



North Village Ground Source Heat Pumps

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Ground Source Heat Pumps Demonstration
Projects

- Installation of Ground Source Heat Pumps
 - 11 Apartment Buildings
 - 1,020 Students
 - 255 Apartments
- Replacement of Aging Heat Pumps
 - R-22 Refrigerant Phase Out
- Alignment with Furman's Sustainability Goals
 - Reduction in Energy Consumed
 - Carbon Neutrality Goal – 2026
 - Educational Awareness Opportunity



- Preliminary Feasibility Study/Grant Submission – July 2009
- Contingent Grant Approval – January 2010
- Final Feasibility Study/Design – January 2010 to June 2010
- Go/No Go/Redirect – June 2010
- Phased Installation Schedule
 - 2010 NV Buildings I and K
 - 2011 NV Buildings A, B, and C
 - 2012 NV Buildings D, E, and F
 - 2013 NV Buildings G, H, and J



Item	Furman Cost	DOE Cost	Total Cost
System Design	\$ 59,335	\$ 59,335	\$ 118,669
Installation:			
Well Fields	\$ 567,374	\$ 567,374	\$1,134,748
Electrical	\$ 90,321	\$ 90,321	\$ 180,641
Insulation	\$ 80,391	\$ 80,391	\$ 160,781
Controls	\$ 59,499	\$ 59,499	\$ 118,998
Equipment/Supplies	\$ 520,943	\$ 520,943	\$1,041,885
Mechanical	\$ 515,921	\$ 515,921	\$1,031,841
Project Management/Overhead	\$ 401,710	\$ 401,710	\$ 803,419
Subtotal	\$ 2,295,491	\$ 2,295,491	\$4,590,982
Commissioning	\$ 41,250	\$ 41,250	\$ 82,500
Energy Metering	\$ 93,500	\$ 93,500	\$ 187,000
Energy Dashboard	\$ 27,500	\$ 27,500	\$ 55,000
Total	\$ 2,457,741	\$ 2,457,741	\$4,915,482

- Less than ideal soil conductivity
- Coordinating Implementation Schedule with Planned Renovations
- Potential Noise Concerns with Drilling Process
- Variations in Modeling Software
- Learning the DOE Grant Process

- Design/Build Contractor – Jennings Dill Mechanical
 - Wade Crowe Engineering
 - Regional Well Drilling Company – TBD
 - Trane Company – Water Source Heat Pump Supplier
- 3rd Party Commissioning Agent – Haley and Aldrich
- Energy Metering – Johnson Controls
- Energy Dashboard - TBD

- Suitability of Ground Source Heat Pumps in Retrofit Application
- Economic Viability of Ground Source Heat Pumps
- Behavioral Impact from Enhanced Metering and Display



- Defining core objectives and goals
- Assembling project team
- Utilizing 3rd party for commissioning/design reviews
- Optimizing system design

Accomplishments, Expected Outcomes and Progress

- Completed load analysis using actual energy use data
- Sized equipment and completed piping layout
- Bid major equipment purchases
- Determined soil conductivity design values
- Completed well field layouts
- Completed 3rd party design review
- Developed implementation schedule
- Base Design is Complete
- Energy Analysis Complete
- Permitting Process Underway

- Project Management Team
- Design Review Meetings
- Project Coordination Meetings

- Optimizing the system design
 - Balancing the heating and cooling loads
 - Incorporating the use of Dry Coolers
 - Use of water to water heat pumps for heating domestic hot water
 - Combining multiple building well fields
 - Location of manifolds
- Finalizing the energy metering and display system

- Base Design is complete
- Work continues on optimizing the design
 - Reduce # of wells required
 - Increase energy savings
- Project Management Team Assembled
- Almost Ready for Implementation