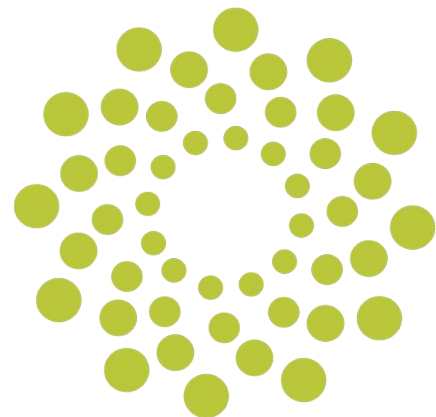


Sustainable Buildings and Decarbonization Strategies

Presentation to the Just Transition Working Group of the Maryland Climate
Change Commission
May 31, 2024

Project





About Us

- 20 years of green and healthy building experience
- Design, Construction Administration, Operations + Maintenance, Tax Incentives, and more!
- 40 Accreditations: Professional Engineer, Certified Energy Manager, Building Energy Modeling Professional, LEED AP, WELL AP, Fitwel Ambassador, Green Globes Professional, NGBS Verifier, and more!
- 1,000+ Green Building projects completed, 315 active projects



Our Services



Green Building, Health & Wellness
Certification Consulting



Decarbonization Planning & Energy
Audits



Sustainability Planning & On-Site
Environmental Testing



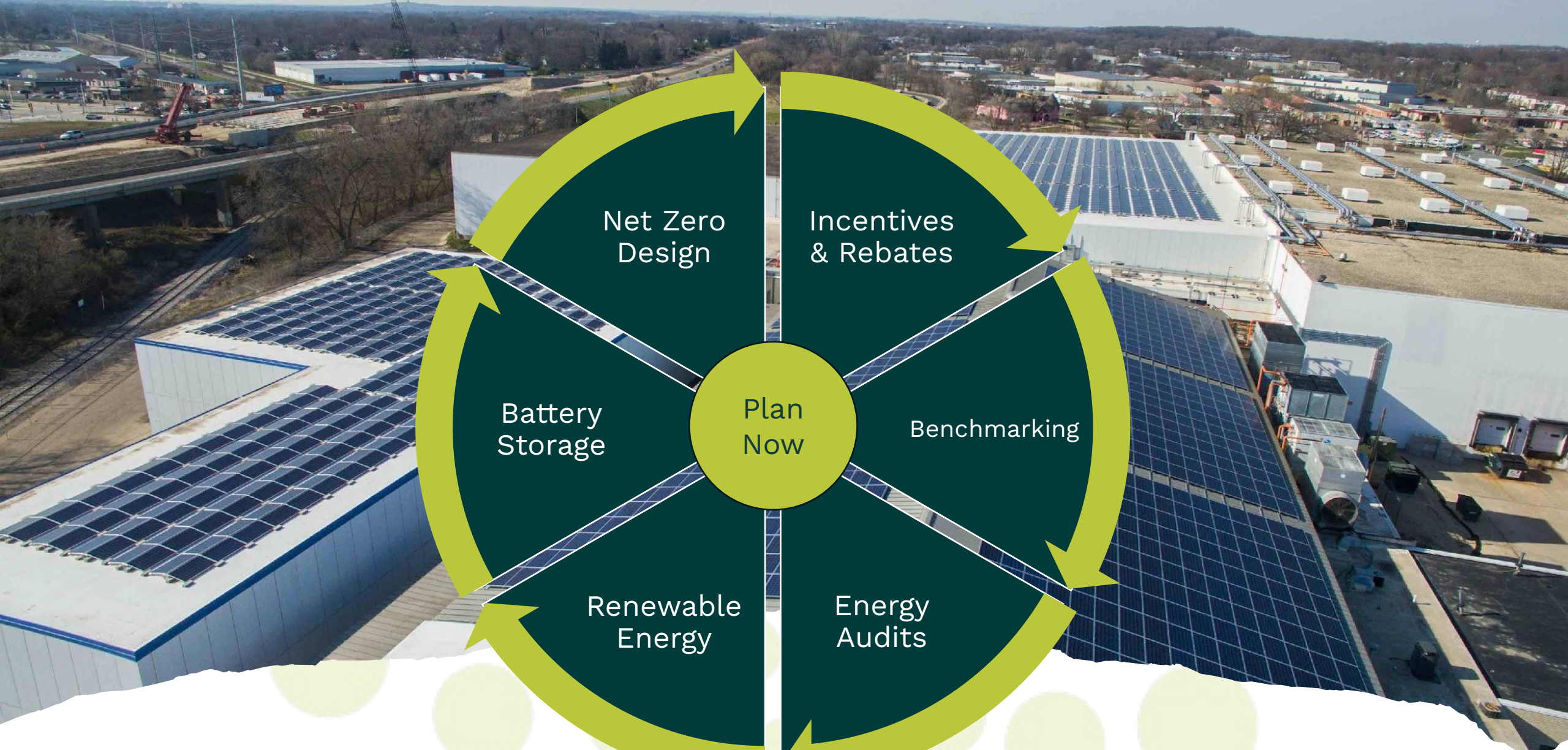
Financial Rebate and Tax Incentive
Analysis

Casey Steven Ross, PE

LEED AP, ASHRAE BEMP, CEM, GGP

- Director of Energy Services at Lorax Partnerships
- Passion for energy efficiency
- Leader in energy modeling, energy audits, and mechanical building design
- Expertise in LEED, WELL, Fitwel, EnergyStar, Living Building Challenge, Green Globes, and NGBS sustainability certification programs
- Licensed mechanical engineer in Maryland





Net Zero Design

Incentives & Rebates

Battery Storage

Plan Now

Benchmarking

Renewable Energy

Energy Audits

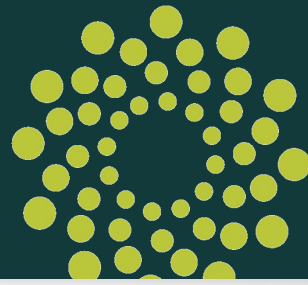
Sustainability Planning



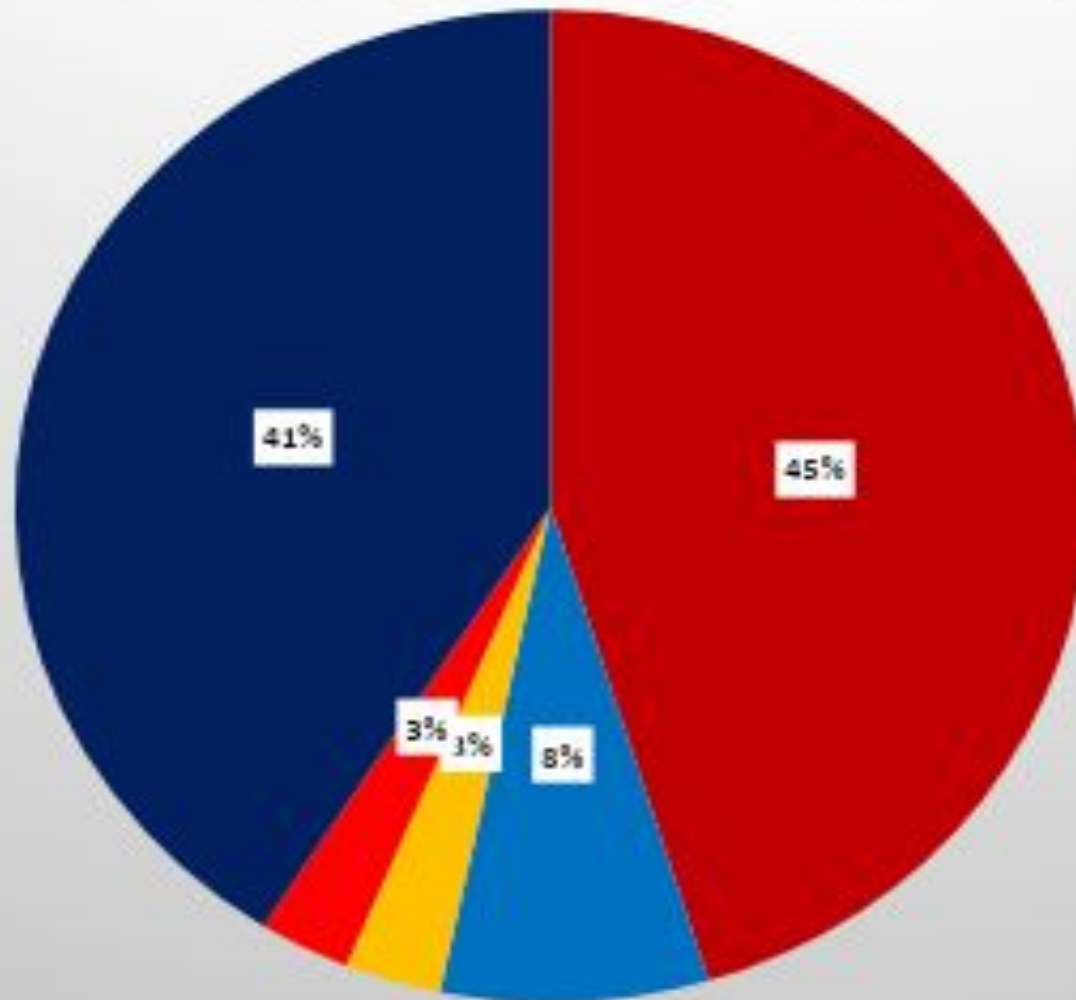
Case Study: Fulton Ave Homes

- Net Zero Affordable Housing, currently in bidding
- Energy modeling used to determine cost effective way to reduce energy
- Total energy use affected largely by air infiltration

Fulton Homes: Energy Results

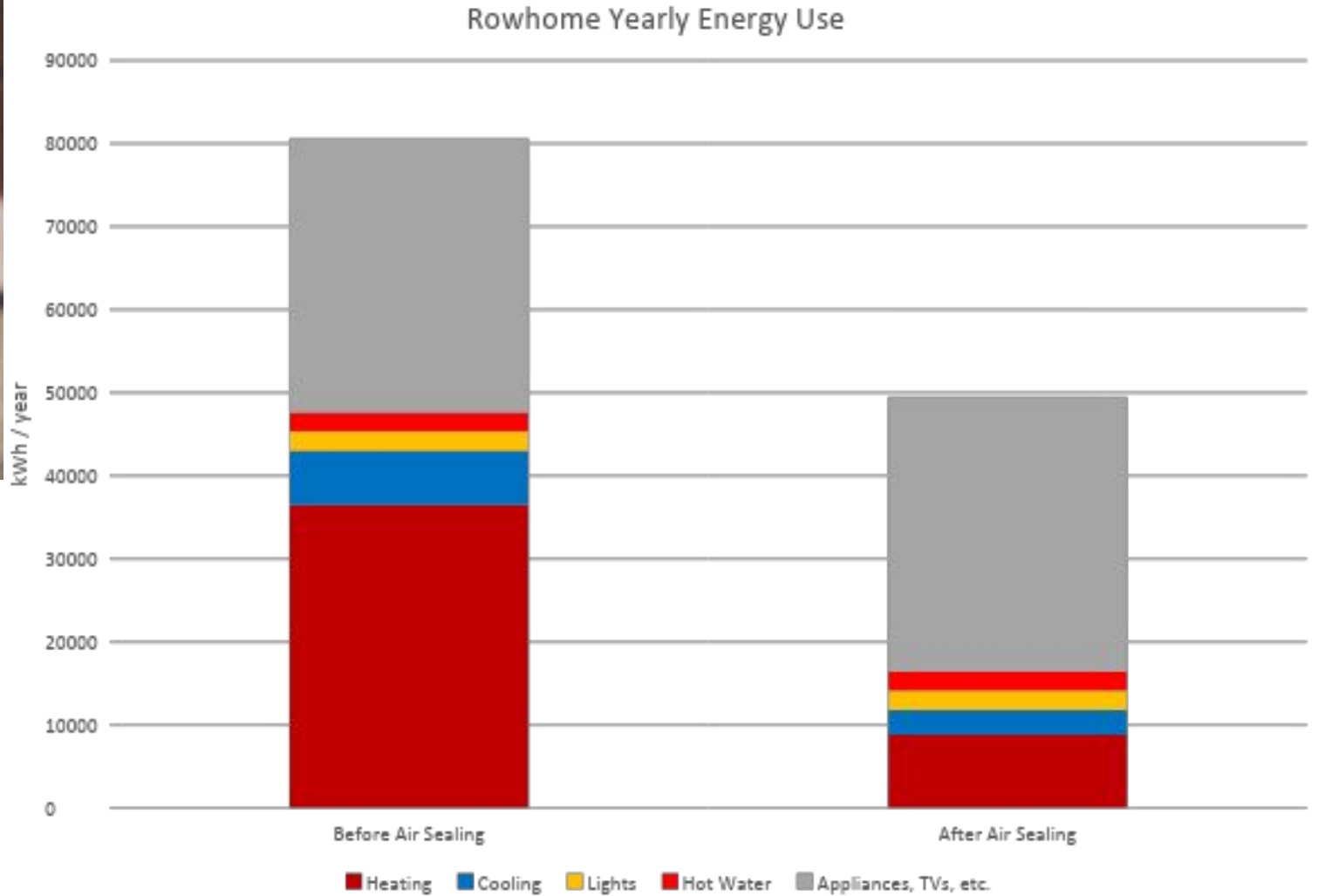
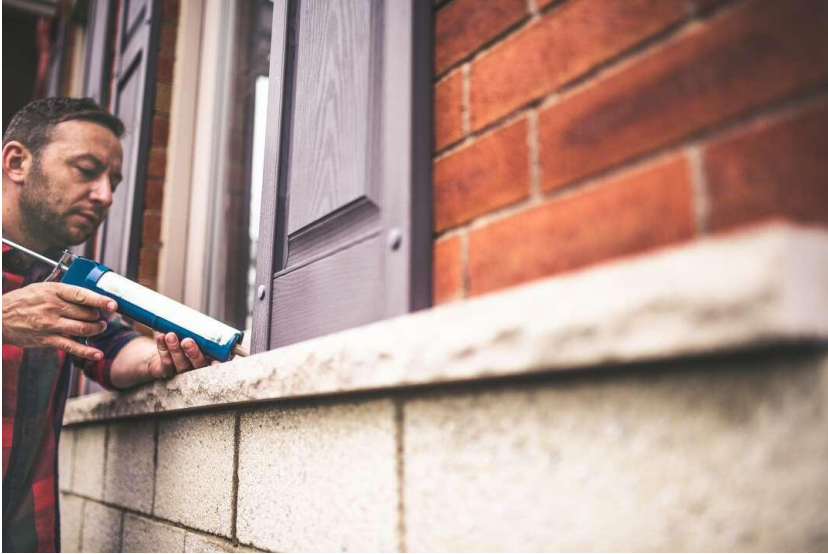


Typical Rowhome Yearly Energy Use



- Heating
- Cooling
- Lights
- Hot Water
- Appliances, TV's, etc.

Fulton Homes: Air Leakage



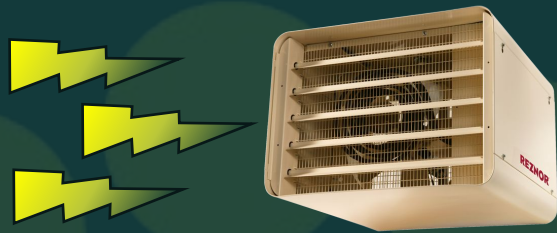
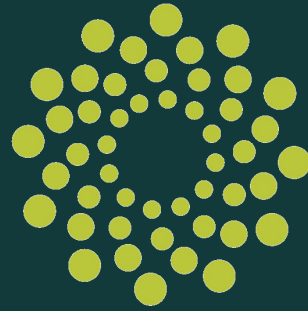
Maryland Building Energy Code

- Leader in progressive energy codes in the US (IECC-2022)
- Enforcement and implementation is lax
- A challenge to advise building owners appropriately

“What does it take to get a permit?”



Heat Pump Energy Efficiency



3 kW heat to the building

Electric Resistance Heating
Converts electricity to heat
100% efficient



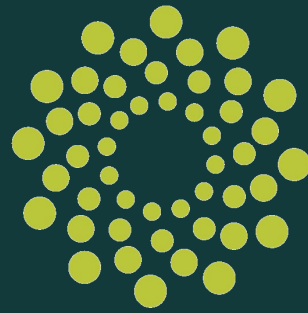
Heat Pump Heating
Uses electricity to move heat
350% efficient



21st Century Heat Pumps Are Just Better

- Hotter air/water temperatures (170°F)
- Colder operating climates
 - -10°F standard, -30°F “hyperheat” models
- Lower GHG refrigerants

Heat Pump Water Heaters Cost Less to Install



80-gallon Gas-Fired AO Smith ProLine Master

Diameter: 26.0"

Height: 60.0"



\$1500 Equipment
\$1500 Labor (approx.)
pipe fitter, flue, etc.

\$3,000 Total Install

80-gallon Heat Pump AO Smith Voltex

Diameter: 26.5"

Height: 69.0"

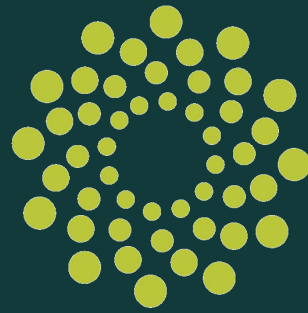


\$2700 Equipment
-\$1000 BGE Rebate
-\$510 IRA Tax Credit (30%
off after rebate)
\$1000 Labor (approx.)

\$2,190 Total Install

120V, 20A
plug-in

Heat Pump Water Heaters Cost Less to Operate



80-gallon Gas-Fired AO Smith ProLine Master

Diameter: 26.0"

Height: 60.0"



1920 therms per year

96% efficiency ->
2,000 therms

\$1.75/therm BGE Gas
Rates

\$3,500 cost per year

56,256 kWh per year

COP 3.2 -> 17,580 kWh

\$0.18/kWh BGE
Electric Rates

\$3,164 cost per year

80-gallon Heat Pump AO Smith Voltex

Diameter: 26.5"

Height: 69.0"



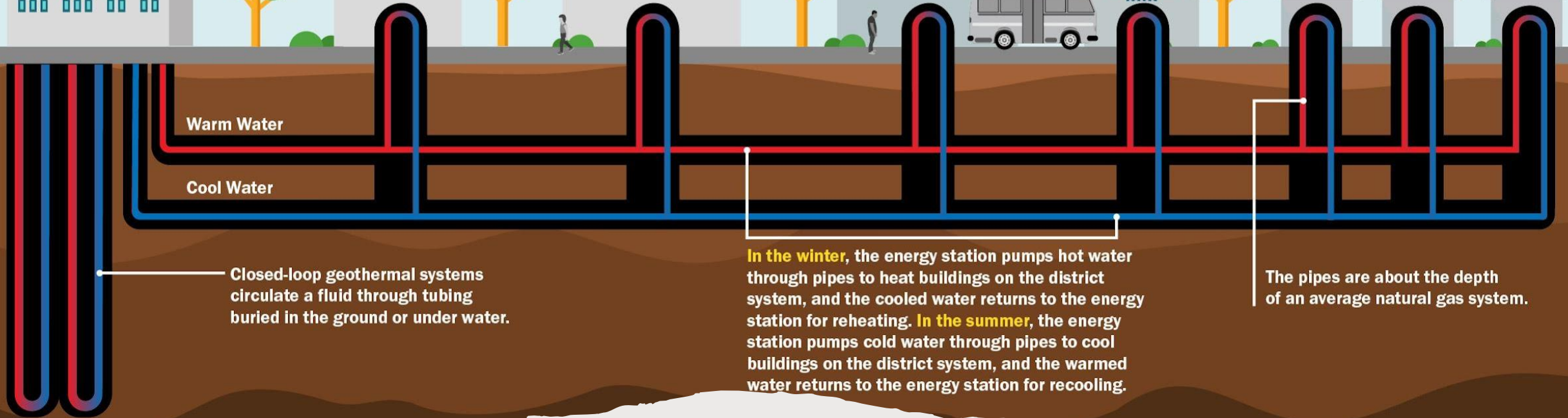
Ground-source Heat Pumps



ENERGY STATION

Inside the energy station, heat is transferred to or from closed ground loops using heat pumps or heat exchangers.

Geothermal district-scale systems can provide heating and cooling to residential, commercial, and community buildings.



Closed-loop geothermal systems circulate a fluid through tubing buried in the ground or under water.

In the winter, the energy station pumps hot water through pipes to heat buildings on the district system, and the cooled water returns to the energy station for reheating. In the summer, the energy station pumps cold water through pipes to cool buildings on the district system, and the warmed water returns to the energy station for recooling.

The pipes are about the depth of an average natural gas system.

Geothermal

Building 101

Community Geothermal Ex. Maryland WARMTH Bill of 2024

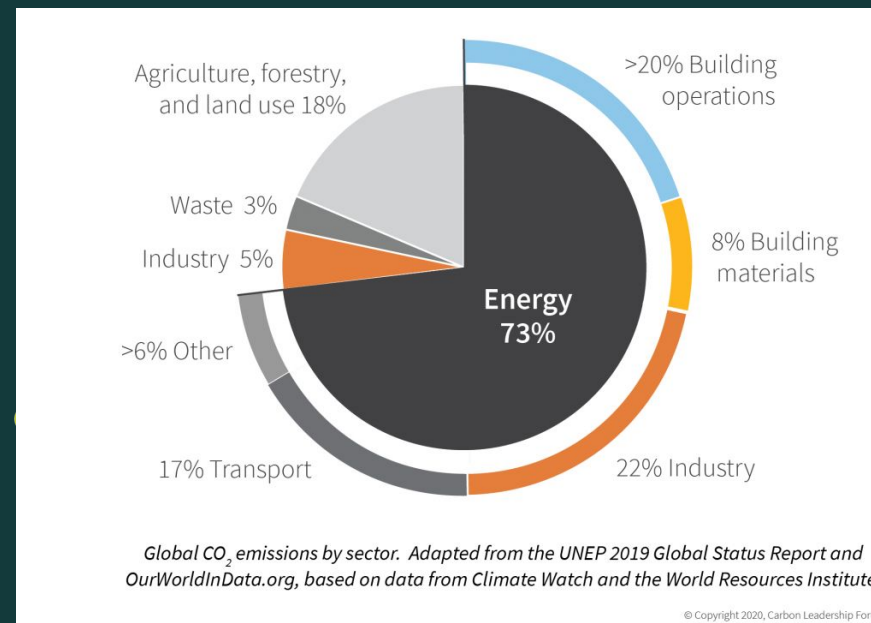
community.

Magnetic Induction Cooking

- All-electric
- Energy efficient - heats the pan, not the air
- Improves air quality



Operational vs Embodied Carbon





Embodied Carbon Trends

Federal Tax Incentive Programs

45L Tax Credit

- Residential Buildings
- Prescriptive modest improvements to insulation, glass, HVAC, and hot water
- \$2,000/unit for most
- \$5,000/unit for prevailing wage projects



179D Tax Deduction

- Commercial Buildings
- Whole-building energy model
- Deduction is transferable
- \$1.07/SF for most
- \$5.36/SF for prevailing wage projects

Maryland Utility Incentive Programs

- DHCD, BGE, PEPCO, Potomac Edison Company, SMECO, and Delmarva
- Direct check to building owner
- Prescriptive
 - Simple lighting and equipment efficiency replacements
 - *Example:* \$1,000 for heat pump water heater
- Custom
 - Energy modeling for complex designs
 - Rebate based on calculated savings



Green Building Local Tax Incentives

City of Frederick
25% LEED Silver
50% LEED Gold
75% LEED Platinum

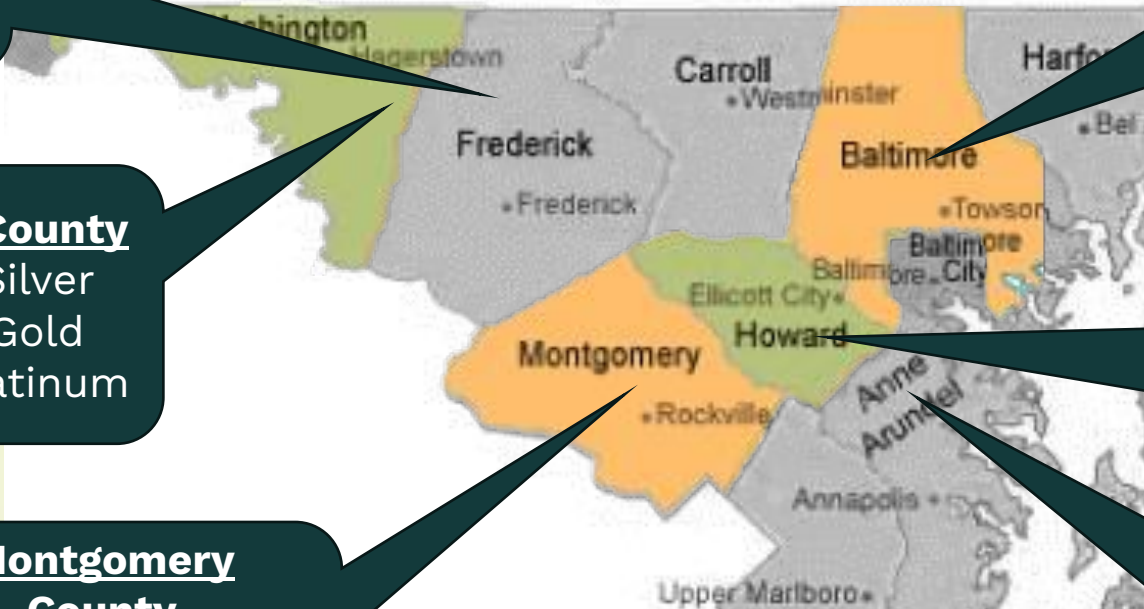
Washington County
20% LEED Silver
25% LEED Gold
30% LEED Platinum

Montgomery County
25% LEED Gold
75% LEED Platinum
+10% for energy

Baltimore County
50% LEED Silver
60% LEED Gold
80% LEED
Platinum

Howard County
25% LEED Silver
50% LEED Gold
75% LEED
Platinum

Anne Arundel County
40% LEED Silver
60% LEED Gold
80% LEED
Platinum



Green Building Jobs

- Engineers
 - Electrical
 - Mechanical
- Data Analysts
- Energy Auditors
- Building inspectors
- Green Building Certifiers
- Pipefitters
- Electricians
- HVAC Technicians
- Air Testing Agents
- Commissioning Agents

