

(4) Closing the Gap: Getting Full Performance from Residential Central Air Conditioners

This two-year project includes the development of next-generation central air-conditioning performance ratings, development and demonstration of a central air conditioner for hot/humid climates, and HVAC contractor training.

Total project cost: \$1,534,716

Funding request: \$683,179

Project Lead: New York State Energy Research and Development Authority

Project Participants: Florida Solar Energy Center; Advanced Energy; Energy Center of Wisconsin, American Council for an Energy-Efficient Economy; CDH Energy; Wisconsin Energy Conservation Corporation, Lawrence Berkeley National Laboratory

Patents

None

Publications/Presentations

“Measured Impacts of Proper Air Conditioning Sizing in Four Florida Case Study Homes”, FSEC-CR-1641-06, Final Report, October 25, 2006. This was the UCF/FSEC deliverable for Task 3.2.

Progress in Past Quarter and Current Status

Task 1 Improve central air conditioner performance ratings

Task 1.1 Review present standards and method of testing

Task 1.2 Field performance data review

Task 1.3 Develop population weighted temperature bin-hour distributions

Task 1.4 Preliminary proposed rating procedures

Task 1.5 Simulate benefits of alternative metrics for diverse climates

Task 1.6 Analysis and recommendations

Task 1 is being primarily completed by other project partners. No activity by UCF/FSEC during this reporting period.

Task 2 Robust Feature Set for Residential Air Conditioners

Task 2.1 Develop trial specification sets

Task 2.2 Draft specification

Task 2 is being primarily completed by other project partners. No activity by UCF/FSEC during this reporting period.

Task 3 Field Performance Data and Innovation

Task 3.2 Benefits of proper sizing

The goal of Task 3.2 was to show the benefits of proper air conditioner sizing to contractors, customers and utilities. Field tests were conducted in 4 Florida case study homes by UCF/FSEC, with additional tests conducted at several homes in Wisconsin by ECW.

On October 25, 2006 UCF/FSEC completed the white paper/report deliverable summarizing the results for the Florida case study homes (see **4. Publications/Presentations** above). This final version of the paper/report included revisions based on feedback received last quarter from both the linked project partners and project advisory committee members.

With the completion of the white paper/report, UCF/FSEC's portion of Task 3.2 is now fully completed.

Task 4 Develop New Climate-Sensitive Air Conditioner Designs

Task 4.1 System Configuration: identification, simulation and cost-benefit analysis

Task 4.2 Prototype System: design, construction, laboratory and field testing

Work on Task 4.1 continued during this reporting period. CDH Energy (NYSERDA subcontractor) and UCF/FSEC continued analyzing existing HVAC systems and ventilation strategies along with new configurations for the climate sensitive air conditioner using computer simulation. The DRAFT white paper/report for this task was completed on October 24, 2006. The DRAFT was subsequently circulated to the linked project partners as well as the project advisory committee. The deadline for comments was November 29, 2006, and comments were only received from two reviewers. The comments received were fairly minor, and our intent is to resolve the comments and issue a final version of the white paper/report in January 2007.

Work on Task 4.2, which had been on-going at a modest level of effort, was accelerated in November 2006 following the completion of the draft white paper/final report for Task 4.1. UCF/FSEC and CDH Energy reviewed various prototype designs and selected a method for incorporating additional dehumidification with a conventional air-conditioning system. A variable speed air handler and additional components were identified and procured. In addition, several custom heat exchangers were ordered with expected delivery in early-January 2007.

Task 5 Information Dissemination and HVAC Contractor Training

The *Class 1 Energy Gauge Rater Training* workshop that trains and certifies Energy Raters to do house and duct airtightness testing in the state of Florida was held in Cocoa, Florida in December. Nine attendees went through the extensive three-day course.

FSEC's *Residential HVAC as if Comfort and Energy Mattered* course was held in Sarasota and Orlando in October. Eleven students attended in Sarasota and sixteen in Orlando.

UCF/FSEC's portion of the training aspect of this task is now completed. As results of other UCF/FSEC tasks are completed (e.g., Task 4), their results will be disseminated.

Plans for Next Quarter:

- Task 4: Work with CDH Energy to address review comments received on the DRAFT white paper/report summarizing the computer simulation results, and issue a final version of the paper/report (Task 4.1). Regarding Task 4.2 (prototype system), complete construction of the prototype unit (approx. January 30, 2007). Complete laboratory testing and evaluation of the prototype unit, implement unit modifications as necessary (February 1 – March 30, 2007). Identify a site for field testing the prototype unit (March 15, 2007).
- Task 5: UCF/FSEC's portion of the training aspect of this task is now completed. As results of other UCF/FSEC tasks are completed (e.g., Task 4), their results will be disseminated.