Team 4
Cleanly Cooling Calvin

Jordan Wanner
Dan VandenAkker
Christina Overbeck
Outline

• Project Description
• Confirmation of Feasibility
• Valuable Resources
• Engineering Analysis
• Design Norms
• Obstacles overcome
• Primary Accomplishments
• Questions
Project: Phase I

- Spec a Geothermal HVAC system to install in Calvin’s new dorm wing as a pilot project for the college.
Project: Phase II

- Calculations to compare the current boiler/chiller and Geothermal systems
  - Cost comparison
    - Upfront costs
    - Operational costs
  - Efficiencies
  - Energy consumption and resulting CO$_2$ emissions
Project: Phase III

- Install instrumentation to compare the current boiler/chiller and Geothermal systems
  - Temperatures around the system
  - Fluid flow rates
  - Energy consumption
  - Occupancy
Project: Phase IV

- Make an educational component to allow the Calvin community to learn about these two HVAC systems
  - Explanation of how each system operates
  - Calculations displayed
  - Live data from instrumentation
Confirmation of Feasibility

- GMB calls Geothermal the HVAC system of the future for West Michigan
- The administration is committed to investigating Geothermal for future construction by starting with our pilot project
Valuable Resources

- GMB, Calvin’s architectural firm and the nations leading geothermal designers, has offered to donate their design expertise.
- The dorm budget (including $40,000 for our project) has been approved by President Byker.
- RETscreen
Engineering Analysis

- Basic cost estimates with break-even points between systems
  - Learned necessity of payback analysis with upfront costs
- Basic well boring quantities and depths
  - Learned how to size a well field
- Selection of suite heat pumps
  - Learned how Architectural considerations influence decisions
Design Norms

- **Transparency**
  - System is easy repair
  - Educational aspect is easy to understand

- **Stewardship**
  - Financial
  - Environmental

- **Integrity**
Obstacles overcome

- Administration resistance to a geothermal system
  - Compromised to a pilot project
- Funding
  - $40,000 from the construction budget devoted to this project
Primary accomplishments

- Collaboration with Administration, Architects, and Engineers
- Elementary price and design specification estimates
- Design of instrumentation package and layout for educational component
- Design of education kiosk software architecture
Questions