

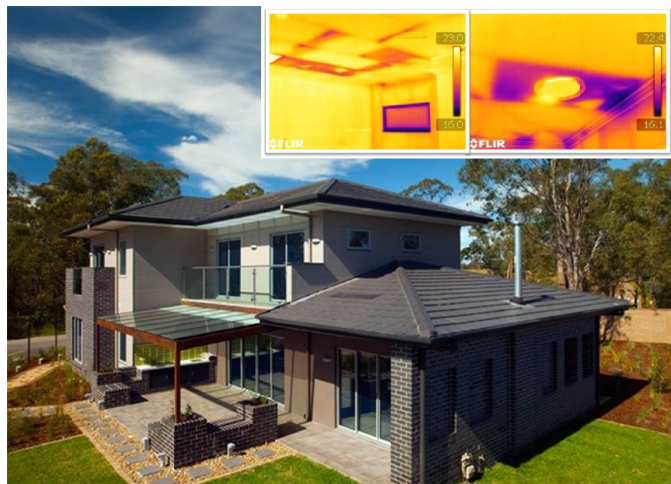
RP1010

# MONITORING AND MODELLING OF THE CSR LOW ENERGY HOUSE

## Problem

With global attention on delivering low energy housing, there is an increasing need to reduce the discrepancy between design and end-use energy. However, test methods like infrared imaging and blower door tests cannot provide a general understanding of this performance gap since they only focus only on a component of energy loss.

Therefore, a reliable measurement needs to be developed which can accurately quantify the discrepancy in general energy performance.

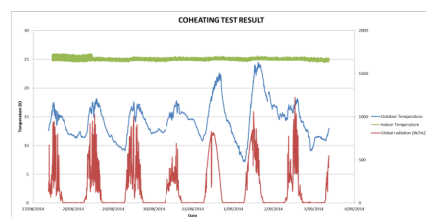


Picture 1. Defects in building envelope may induce greater energy consumption than you expect.

## Solution

In order to evaluate the energy performance gap, a co-heating test was developed and utilised on the CSR house.

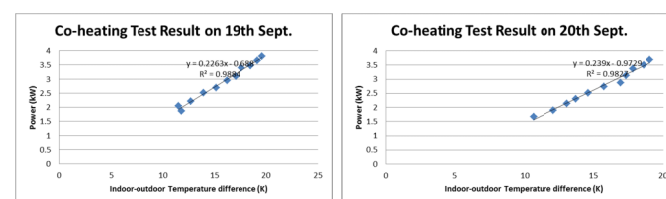
The co-heating test is an experimental method that can determine a housing's overall heat loss coefficient due to conductive and ventilation heat losses. During the test period, the internal temperature of the house is maintained at a constant value using electrical heaters. The whole house heat loss coefficient (W/K) can then be determined from the gradient of a plot of mean heat input measured against the internal to external air temperature difference.



Co-heating analysis is an effective and valuable methodology for understanding real house thermal performance.

## Benefits

The co-heating test has been conducted in the CSR house during a consecutive 40 days test period.



Picture 2. Samples of co-heating test results.

The result of the test shows excellent linearity and the overall heat loss coefficient can be determined with insignificant uncertainty. Also, the heat loss coefficient (W/K) can be transformed into an effective U-value (W/K/m<sup>2</sup>) by dividing by the external surface area of the house. Hence this indicator can provide a good understanding of the in-situ thermal performance of the whole house envelope.

Furthermore, the design heat loss coefficient can be calculated in EnergyPlus model, and the difference between modelled heat loss coefficient (HLC) and HLC obtained from the co-heating test can present a clear idea of the energy performance discrepancy.

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