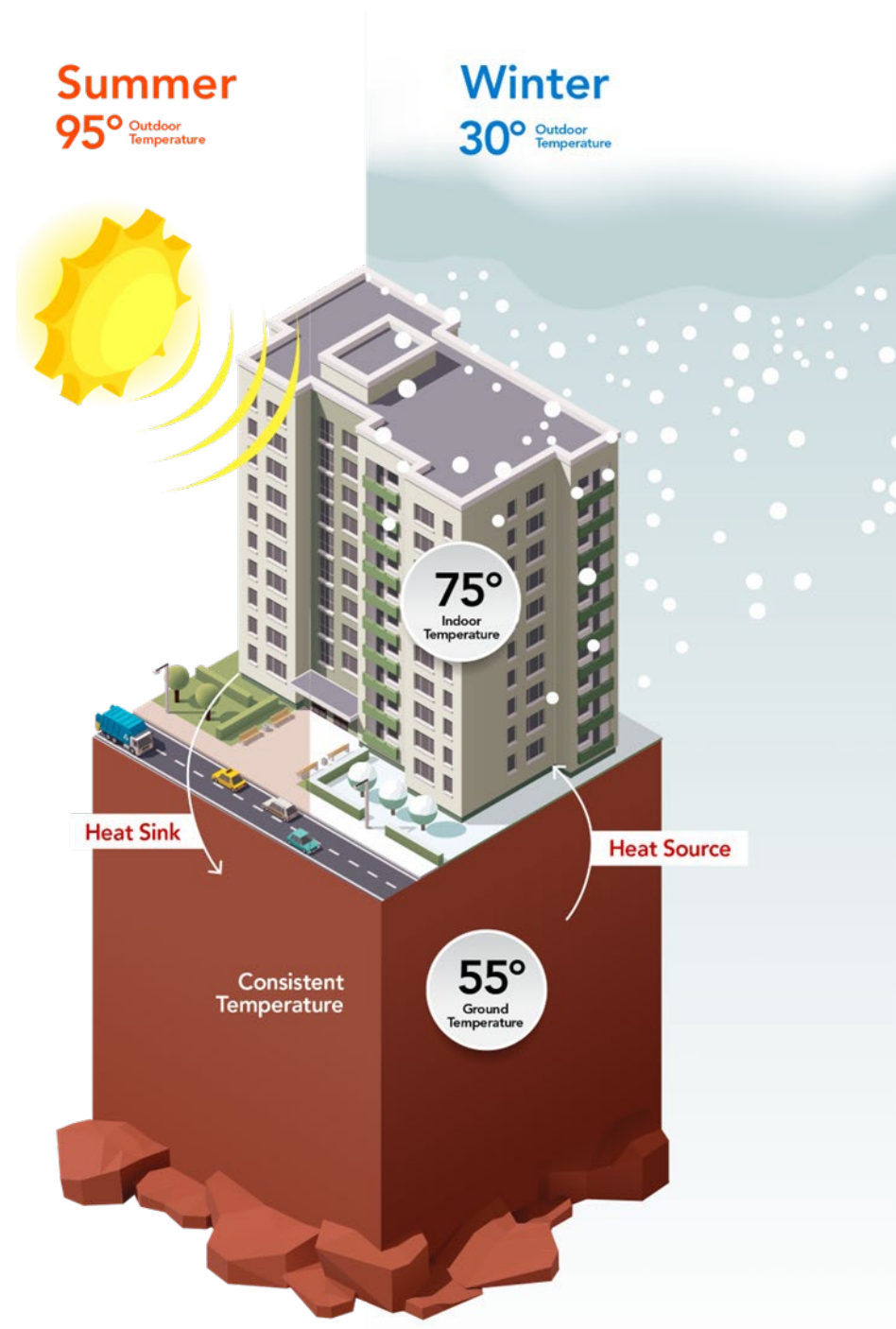
Catholic Duty to Look Out For Our Environment

- Pope Francis has commissioned us to take steps towards finding clean and renewable energy in his encyclical *Laudato Si'*

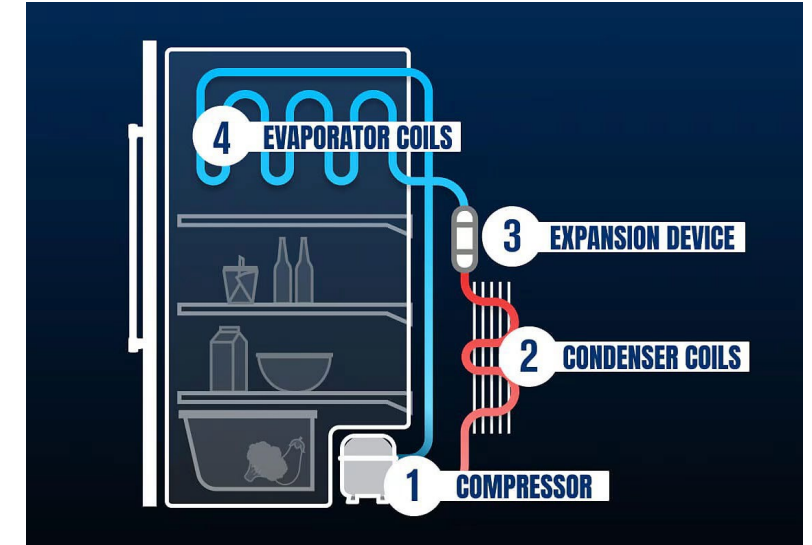
Atmospheric carbon dioxide amounts and annual emissions (1750-2021)



Geothermal Energy: What It Is



Geothermal technology works using the same principal as your refrigerator to move heat from source to sink

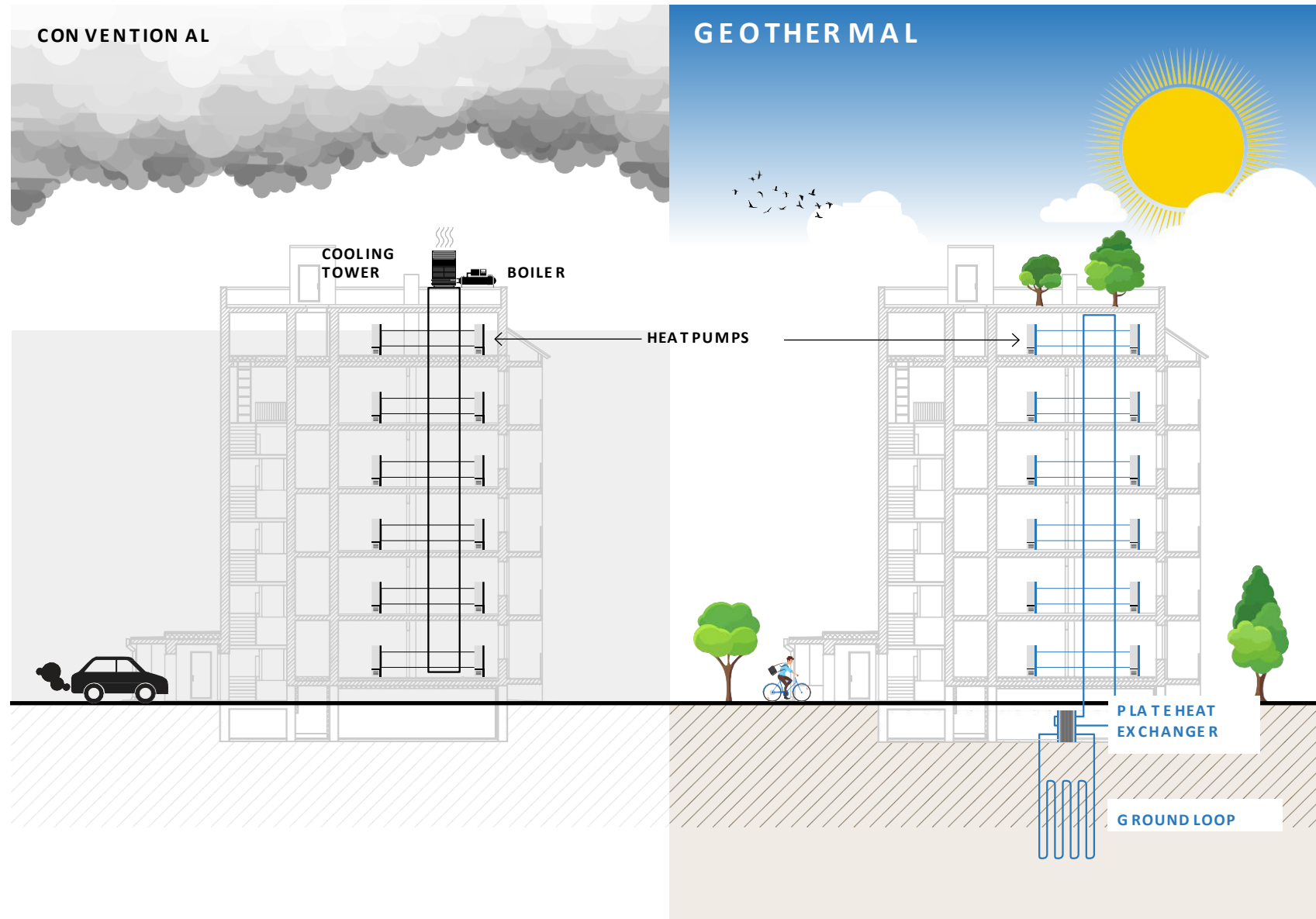


- Using ground source heat pumps to transfer heat between your building and the soil, geothermal systems create a thermal battery with a one-year charge/discharge cycle
- Multiple holes are drilled into the earth and plastic pipe with circulating water are installed to create coils that transfer heat into the ground
- Geothermal systems replace conventional heating and cooling systems and are over 3x more energy efficient
- On site fossil fuel combustion systems can be eliminated reducing heating carbon emissions by up to 90% ¹

Footnotes:

¹ Carbon emission savings are dependent on emissions factors of regional electricity grid

Conventional HVAC vs. Geothermal System Configuration



- New Building or Retrofit applications possible
- Replaces chillers, cooling towers, and boilers
- Can be coupled with any type of water-based HVAC system (heat pump, fan coil, VRF, radiant)
- Allows for simultaneous heating and cooling throughout the building all year long

Freed-up penthouse space can be used for additional outdoor amenity, saleable, or leasable area in your building's most valuable real estate

Contractor Geothermal vs. Subterra Geothermal

You've decided on geothermal, but who do you go to?

Contractors

- ✗ YOU take the risk
- ✗ YOU pay the Capex
- ✗ YOU pay the Maintenance costs
- ✗ YOU must monitor thermal field
- ✗ Multiple subcontractors delay job

subterraTM
RENEWABLES

- ✓ Temperature guaranteed to the degree
- ✓ WE pay all Capex
- ✓ ONE fixed Energy Fee
- ✓ WE monitor and balance field for 30+ years
- ✓ Vertically integrated – no delays

WE “DBOOM” – You pay one, fixed Renewable Energy Fee

subterraTM
RENEWABLES

JULIUS
CAPITAL

“*DBOOM*”: Design, Build, Own, Operate and Maintain



We Design

- Test borehole
- Pre-feasibility tests
- No design cost to customer
- Financial model



We Own

- We pay 100% of the capital expense
- Maintenance and mechanical replacements
- At the end of term, YOU own the system



We Build

- Vertically integrated
- In-house drilling expertise
- Largest rig fleet on the continent
- 50+ drill rigs and 250+ employees



We Operate & Maintain

- In-house engineering and operations staff
- State-of-the-art management technology
- Web-enabled temperature sensors
- Real-time system diagnostics
- Comes with Performance Guarantee

Our “DBOOM” structure makes Subterra unique among all other geothermal providers and removes up front capital cost to customers.

Renewable Energy Fee

Our service is 100% covered by one fixed Renewable Energy Fee

The Renewable Energy Fee includes . . .

- I. **Early Optimization:** Engineering review and operation refinement to ensure system was commissioned correctly
- II. **System Monitoring:** Consistent remote monitoring of temperature and thermal balance
- III. **Planned Maintenance:** Maintenance schedule worked out in advance
- IV. **Capital Investment:** Subterra will fund capital expenses as-needed to ensure operations of the system

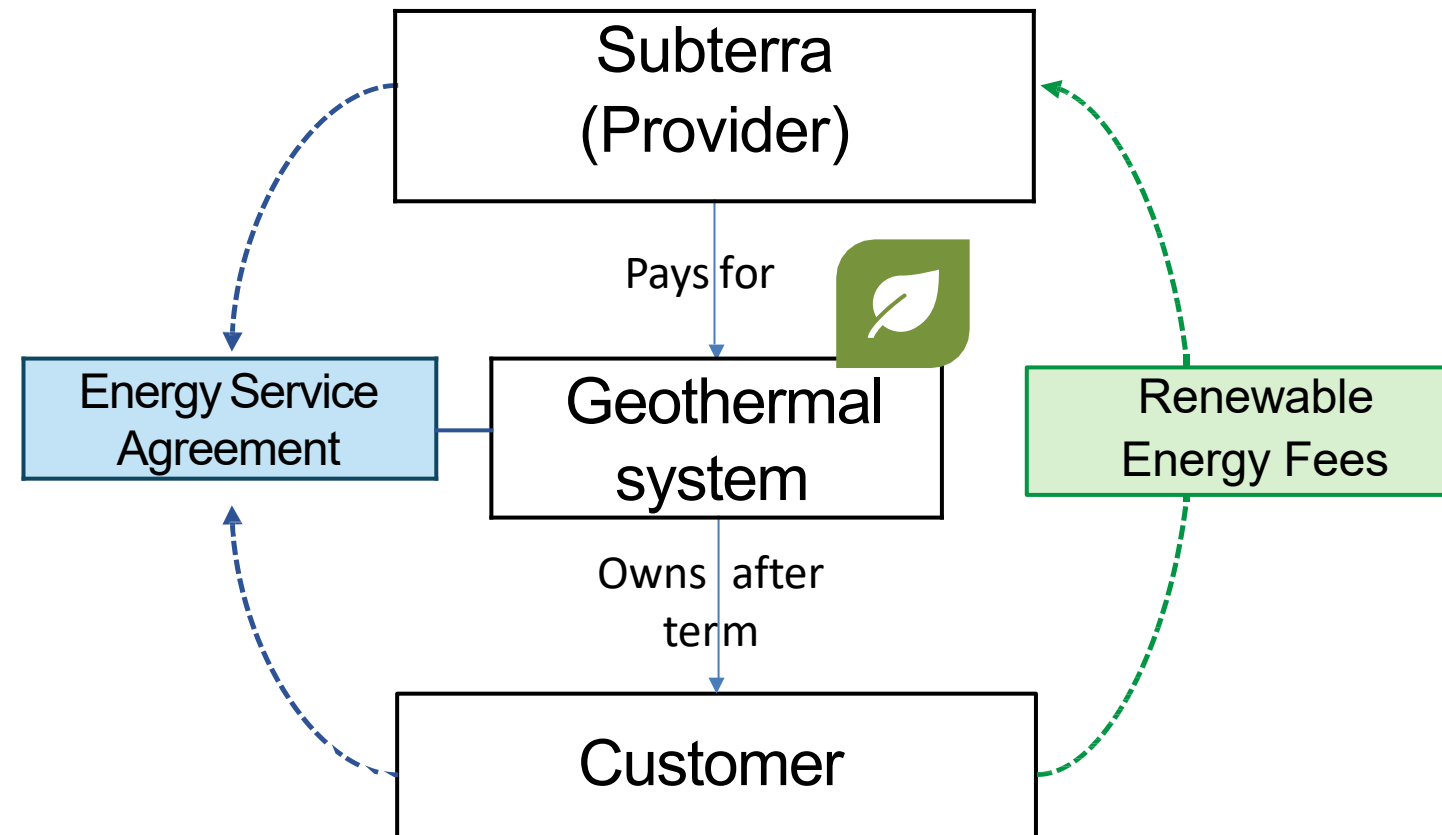
. . . and lasts for the entire duration of the Geothermal Energy Service Agreement.

The Subterra Solution to Paying for Geothermal

Subterra's *Geothermal Energy Service Agreement* is tailored to its client

How Does it Work?

- ✓ Subterra pays for entire geothermal system
- ✓ Signs energy agreement with customer
- ✓ Subterra provides energy services
- ✓ Energy fees pay off Subterra's investment
- ✓ Customer **owns** the system at expiration of term



So, let's summarize all this quick . . .

Subterra's Value Proposition

The Subterra Guarantee

- System guarantees the temperature **to the degree** for the length of the contract term

ZERO Capital Outlay

- Subterra designs, builds, owns, operates, and maintains (“**DBOOM**”) the system at ZERO upfront cost to the client

ONE fixed Energy Fee

- **Renewable Energy Fee** is all inclusive, like a utility

Lower Operational Costs

- Subterra's business model allows them to charge a price **at or below** what you're already paying for conventional HVAC

Off-Balance Sheet solution

- Subterra's Geothermal Energy Service Agreement (“**GESA**”) is structured to be off-balance sheet for the client

Tax credit and incentives

- Investment tax credits (“ITCs”) and incentives all go to client – **30% or 40% credit** on the total Capital Expenditure

The Investment Tax Credit (ITC)

Investing In Geothermal Comes With Great Incentives

Investment Tax Credits (ITC):

- Inflation Reduction Act of 2022
- ***30% credit on the total capital expenditure***
- ***+ 10% credit for qualifying “energy communities”***
- Additional state credits and incentives (CO, NY)
- Owner receives ITC

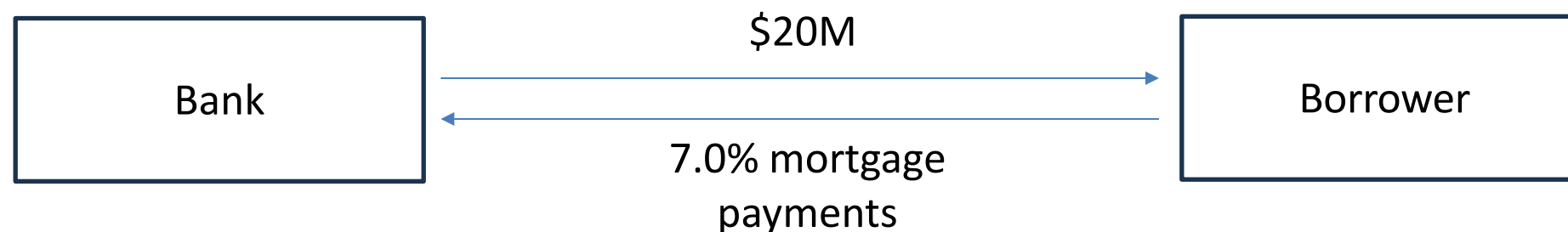
Why Subterra is the Perfect Partner

- Subterra is the owner
- No ITC application hassle
- Client receives ITC benefit
- Other qualifying HVAC capital projects can be included
- Bigger Capex = Bigger ITC amount

How can Subterra do this and keep their Energy Fee affordable?

How Subterra Sets the Renewable Energy Fee

Imagine a \$20MM, 30-year fully amortizing loan at 7.0% . . .



With Subterra, it's the same thing, with one more step.

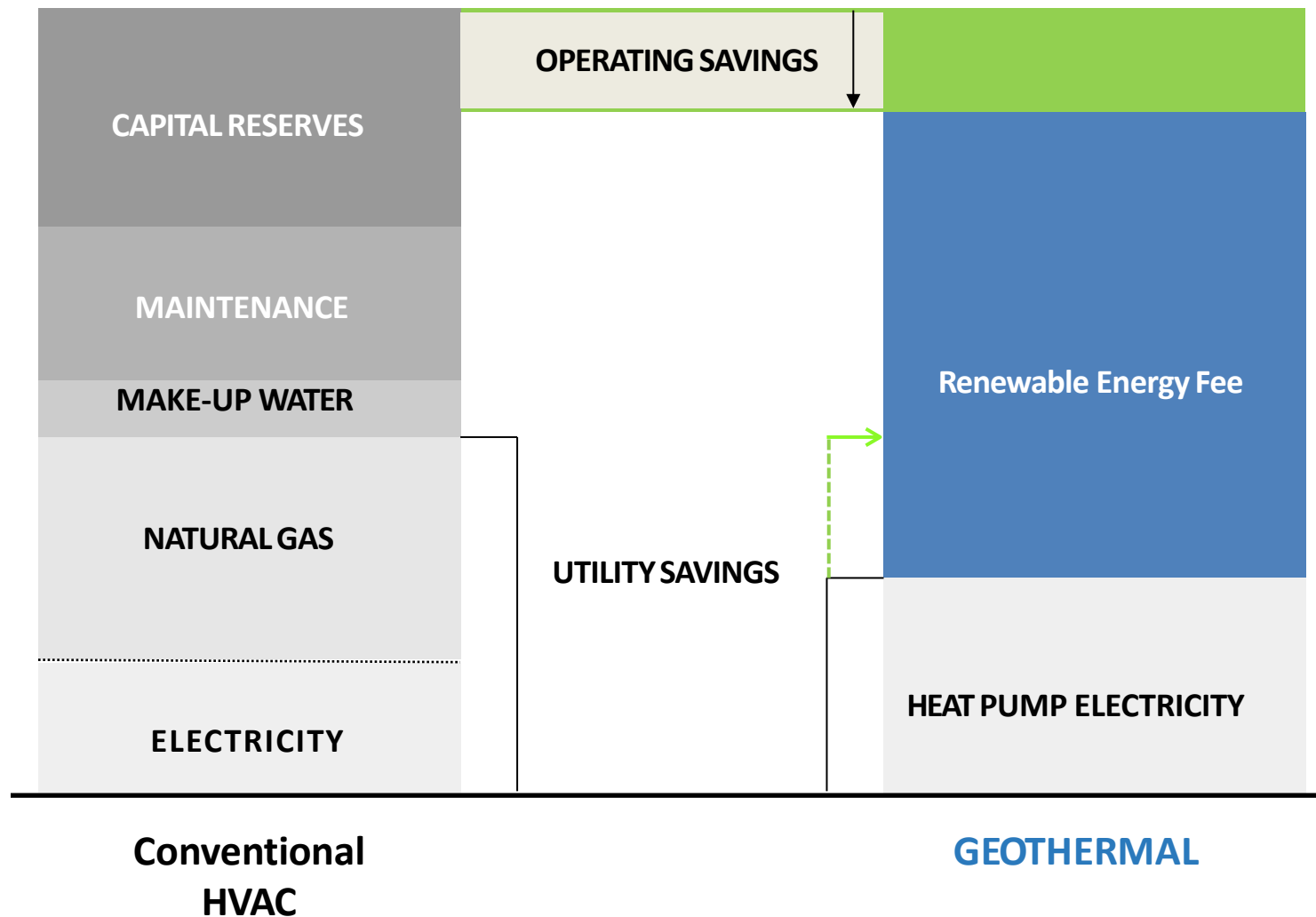


Subterra charges a Renewable Energy Fee that will give Subterra about 9.0% Unlevered IRR¹ on their Capital Outlay

¹ Based on market rates as of 9/01/2024

Annual Operational Savings

The Renewable Energy Fee is structured to be at or below the annual Operating costs of a conventional HVAC system.



The Renewable Energy Fee plus your Electric bill will be at or below the “All-In” total operating cost of running a conventional HVAC system

Now, let's see some real numbers!

Scenario 1: New Building

You're building an 80,000 sq. ft., \$40M new building . . . What is YOUR cost?

	Conventional HVAC	Contractor Geothermal	subterra™
General Construction	\$35M	\$35M	\$35M
HVAC	\$5M	\$5M	\$0M
Geothermal	\$0M	\$10M	\$0M
Construction Subtotal	\$40M	\$50M	\$35M
ITCs	\$0	(\$4.5M)	(\$4.5M)
Net Construction Cost	\$40M	\$45.5M	\$30.5M
Annual O&M+ Capital Reserves	\$850K	\$600K	\$0
Gas Utility	\$50K	\$0	\$0
Electric Utility	\$100K	\$150K	\$150K
Renewable Energy Fee	\$0	\$0	\$850K
Total Operating Cost	\$1.0M	\$750K	\$1.0M
30-YR Operating Cost¹	\$46M	\$34.5M	\$46M
30-YR TOTAL COST	\$86M	\$80M	\$76.5M

\$40M construction cost shrinks by almost **\$10M**

Equals what you're **currently paying** for conventional HVAC

At or below what you're **projected to pay** for conventional HVAC

¹ Assumes a conservative 2.0% annual growth rate; estimates indicate electrical costs to be growing at almost 7%. Cf. Wilson et. al., U.S. Department of Energy (slide 3)

Scenario 2: HVAC Retrofit

You have an inefficient, old 80,000 sq. ft. building accumulating deferred maintenance . . .

	Conventional HVAC	Contractor Geothermal	subterra™	
General Construction	\$0M	\$0M	\$0M	
HVAC	\$15M	\$10M	\$0M	
Geothermal	\$0M	\$10M	\$0M	
Renovation Subtotal	\$15M	\$20M	\$0M	
ITCs	\$0M	(\$6M)	(\$6M)	
Net Renovation Cost	\$15M	\$14M	(\$6M)	← Net Renovation Cost is <i>negative, i.e., a check to YOU</i>
Annual O&M+ Capital Reserves	\$1.0M	\$700K	\$0K	
Gas Utility	\$80K	\$0K	\$0K	
Electric Utility	\$120K	\$200K	\$200K	
Renewable Energy Fee	\$0K	\$0K	\$1.0M	
Total Operating Cost	\$1.2M	\$900K	\$1.2M	← Equals what you're <i>currently paying</i> for conventional HVAC
30-YR Operating Cost ¹	\$55.2M	\$41.4M	\$55.2M	← At or below what you're <i>projected to pay</i> for conventional HVAC
30-YR TOTAL COST	\$70.2M	\$55.4M	\$49.2M	

¹ Assumes a conservative 2.0% annual growth rate; estimates indicate electrical costs to be growing at almost 7%. Cf. Wilson et. al., U.S. Department of Energy (slide 3)

A Couple of Case Studies

Subterra has completed over 500 projects in Canada and the United States, notably . . .

1. Oberlin College & Conservatory, Ohio: Full 440-acre campus geothermal heating and cooling system. 55 building retrofit.

Budget: \$140M

ITC credit: ~ \$40M

Net cost: \$100M



2. Fordham University, New York City: Full 85-acre campus conversion of district steam loop. 35 building retrofit in the Bronx.

Budget: \$100M

ITC credit: ~ \$30M

Net cost: \$70M



FORDHAM UNIVERSITY
THE JESUIT UNIVERSITY OF NEW YORK

Will You Answer the Call?

“The urgent challenge to protect our common home includes a concern . . . to seek sustainable and integral development.”

- Pope Francis, Laudato Si’

Partnering with Subterra is a viable, effective and practical way to answer Pope Francis’ call

- *Eliminate GHG emissions*
- *Save BIG on long-term costs*
- *Finance deferred capital projects*
- *Potential cash in-hand*

All for one, fixed Renewable Energy Fee and without sacrificing any quality

What’s stopping you from making the call today?

Contact Us

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