Energy Efficiency Rating Software

The new *Energy Efficiency Measures* (EEM) for the *Building Code of Australia* (BCA) will be released at Amendment 12, the commencement date is 1 July, 2003 for Western Australia. These requirements will ensure that all new Class 1 and Class 10 buildings will be energy efficient. A means for verifying this efficiency is by way of software. The Star Rating is a simulation that allocates a value between one and five stars to a building, with five stars being the most efficient (this is called the *Building Energy Rating*).

A Star Rating of a building demonstrates the expected thermal performance within a specific climate type. Climate data collected by the Bureau of Meteorology is used in simulations in the form of hourly values of temperature, humidity, solar irradiation and wind speed. Furthermore, typical user occupant behaviour patterns and heat energy inputs into the house from appliance (water heaters, stoves, televisions etc) are included in the calculations.

Where a building may be both heated and cooled, the rating reflects the sum of the heating and cooling energy required to maintain the building within a comfort temperature band. In warmer regions (two thirds of Australia) where there is little heating or cooling used, the Star Rating reflects the amount of time that a building maintains a temperature outside of the thermal comfort band.

To assist building practitioners with this additional legislative requirement, various software programs (NatHERS, FirstRate and BERS) have been developed and are briefly described below.

Nationwide House Energy Rating Scheme (NatHERS)

Initially funded by the Australian and New Zealand Minerals and Energy Council, it requires: architectural plans, insulation levels, colour of roof and walls, window sizes and frames and details of overshading buildings, and trees, to be entered into the program.

NatHERS simulates the building using in-built climate data and the user occupancy pattern. The simulation estimates the amount of heat that needs to be added, or subtracted, to maintain a comfortable temperature for occupancy.

NatHERS can analyse any house, cottage, terrace house or apartment and the location is determined by just entering the postcode. The house data is inputed into the software by a simple template system. The simulation engine of NatHERS is the CSIRO thermal simulation program Chenath which has been upgraded from the Cheetah engine. On a typical Pentium 2/333 the running time for a simulation is about six seconds.

The program can create two report types: simple and complex. The simple report details how much energy is needed for summer cooling and winter heating in Mega Joules per square metre of conditioned space. The complex report offers full details of the building data. The report can be saved, and retrieved, at a later date.

The program requires 11 Mega Bytes of hard disk space and can be purchased from Housing Energy Rating.

First Rate

This is a correlation program where the information of the building is inputed into the program; such as, construction materials, wall windows, floor areas and building orientation. The program provides points for the building elements which are entered into the program. The sum of the points provides the Star Rating.

The program is administered by the Sustainable Energy Development Office (SEDO) and provides advice on optimising energy efficiency.

FirstRate can be run off an operating system of Windows 3.1, Windows 95, or later, and the energy ratings cover the 20 different climate zones across Australia. Similar to NatHERS, this program provides two report types (the comprehensive FirstRate mode and the indicative Quickrate mode) Quickrate is ideally suited for preliminary sketch design while the comprehensive mode is used for more developed designs. The program requires 4.5 Mb of hard disk space and can be purchased from SEDO for $400

(including GST). For more information, Andrew Fairs, Manager, can be contacted at the Sustainable Energy Development Office (SEDO).

BERS

Dr Holger Willrath, of Solar Logic, who was responsible for the Domestic Thermal Program (DTAP) software also authored BERS. Similar to FirstRate, DTAP is a correlation program, but BERS is mathematically more rigorous. BERS assesses a house in two ways:

a) Computing and producing an energy rating in Mega Joule per square metre as is appropriate for southern/temperate climate;

b) Computing, and producing, a 'comfort rating' in degree hours of discomfort as is appropriate for northern/tropical (tropical lightweight housing construction).

The mathematical engine for this program is the same as NatHERS which is the CSIRO thermal simulation program Chenath which has been upgraded from the Cheetah engine.

Central TAFE and the Housing Industry Association (HIA) and both offering training on these programs and can be contacted to ascertain the cost of courses and commencement dates. The course enquiries telephone number for Central TAFE is 1300 300 822 and the HIA can be contacted on 92443222.