



# House Energy Efficiency

## How energy efficient is your home?

Your home<sup>1</sup> should be a place where you can enjoy comfortable temperatures all year round without relying on excessive energy for heating and cooling.

If your home is energy efficient it will:

- ▶ Be designed to provide a naturally comfortable temperature all year, possibly without the need for air-conditioning or heating<sup>2</sup>.
- ▶ Require a smaller, cheaper heating or cooling unit to achieve comfort levels
- ▶ Use less energy, reduce your energy bills and have less impact on the environment.

House energy rating assessors use thermal simulation computer programs to determine if a house is energy efficient.

## House Energy Rating Software

Second-generation House Energy Rating Software (HERS), which includes AccuRate, BERS and FirstRate, can be used:

- ▶ For house energy ratings to determine star ratings up to 10 stars
- ▶ To predict inside temperatures
- ▶ To help you decide if you need an air conditioner



*A naturally comfortable temperature all year round*

- ▶ Many times over by accredited project home builders and by accredited architects and building designers throughout the design process.

## How HERS works

Each space within a house is identified according to its purpose i.e. living, cooking, sleeping, bathing, etc. Heat enters and leaves these spaces through the walls, floors and ceilings, so it is important to

know the relationship of each space to adjacent spaces and to the outside. For example, heat conducted between rooms may not be as great as heat transfer through glass between the inside and the outside.

Home energy efficiency is determined by the type of material used in construction, by the type of windows and doors, by eaves and verandas and also by adjacent structures. Details are entered into the software which then predicts the additional heating or cooling needed to maintain comfort.

## Climate

Climate is a critical factor. Ideally, houses should be designed in relation to the climate, otherwise they may cost more to construct and have higher energy bills.



*Each space is identified according to its purpose*

1. Your home might be a house, duplex, townhouse or an apartment in a block of multi-units.  
2. See Sustainable Energy Development Office FACT SHEET No 1 "Designing Energy Efficient Homes" February 2004.



## Orientation

Orientation to the sun has a major impact on the way heat enters and leaves a house. For example, in the South West, optimum design principles allow the sun's heat into the home during winter while excluding it during summer. HERS software tools can model orientation in 1° increments for precise calculation of the impact of the sun on the house.

## Natural Ventilation

Houses that use natural ventilation as a cooling strategy can be effectively modelled by HERS. By taking into consideration the situation of the house (coastal or suburban), the openings in walls, the orientation of the house to the wind and the passages for airflow, the program can assess the effects of natural ventilation to cool the occupants in lieu of air conditioning. As increased airflow enhances evaporation from the skin (which has a cooling effect on the body) you can feel cool at slightly higher temperatures if there is a breeze.

In energy terms, this results in improved energy efficiency through the decreased use of air conditioning. As HERS can model natural ventilation, it is particularly suitable to tropical regions and in other areas where cooling sea breezes (eg "The Fremantle Doctor") are common.

## Simulation

On completion of the data entry, a simulation is performed. The calculations

take into account the heat gains (from the sun and from the occupants) and heat losses (natural ventilation and conduction).

Temperatures within each space are predicted at every hour of a typical year (8760 calculations). Modelling indicates when temperatures are likely to fall below comfort levels during cold weather. From this, the program will calculate the amount of heating energy that would be required to raise the temperature. The sum of these values gives a measure of the total heating energy required during cold weather. The same applies to calculating the amount of cooling energy needed in hot weather.

## Star Rating

On completion of the simulation, the report displays the results as heating load, cooling load, total energy load and star-rating. Zero stars suggest a very poor house design and 10 stars an extremely efficient house. If the home meets current building code standards<sup>3</sup>, the homeowner will receive a certificate endorsed by the Sustainable Energy Development Office.

## Energy ratings for buyers — new or existing houses

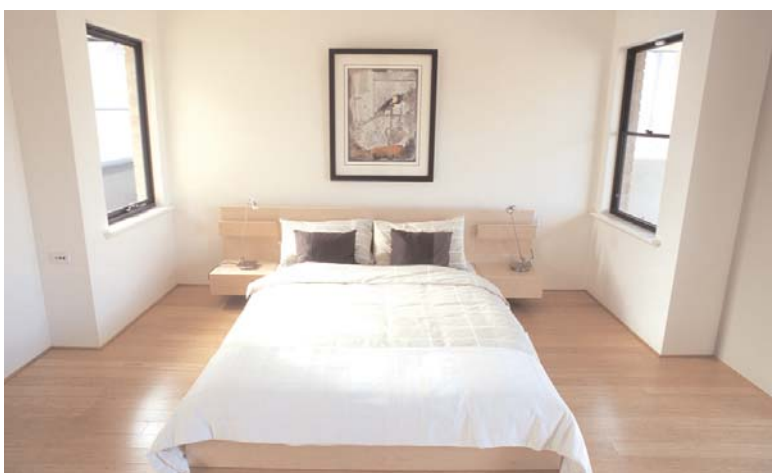
If you are building a new home, your Accredited Assessor can use a HERS program to help calculate how much insulation you may need or where windows should be placed to best use the winter sun and summer cooling breezes.



*A more environmentally sensitive home*

The Assessor could also help you decide which block to buy so you can build a more environmentally sensitive home. If it is an existing house you are considering purchasing, it makes good sense to use an Accredited Assessor to compare the energy performance with other houses.

Just like a white ant certificate or building inspection which uncovers problems before you buy, the small cost of a house energy rating will be repaid many times over with savings in energy bills.



*You can feel cool at slightly higher temperatures if there is a breeze*

## More information

Want to know more about the software tools, have your house energy rated or find an Accredited Assessor? Call the Energy Smart Line on 1300 658 158 or visit the Sustainable Energy Development Office website at <http://www.sedo.energy.wa.gov.au>.

3. See Sustainable Energy Development Office (SEDO) Fact Sheet No 2 "Changes to the Building Code of Australia".