

Residential Heat Pump and Air Conditioner Research, Demonstration and Deployment; Improving Pacific Northwest Utility and State HVAC Programs.

The project is focused on discovering the simplest means to diagnose and optimize the new generation of high performance heat pumps and air conditioners and to integrate these diagnostic and optimization tools into the energy efficiency programs operated by the SEOs and utilities of the Pacific Northwest.

Total project cost: \$1,420,000

Funding request: \$630,000

Project Lead: Idaho Department of Water Resources, Energy Division

Project Participants: Northwest Power and Conservation Council, Bonneville Power Administration, Energy Trust of Oregon, Oregon Department of Energy, Washington State University Extension Service, Ecotope Inc., Stellar Processes, NEEA, NW Power and Conservation Council, Plus representative utilities

Start Date: March 23, 2006

End Date: March 23, 2008

Presentations/Publications

No publications based on or about the project were created or published during the quarter. The project was presented at an informal session on Thursday, August 17, 2006 at the ACEEE Summer Study on Energy Efficiency in Buildings. Attendance was small, but included the program partners and several people interested in heat pumps from around the nation.

The Oregon Department of Energy presented information about the project research agenda to Oregon solar energy system installers at Solar Expo Northwest. The role of high performance HVAC systems in net energy homes was explained.

Patents

None.

Progress in Past Quarter and Current Status

During the time period beginning July 1, 2006 and ending September 30, 2006, the Energy Division accomplished the following.

Task 1. Develop and Implement Technical Advisory Group

The working group met at the ACEEE Summer Study on Energy Efficiency in Buildings on Thursday, August 17, 2006 after the informal presentation given that afternoon. We discussed project timelines, status of lab and field tests, preliminary findings from the two sites instrumented at that time, and interface with the ASHRAE Technical Committee 6.3 on Small Forced Air Heating and Cooling Systems. Mike Lubliner, Working Group member from WSU Energy, is chairman of TC 6.3's Research Subcommittee.

In addition to the formal Working Group meeting, Ken Eklund, Project Manager, met with various members of the Technical Advisory Group throughout the Summer Study, which proved a very fruitful venue.

Task 2. Conduct Lab Testing of HP Systems

Ecotope executed a contract with Purdue for lab testing of three systems on August 15, 2006. Larry Palmiter of Ecotope has been in discussion with Dr. James Braun to negotiate the contract. Dr. Braun is

the member of Purdue's engineering faculty most involved with HVAC design and analysis. After contract signing, Palmiter began working with Dr. Eckhard Groll who is in charge of the lab and testing regarding the actual lab set up. During the last week of September, 2006, Palmiter visited the Purdue lab for detailed discussions with Dr. Groll and his staff on testing set up and procedures.

Task 3. Develop and utilize enhanced modeling tools

Progress was made by Larry Palmiter and Erin Kruse in three areas during the quarter:

- 1) Integration of latent load into the overall system model;
- 2) Developing an enhanced method of adding different heat pumps and components to the model;
- 3) Developing enhancements in building entry procedures. This work is being done in conjunction with the Northwest Power and Conservation Council and the Regional Technical Forum.

Task 4. Develop and Test Field Commissioning Protocol Tool

Draft one of the field commissioning protocol tool was completed. It will be revised in light of the field monitoring and then tested.

Task 5. Perform Long Term Monitoring and use it to Verify/Beta Test Short Term Monitoring (STM)

Four houses were recruited and instrumented during the quarter.

- 1) A house in Ashton, Idaho was instrumented on August 30 & 31, but the system was found to be so poorly installed, that the field crew had to return on October 17 to reinstall the monitoring gear after the heat pump was reinstalled.
- 2) A house in Moses Lake, Washington was instrumented on September 5 & 6.
- 3) Instrumentation of a house in St. Helens, Oregon was accomplished on September 11 & 12.
- 4) A house in Shelton, Washington was instrumented on September 28 & 29.

Data is being transmitted from the six houses via the internet, archived and summarized and posted in review format on the web. The website will be given to NASEO in next quarter's report.

NOTE: The owner of the first house instrumented in Bend, Oregon died yesterday, due to severe injuries from an automobile accident on Friday, October 20. Gary Bunger was the co-owner of Mountain View Heating and very enthusiastic about the STAC project. The data link to the site stopped transmitting recently, Mr. Bunger was working on it, and it is unclear if there will be an opportunity to solve the problem in the near future. There are also other issues, which will be difficult to solve without him. If we do lose this site, we do not have the resources to replace it.

Task 6. Develop HVAC Technician Training, Recruit Contractors, Train and Provide Technical Assistance, and Monitor Results

No work was done on this task.

Task 7. Conduct Data on Cost of HVAC equipment and commissioning

No work was done on this task.

Task 8. Develop Final Report

No work was done on this task.

Task 9. Manage Project

The subcontract with WSU Extension Energy Program was executed on July 27, 2006, and the subcontract with Oregon Department of Energy was executed on September 19, 2006.

Plans for Next Quarter:

During the next quarter, work on Tasks 1, 2, 3, 4 and 5 will continue. A major project meeting is planned for December 2006 in Seattle. The meeting will review data gathered to date, modeling progress, commissioning protocol development, and to discuss cost data collection. The meeting is being planned for Seattle, in order to facilitate the participation of Larry Palmiter.