TREEDC Middle TN Meeting
Columbia State Community College
March 9, 2012

Columbia TENNESSEE

Grants

Energy Solutions

Business Sustainability

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Geothermal for Schools

THE UNIVERSITY of TENNESSEE
MUNICIPAL TECHNICAL ADVISORY SERVICE

Tennessee Renewable Energy Economic Council

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Today's Discussion

- About ARiES Energy
- Grants
- Basics of Geothermal
- A Few Quick Facts
- Advantages & Benefits
- Conclusion

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About ARiES Energy

Alternative, Renewable, Innovative Energy Solutions

Specialties:

- Renewable Energy Design and Installation
  - Solar
  - CHyP – Biomass to Power
  - Geothermal
- Securing Funding for our Clients - millions $ in grant awards, incentives & loans
- Feasibility Studies

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Current Solar Installation

- Alstom Power Inc., Chattanooga, TN
- 56 Kilowatt

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Current CHyP Projects

- Wampler's Farm Sausage, US
  - Lenoir City, Tennessee
  - Off set base load – Power
  - Commercial Manufacturer

- Heckfield Place, UK
  - Hampshire, England
  - 2.6 MW – Combined Heat/Power
  - Luxury Country House Hotel-Resort

- Transfer Station, US
  - Raleigh, North Carolina
  - 600kW – Power & Volume Reduction
  - Construction & Demolition Debris

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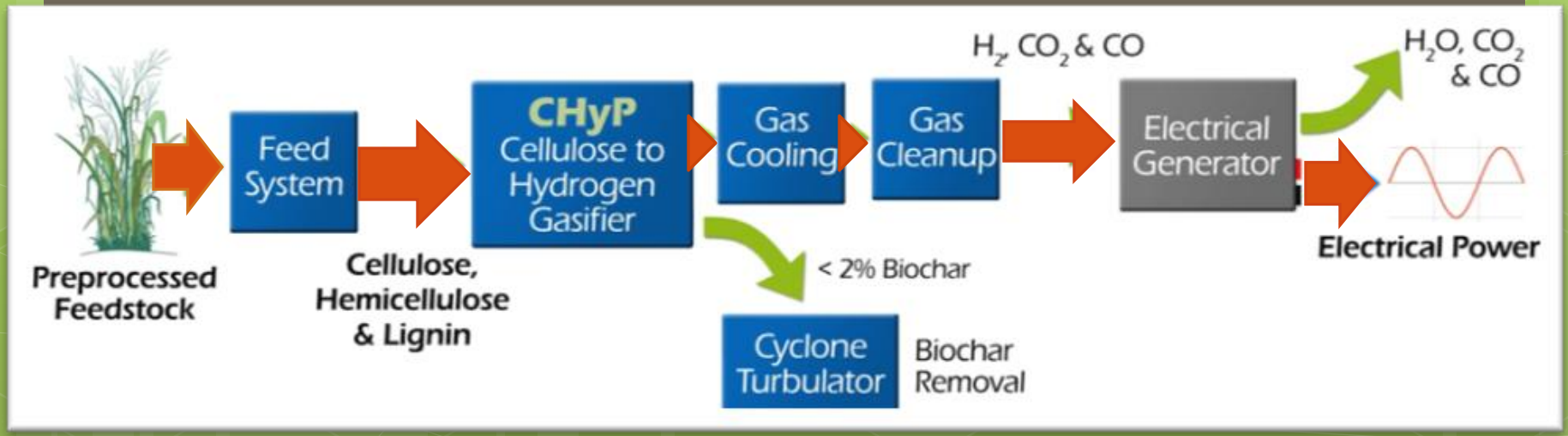
What is the CHyP System?

The CHyP System is a Cellulose to Hydrogen Power Gasification system that generates a hydrogen-rich gas stream for power & heat.

Preprocessed cellulosic biomass is fed directly into the apparatus.

Through a thermal gasification process, hydrogen syngas is produced…

…which feeds a natural gas generator to produce electricity or heat.



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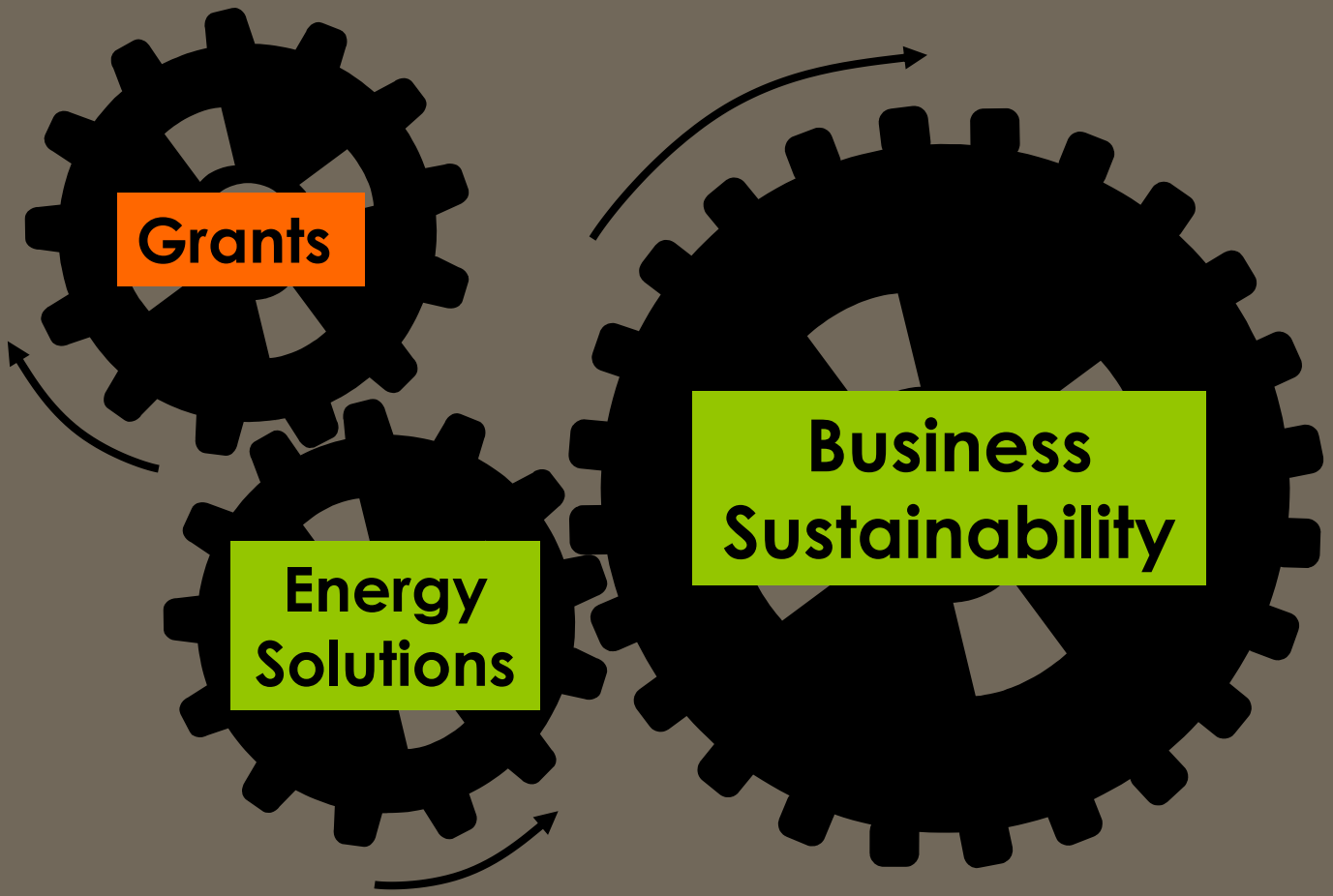
Grants



Clean TN Energy Grant

Jan. 11, 2012 TDEC announced a series of energy efficiency projects in state government and the new CTEG Program.

The purpose of the **Clean Tennessee Energy Grant Program** is to select and fund projects that best result in a **reduction of emissions and pollutants**….

"Increasing energy efficiency in state govt. will help us be even better stewards of both taxpayer dollars and our environment."

Governor Bill Haslam

Funding Source?

Funding for the projects comes from an April 2011 Clean Air Act settlement with TVA. Under the Consent Decree, Tennessee will receive $26.4 million over five years to fund clean air programs in the state – at approximately $5.25 million per year. **In the first year, $2.25 million** will go to fund air quality grants…. The remaining $3 million will fund energy efficiency projects in state government.

Project Categories

Projects categories that qualify:

- **Cleaner Alternative Energy:** biomass, geothermal, solar and wind
- **Energy Conservation:** lighting, HVAC improvements, improved fuel efficiency, insulation and idling minimization
- **Air Quality Improvement:** reducing GHG, SO2, VOC's, NOx, HAP's or PM

Grant proposals due: March 30th, 2012

Recipients announced by: May 2012

Who is Eligible?

Eligibility:

- Tennessee sites only
- Non profit organizations
- Public or private organizations
- Local and state government agencies
- Utilities
- Educational institutions (Colleges, Universities, public or private)

NOT Eligible:

- Federal agencies
- Residential Projects
- Energy Audits
- Any project that has already commenced
- Projects not consistent with the TVA Consent Decree from which this funding originated

Grant Financials

- Grants awarded on a reimbursement basis
- Minimum grant request: $5,000
- Maximum grant request: $250,000
- Grant matching is required:
  - 20-50% of the project cost needs to be provided by grant applicants.
  - Match may be satisfied by in-kind contributions including: volunteer labor, materials, equipment and others approved by TDEC.
  - Those applicants that provide a greater percentage of matching will be weighted more.

Scoring for Eligible Projects

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Scoring Criteria	Solar	Geothermal	Wind	Biomass/ CHyP	Lighting
Energy Efficiency (25 Points)	–	+	–	/	+
Air Quality (30 Points)	+	+	+	+	+
General Public Benefit (15 Points)	+	+	+	+	+
Protection of Environmental Resources (15 Points)	/	/	/	+	/
Creative/New Technology (15 Points)	/	/	/	+	/

–	No Credit
+	Credit
/	Some Credit

Grants/Incentives

- TDEC's website at www.tn.gov/environment/energygrants
- There is a 30% Federal tax credit for the installation of renewable energy systems
- Other grants and financial incentives are available depending on your organization and eligibility.

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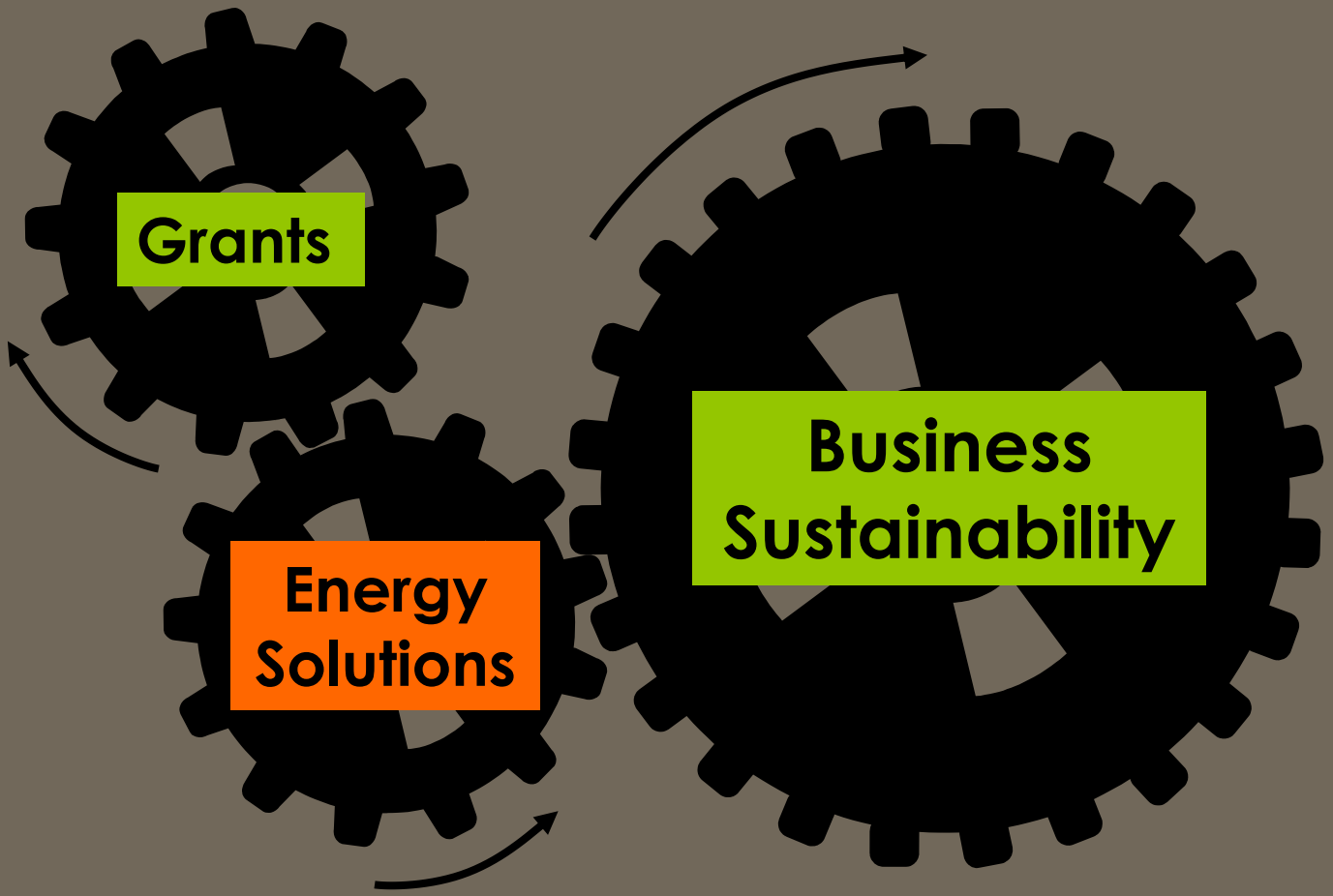
Energy Solutions: Geothermal



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Geothermal - A Few Quick Facts

Fact #1

According to the U.S. Environmental Protection Agency, geothermal systems are "the most energy efficient, environmentally clean, and cost effective space conditioning available today."

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A Few Quick Facts

Fact #2

The installation price of a Geothermal system is drastically less than most people think!

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A Few Quick Facts

Fact #3

Geothermal heating and cooling is more common than most people are aware:

- Hardin Valley Academy
- Oliver Springs Elementary
- Grainger County High School
- City of Knoxville Transit Center
- The New UT Pan-Hellenic Buildings
- Many Churches, Offices and Residences

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A Few Quick Facts

Fact #4

Geothermal systems have:

- Lower Operating Costs
- Enhanced Comfort
- Quiet Operation
- Reliability
- Environmental Friendliness

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So What is Geothermal Heating and Cooling?

Geothermal heating & cooling systems, often called a **geothermal heat pump** or **ground source heat pump** (GSHP) is a central heating and/or cooling system that uses the natural warmth of the earth

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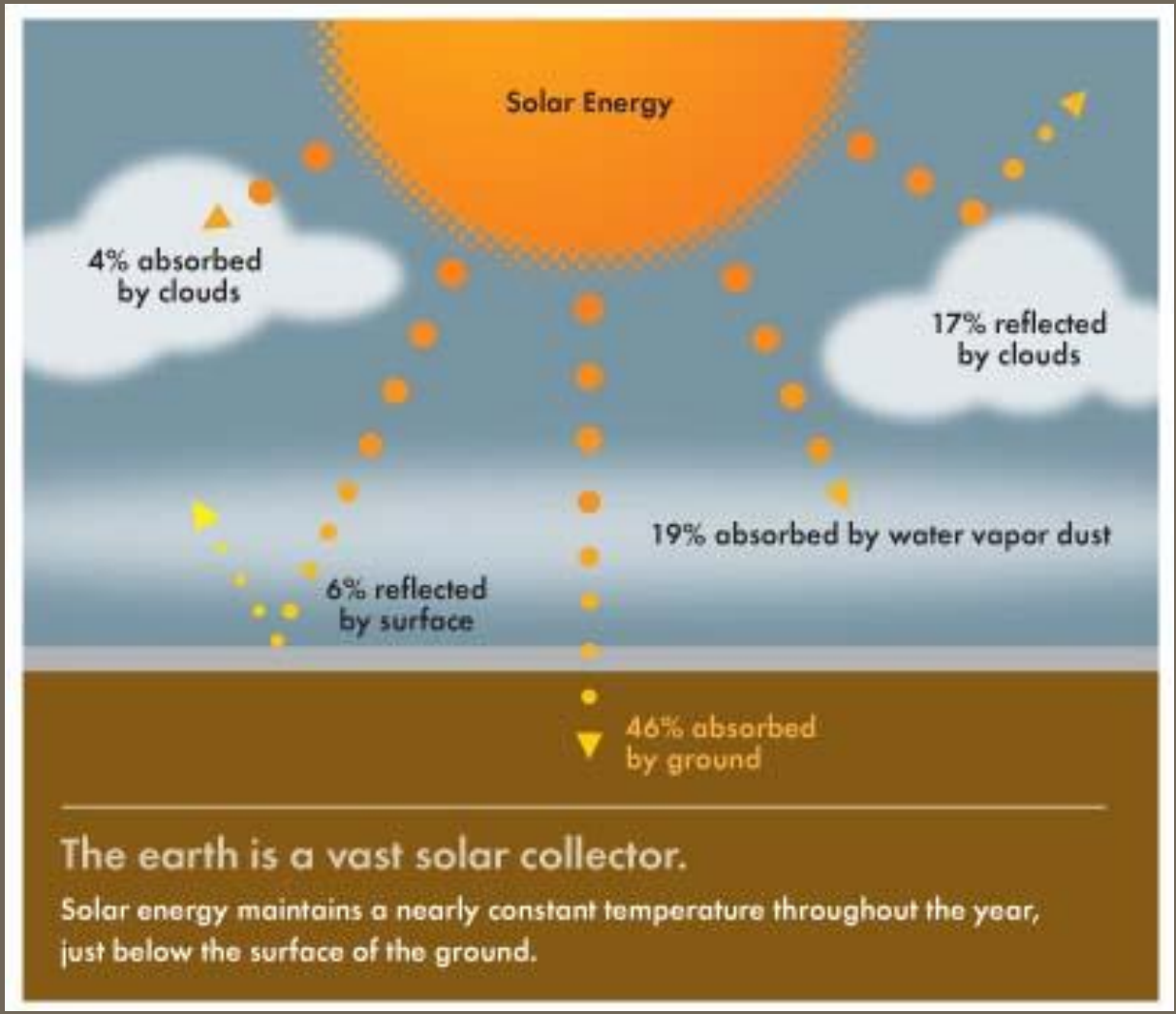
The Sun's Renewable Energy

About ½ of the sun's energy that reaches the earth is captured & stored in the ground at a constant temperature 50 – 70



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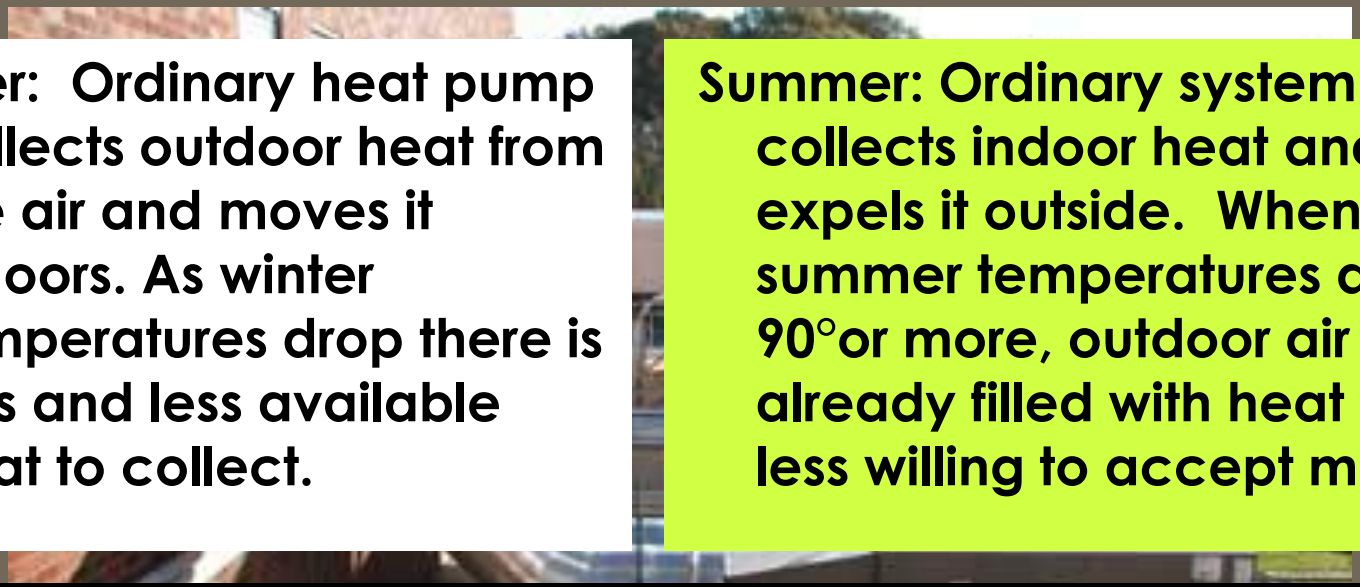
Different than Conventional Heat &Cooling Systems?



Winter: Ordinary heat pump collects outdoor heat from the air and moves it indoors. As winter temperatures drop there is less and less available heat to collect.

Summer: Ordinary system collects indoor heat and expels it outside. When summer temperatures are 90°or more, outdoor air is already filled with heat and is less willing to accept more.

These exchange processes become harder and harder on the conventional unit. Therefore, the system becomes less efficient at a time you need it to be the most efficient.

**** A geothermal system is NOT exposed to outdoor conditions ****

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2 ways to capture & use heat
Open & Closed Loop Systems

- Areas with a well or
- Near a lake or river
- Must have sufficient water available
- More common in Rural Areas
  - Water is pumped directly into the Geothermal unit and then discharged into a return well or a body of water.

- Most common - a piping system installed in the ground or in a pond depending on space available
- These systems can be placed:
  - Horizontally – Most cost effective on smaller projects with lots of space
  - Vertically – Mostly Commercial use due to lack of space

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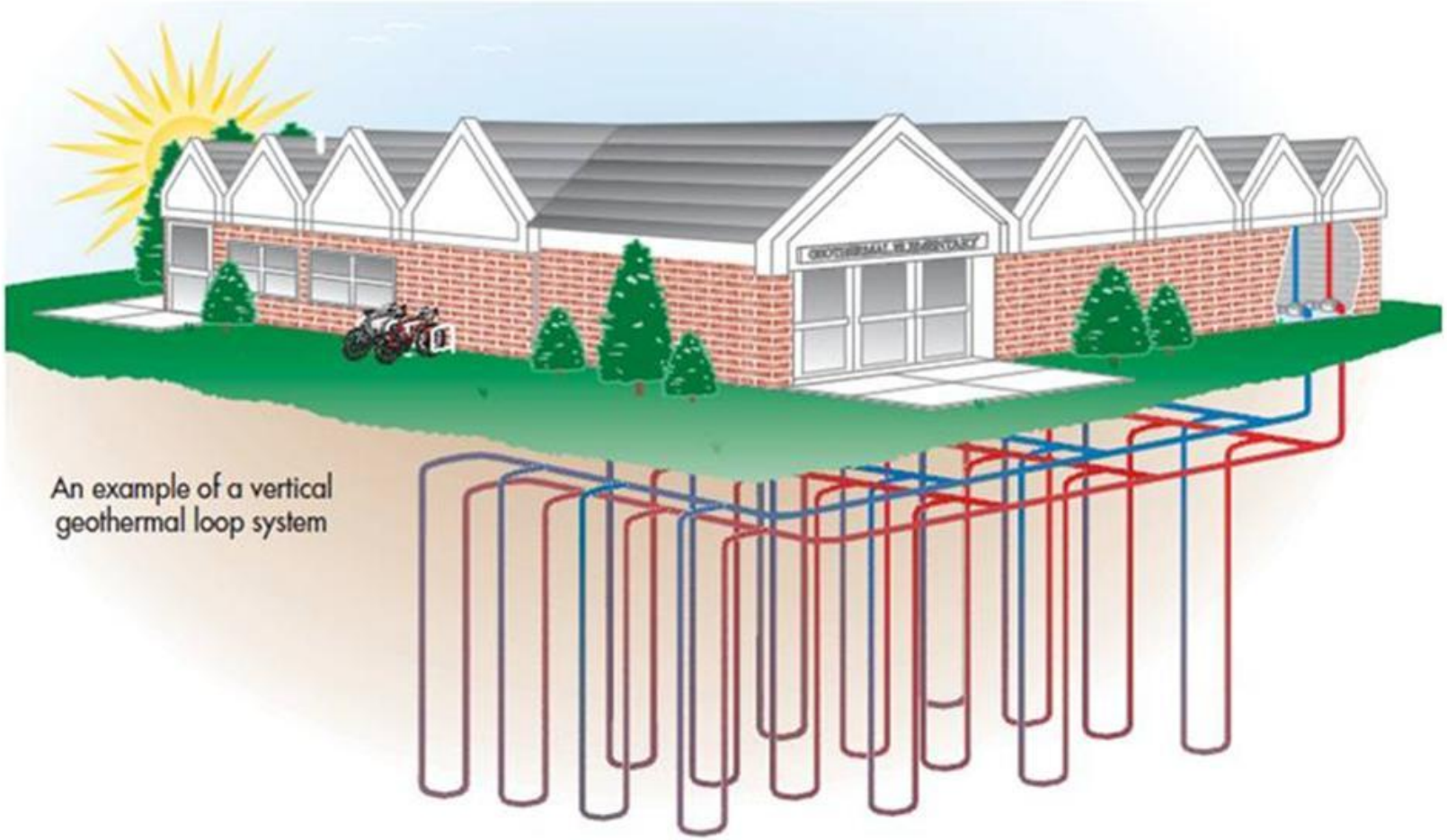
Vertical Geothermal Closed Loop System



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Geothermal Winter Heating & Summer Cooling

Winter: The earth is your heat source. Water circulating inside the underground earth loop system absorbs heat from the earth and carries it to the school where it is compressed to a higher temperature and used to heat classrooms, offices, and make hot water for kitchens, showers, or even to deice sidewalks.

Summer: The system reverses and expels heat from the building to the cooler earth via the loop system.

**** The system is so efficient it can be configured to provide hot water at nearly no additional operating cost. ****

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Advantages & Benefits

- Greater Functionality
- More Energy Efficient
- More Environmentally Friendly
- Lower Operation & Maintenance Costs

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Geothermal systems are the most environmentally friendly, cost effective and energy efficient heating and cooling technology available.

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Geothermal Technologies Program

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Greater Functionality

- Installed as a retrofit or new construction
- Flexible design requirements – ideal install for commercial buildings
- Dependable – longer life span (~30yrs)
- Quiet – no noisy outside unit
- Maintains a comfortable, even temperature
  - Teachers have complete control of class room temperature
- Higher level of consumer satisfaction

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More Energy Efficient & Environmentally Friendly

- More than twice as efficient at cooling than any regular heat pump or air conditioner
- EPA- use of geothermal lowers electricity demand by approx. 1kW per ton of capacity
- Reduces foreign oil consumption by 2.15 million barrels annually
- Emission reduction - no on-site combustion - no carbon monoxide
- USGBC Approved: 8-10 LEED points

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Lower Operations & Maintenance Costs

- The operating cost of geothermal can be up to 70% less than conventional systems.
- No cooling towers or heating elements to operate, which require additional energy
- Safe – with few moving parts
- Reduces electricity consumption in U.S. by 799 million kilowatt hours annually
- Eliminates boiler maintenance
- Significantly reduces full-time maintenance staff

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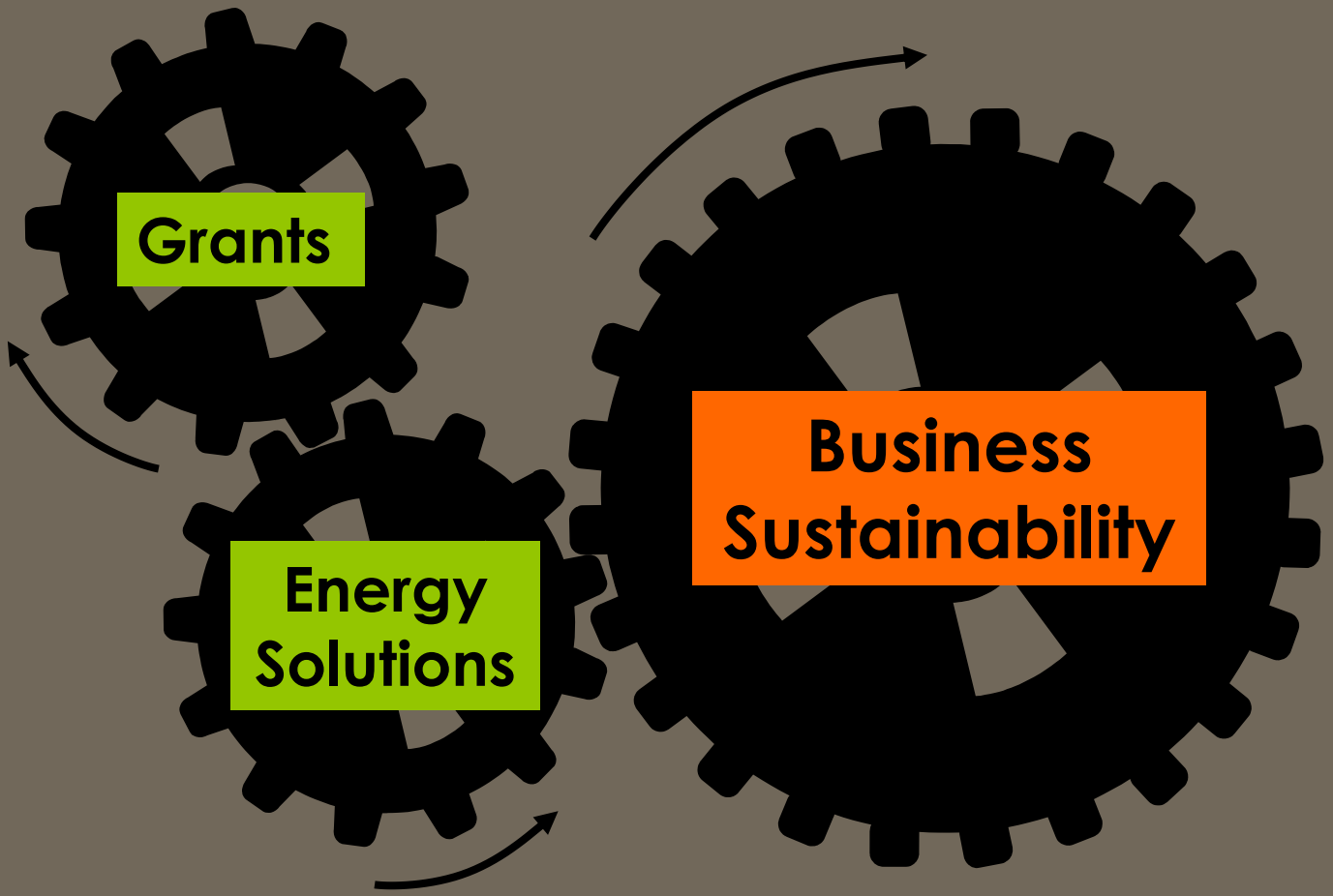
Business Sustainability



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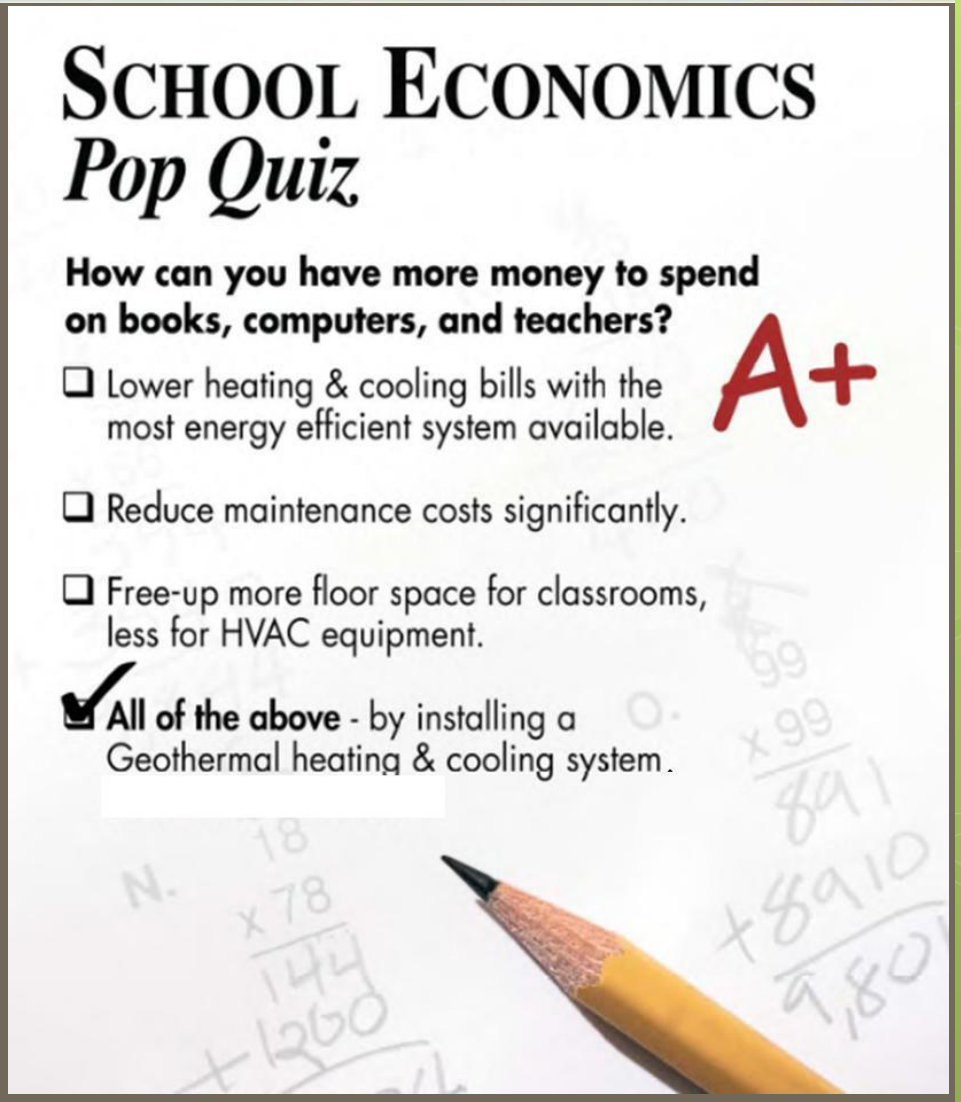
Opportunities for Schools

- Energy cost savings
- Cost-savings allow for money to be reinvested in school programs
- Reduces vulnerability to rising energy costs
- Quality of life increases



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Cost Savings

Monthly Utility Bill	Savings
$ 200.00/mo	$1,255.00/year
$ 250.00/mo	$1,569.00/year
$300.00/mo	$1,791.00/year

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Conclusion

- The Positive Impact of Geothermal is Proven
- Wasted energy is wasted money
- Schools reducing energy consumption allows them to reinvest in the school and the community

Together we <u>need</u> to and we <u>can</u> do more to promote and implement renewable energy solutions and incentives.

A "Greener" Tennessee starts TODAY!

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Thank you!

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