



Geothermal Heat Pump System for the New 500-bed 200,000 SF Student Housing Project at the University at Albany's Main Campus

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Organization: University at Albany

Track: GSHP Demonstration Projects

– Timeline

- Project start date: Jan 29, 2010
- Project end date: Sep 30, 2014
- Percent complete: <5%

– Budget

- Total project funding: \$5,572,500
(will be revised based on cost estimated currently being developed)
- DOE share: \$2,786,250 (50%)
- Awardee share: \$2,786,250 (50%)
- Funding received in FY09: \$0
- Funding for FY10: \$1,842,000 (50% of FY10 cost)
- Anticipated costs for FY10: \$3,684,000
 - Feasibility Analysis \$ 175,000
 - Design and Engineering \$ 382,500
 - Construction \$ 3,100,000
 - Commissioning \$ 24,750
 - Project Management \$ 1,750

– Barriers

- Technical Feasibility
 - Well field capacity and properties
- Financial Feasibility
 - Initial capital investment (project funded through debt service backed by student room rent revenue)
 - Life Cycle Costs, including utility and O&M costs
 - Part of student housing new construction project- affected by overall project cost and competing project components

– Partners

- Dormitory Authority of the State of New York (DASNY)
- Project A&E Team: PS&S Architects and their consultants
- Geotechnical Engineers: Pathfinders LLC
- General and MEP Contractor: To be selected via bidding process
- Commissioning Agent: Genesys Engineering
- NYS Energy Research & Development Authority (NYSERDA)

Project Objectives

- Technical and financial feasibility analyses
- Closed loop vertical bore geothermal heat pump system installation
- Heat and cool the planned 500-bed apartment-style student housing
 - Total Conditioned Area 184,533 SF
 - Peak Cooling Load 315 tons
 - Peak Heating Load 4,263 MBH
- Life Cycle Costs to analyze innovative options
- Continuous data collection and annual re-commissioning

Project Objectives

- Case study for future geothermal installations/projects
- Strong educational opportunity
 - Part of 64-campus SUNY system
 - Member Association for the Advancement of Sustainability in Higher Education (AASHE)
 - Partnership with NYSERDA
 - DOE reporting and case study
 - Educate student occupant- future generation
- Need for specialized design and construction skill set in the local market
- Specialized training to in-house facilities staff

- Technical feasibility analysis
 - Formation thermal properties/test well reports
 - Thermal conductivity 1.18 Btu/hr-Ft-° F
 - Thermal diffusivity 0.85 ft²/day
 - Undisturbed temperature 52.5-54 ° F
 - Capacity requirements – 315 tons cooling, 4,263 MBH heating
 - Well field layout – (180) 400' deep vertical bores
- Financial feasibility analysis
 - Base case: Water source heat pump system
 - Capital investment
 - Life Cycle Costs analysis

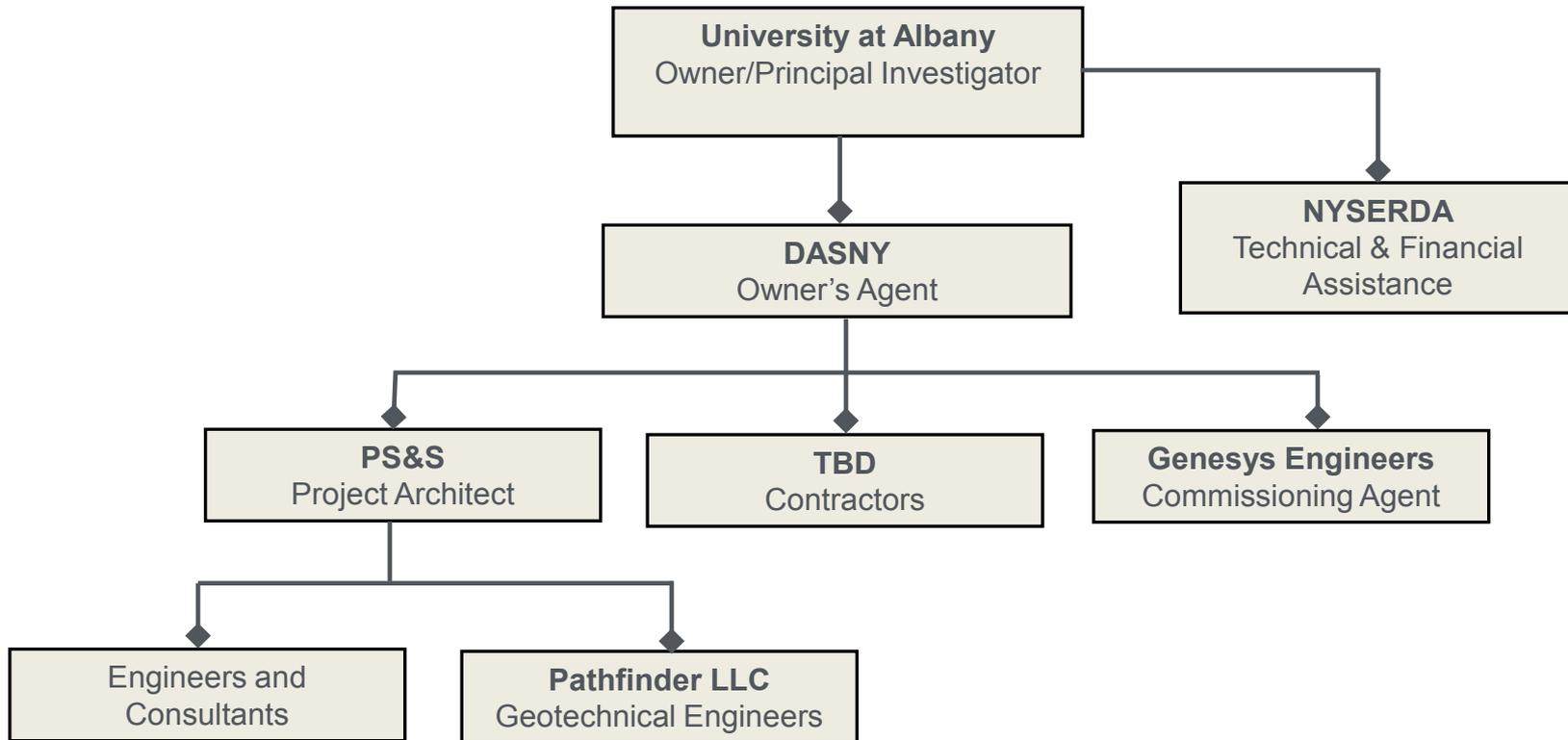
- Reduce HVAC loads first, right-sized equipment:
 - 586 SF/ton cooling (compared to 350-450 SF/ton)
 - 23,000 Btu/SF heating (compared to 40,000 Btu/SF)
- Decouple latent and sensible loads and reduce latent loads:
 - Dedicated ventilation air unit with energy recovery
 - Demand controlled ventilation to vary outside air
- Hybrid system:
 - Size for cooling load.
 - Supplemental boiler to meet peak heating load
- Centralized GSHP units (20-30 tons/unit) to serve AHU instead of terminal units
- Integration with solar thermal system to meet DHW loads
- Potential use of Indian pond for heat rejection

Planned milestones and go/no-go decisions for FY10 and current status

- Technical feasibility – Project a GO
- Financial feasibility- Ongoing. Expected decision: Jun 2010
- Design and Engineering:
 - 60% DD completed. Redraw 100% DD to include GSHP
 - CD complete: Oct 2010
- Construction:
 - Start site work: Aug 2010
 - Start building construction: Nov 2010
 - Geothermal wells drilling: Mar/Apr 2011
 - Construction complete: Jul 2012

- 60% DD complete
- Well field concept study including schematic well field layout complete
- Test wells report done
- Project technically feasible
- Financial feasibility analysis underway
 - eQUEST 3.63 model
 - Detailed cost estimates
- Annual energy usage and utility cost savings
- Campus carbon footprint reduction—avoided offset costs
- ~\$1.1 Million worth of jobs creation/retention in design and construction industry

Project Organization Chart



Project Schedule

- Technical Feasibility : Complete
- Financial Feasibility Analysis: Jun 2010
- 100% Construction Documents: Oct 2010
- Site Work: Aug 2010- Nov 2010
- Building Construction: Nov 2010 – Jul 2012
- Project Close-out: Sep 2012
- Commissioning: During design, construction and close-out phase
- Re-commissioning: Annual, min. 3 years post-construction
- Data Collection & Reporting: min. 3 years post-construction

FY2010 Spend Plan

	Projected Costs	% Complete
Anticipated costs for FY10:	\$3,684,000	65%
– Feasibility Analyses	\$ 175,000	100%
– Design and Engineering	\$ 382,500	100%
– Construction	\$ 3,100,000	65%
– Commissioning	\$ 24,750	25%
– Project Management	\$ 1,750	20%

- Finalize decision regarding project feasibility
- Analyze various technical options and finalize system design
- Complete design & engineering and start construction
- Complete design phase commissioning and continue construction phase commissioning
- Estimate project savings-utility and O&M
- Share information with DOE, NYSERDA and campus community

- Install a large GSHP system on University campus after completion of technical and financial feasibility analyses
- Consider Life Cycle Costs – Initial incremental investment, utility costs, O&M costs, carbon offsets
- Part of the planned new student housing project
- Right project team in place
- Analyze options during design to optimize performance and reduce costs
- Include enhanced commissioning and annual re-commissioning
- Continuous data collection, monitoring and analysis to troubleshoot and optimize
- Educate and disseminate information