(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. During this reporting period, UCF/FSEC reviewed the latest version of a task document entitled "Improving Central Air Conditioner Performance Ratings: A Review of Present Seasonal Energy Efficiency Ratings (SEER) and Test Methods" and provided comments to ACEEE. This document will eventually be sent to the project advisory committee for their review and feedback.

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.

UCF/FSEC's portion of Task 3.2 was fully completed in October 2006, with the findings summarized in the report "Measured Impacts of Proper Air Conditioning Sizing in Four Florida Case Study Homes", FSEC-CR-1641-06, Final Report, October 25, 2006.

http://dbase.fsec.ucf.edu/pls/pub/pub_show_detail?v_pub_id=4321

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. 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. During the current reporting period, UCF/FSEC and CDH Energy (NYSERDA subcontractor) worked to resolve the issues identified by these two reviewers. Our intent is to complete a final version of the white paper/report by May 2007.

Work on Task 4.2 also continued during this reporting period. A prototype air handler with enhanced dehumidification performance was constructed. Air flow through the unit became on issue, resulting in a delay of several weeks. Manufacturer's performance information for a fan blower selected for use in the prototype was found to be overstated, and a second fan had to be procured and installed to provide the required air flow. Laboratory measurement points were identified and instrumentation was procured, calibrated and installed in preparation for performance testing of the prototype in a controlled environment. Laboratory tests will begin during the month of April. Once laboratory testing is completed, the prototype unit will be installed at a field test site, UCF/FSEC's 1600 ft^2 Manufactured Housing Laboratory, where its performance will be further monitored and evaluated.
http://www.fsec.ucf.edu/en/about/organization/facilities/manufactured_housing_lab/index.htm

A second aspect of Task 4.2 is developing and testing an improved supply air fan control. A potential field test site was identified and portable data loggers were deployed to collect baseline indoor humidity data.

Task 5 Information Dissemination and HVAC Contractor Training

UCF/FSEC's portion of the training aspect of this task was completed in December 2006. As other UCF/FSEC tasks are completed (e.g., Task 4), their results will be disseminated.

Plans for Next Quarter:

- Task 4.1: 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 4.2: Complete laboratory testing and evaluation of the prototype unit, implement unit modifications as necessary (April 1 – April 30, 2007). A site for field testing the prototype unit has been identified. The prototype will be installed at the field site upon completion of laboratory testing (May 1, 2007). Field measurements will be collected through the summer of 2007.

  In terms of the improved supply air fan control, a variable speed air handler will be installed in the identified test home and the AC system and house will be instrumented. Data will be collected in baseline condition with constant fan speed operation and a standard post compressor operation time delay. Data collection will continue through the month of June. Preparations will be made to control air handler speed and time delay using a Campbell CR10 data logger on a separate laboratory air handler to work out control logic.

- Task 5: UCF/FSEC's portion of the training aspect of this task was completed in December 2006. As results of other UCF/FSEC tasks are completed (e.g., Task 4), their results will be disseminated.