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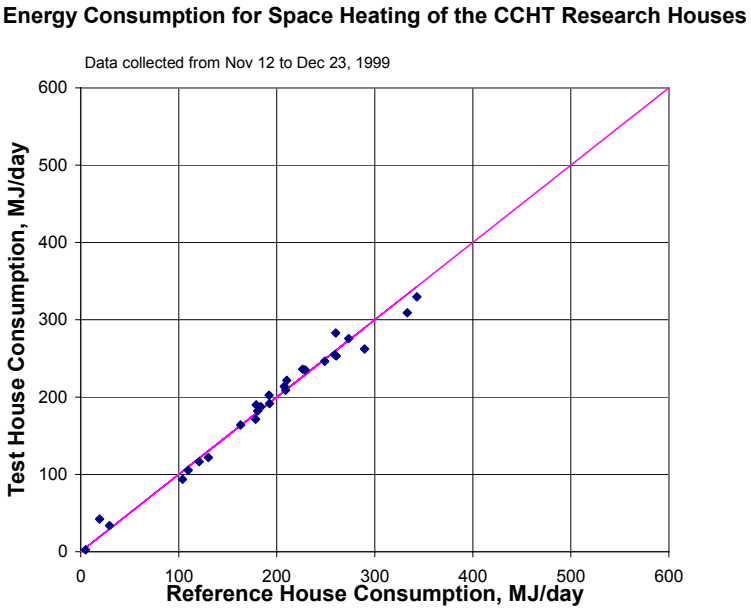
Commissioning of CCHT Test Houses Holds Interesting Results

By Luc Saint-Martin

During the fall and early winter, Mike Swinton, Research Manager of the Canadian Centre for Housing Technology (CCHT), and his team were busy calibrating and commissioning the centre's reference and test houses. This is for good reason because in order to obtain accurate and significant results when evaluating a new technology in the test house, it is critical to ensure that it is operating as closely as possible to the reference house before making any changes. This meant weeks of



painstaking work, looking closely at thousands of details from sensors to data acquisition system operation, temperature distributions, gas and electrical consumption of specific appliances and components, as well as hundred of on/off events of the simulated occupancy system.

Inevitably, something of this complexity can't be expected to go completely right the first time. There were glitches and a few mishaps, including a shower running continuously for almost 12 hours, but in the end, it was satisfying to see how closely the two houses perform as shown by the near-perfect fit of the 45-degree curve in the figure.

Some results were also surprising. For instance, the furnace fan is set to run continuously in order to achieve a more uniform temperature distribution in the houses. When fan electrical consumption is blended in with the total electrical consumption of the houses, few people may pay attention to the fact that running a 300-W motor over 24 hours accounts for over 7 kWh of electricity per day. That is about a third of the total daily electrical consumption of an average household. This information raises the question of whether continuous fan operation is worth the additional comfort. Further investigation is this area could provide useful information.

Close monitoring also revealed, early in the commissioning work, that the furnace fan of one of the identical furnaces was consuming much more energy than the other fan. As it turned out, something had happened to that fan motor and it had to be replaced. Without the benefit of such sophisticated monitoring and comparison, a homeowner would never know where the sudden increase in electricity consumption came from or even know that the problem existed.

Cold sunny days also gave the CCHT team the opportunity to capture some interesting data on temperature distributions through south facing wall assemblies and on the inside and outside surfaces of the low-E, argon-filled windows. For example, the outside face of brick exposed to bright sun on a short January day with a high of -18°C, reached a temperature almost 36°C above ambient temperature (about 18°C). Researchers also noted that the temperature of the inside pane of the low-E, argon-filled windows rose over 40°C on some of those cold sunny days.

With the implementation of the first CCHT project, which is evaluating a combination space and water heating gas system, the research team was delighted to see that they could detect very slight variations in performance between the two houses. The sheer amount and accuracy of data collected allows trends to be plotted early in the project. CCHT is now poised to evaluate a large array of energy-saving technologies, either related to the building envelope or to mechanical systems, and to report on their performance for the benefit of the industry.

Mike Swinton will be publishing a more comprehensive account of the commissioning work in the near future and we will keep Solplan readers informed.

Luc Saint-Martin is business manager of CCHT.