ENERGY EFFICIENCY RATING

From 1 March 2002, proposals for two or more dwellings on a lot in a residential zone in Victoria should be designed to achieve a four-star energy efficiency rating using the Sustainable Energy Authority of Victoria’s FirstRate system, or equivalent.

This practice note provides guidance for applicants and responsible authorities about:

- understanding the available energy efficiency rating tools
- using these tools in the design of energy efficient dwellings and assessment of planning applications

WHAT IS AN ENERGY RATING?

A house energy rating is a measure of the relative energy efficiency of a dwelling. Ranging from zero up to five stars, the rating is based on an estimate of the amount of energy which would be required to heat the dwelling in winter and cool it in summer. The rating is the outcome of a complex assessment of the interaction between the building’s design and the materials used.

Each dwelling within a development should achieve a minimum of four stars using the FirstRate software or an equivalent house energy rating software program.

WHAT ENERGY RATING COMPUTER SOFTWARE IS AVAILABLE?

FirstRate

The FirstRate house energy rating software has been developed by the Sustainable Energy Authority of Victoria. It can be used for a wide range of housing types – from detached houses to high rise dwellings. FirstRate includes all climate zones within Victoria and is recognised as a house energy rating tool under the Nationwide House Energy Rating Scheme. It is available from the Sustainable Energy Authority. Visit www.senw vict.gov.au for information about this system.

While FirstRate can be used for most designs, the Sustainable Energy Authority recommends that FirstRate not be used for designs where:

- the total glazing is greater than 50 per cent of the Net Conditioned Floor Area (NCFa – defined as the gross floor area minus utility rooms and external walls)
- the glazing of any one orientation is greater than 25 per cent of the NCFa.

Use the Nationwide House Energy Rating Software (NatHERS) system in these cases.

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GENERAL PRACTICE NOTE
NatHERS

NatHERS is the other major house energy rating software program recognised under the national scheme. Visit www.nathers.com for information about this system.

NatHERS is a sophisticated house energy rating simulation program which was developed by the CSIRO. Before using NatHERS, you should obtain the guidelines for its use in Victoria from the Sustainable Energy Authority.

The FirstRate software has been designed to ensure that the ratings match NatHERS ratings. The main difference between the programs is in data entry. Compared to other programs, FirstRate will typically take substantially less time to complete a rating. Consequently, the cost of undertaking ratings will generally be less using FirstRate.

**HOW IS AN ENERGY RATING CARRIED OUT?**

Who can carry out an energy rating?

An energy rating should be carried out by an accredited house energy rater.

In Victoria, accreditation for house energy raters is available in both the FirstRate and the NatHERS programs (although most are accredited only in the FirstRate software). Energy raters must pass an exam to become accredited and each year submit a sample of their ratings to be checked for accuracy. A Code of Conduct specifies the conditions under which accredited energy raters must operate.

Each accredited energy rater is issued with an accreditation number and stamp by the Sustainable Energy Authority of Victoria.

A list of accredited energy raters is available from the Sustainable Energy Authority.

For further information about becoming an accredited energy rater, contact the Sustainable Energy Authority.

What information will I need?

The information required for an energy rating includes:

- floor, wall and ceiling dimensions
- the size, orientation and shading of windows
- the type of window frame and glass
- floor and wall types
- insulation levels
- air leakage information (for example, vented skylights).

Where this information is not available when a planning permit application is lodged, the following assumptions can be made about the development. They are based on common and affordable fittings that are most likely to be installed. In the case of window coverings, holland blinds have been selected because this curtain type provides a medium level of protection against heat loss in winter and heat gain in summer. For each window, always choose holland blinds.

**FITTING**

- **Floor coverings**
  - that all areas will be carpeted except for kitchens and utility areas
- **Air leakage points**
  - that gaps around doors, windows and draught points such as ventilators and exhaust fans are unsealed unless otherwise specified on the plan
- **Window frames and glazing**
  - standard aluminium window frames and single glazing will be used unless otherwise specified on the plan

Considerations when designing for four stars

There is no single recipe to achieve a four-star design. A good energy rating is the outcome of the interaction between a number of factors, including the dwelling's dimensions, building materials, insulation levels, glass size and orientation. Different sites and different building materials will need different design strategies. For example, a site which is overshadowed to the north will need a different design strategy to one that has good solar access.

**Tips for upgrading a low energy rating**

In Victoria:

- use north windows where possible to make use of the sun in winter
- avoid placing garages and carports to the north
- make sure that north windows will not result in excessive heat gain in summer. Where north windows are large and cannot be reduced in size, protect them from the summer sun by eaves, shaded pergolas, or external blinds
- minimise windows to the west and east
- where medium to large areas of west-facing glass are used, shade the windows from the summer sun with eaves or vertical shading devices.
Shading can also include the use of high-performance window frames and glazing designed to reduce the impact of the sun.

- glazing should be sized according to the weight of the building materials because lightweight dwellings will respond quickly to solar heat gains through windows
- if there is no or minimal northern solar access to the site, look at: increasing the levels of insulation; using high-performance glazing products in south-facing windows; and shading west and east-facing windows from the harsh summer sun
- for two-storey dwellings, consider using higher levels of wall insulation. Two-storey buildings tend to have greater areas of external walls than one-storey dwellings, and therefore, have a higher rate of heat loss through walls
- take steps to minimise heat loss from draughts by fitting draught excluders under doors and ensuring that gaps around windows, doors and plumbing fittings are sealed
- fit exhaust fans that seal when not in use
- share floors, walls and ceilings of dwellings wherever possible. There will be minimal heat transfer across shared elements
- keep the north walls of dwellings available for locating windows.

These methods will not guarantee that a four-star design is achieved. Using a house energy rating software program as a design tool will help achieve energy efficiency early in the design process. For example, FirstRate provides hints on how to improve energy ratings and can test a range of energy efficient design strategies.

**Will a four-star dwelling cost extra to construct?**

Designing for energy efficiency from the outset will help minimise the impact on designs and reduce the cost of achieving a four-star rating.

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**ASSESSMENT OF APPLICATIONS**

**When is an energy rating provided?**

An energy rating should be provided prior to council's decision on the planning permit application. It is desirable to submit a report with the application as the energy rating helps explain how the energy efficiency objectives have been met.

**What evidence of the energy rating should be provided?**

Check with the planning department of the local council regarding their requirements for rating reports submitted with planning applications. They may ask for a copy of the printed report, a copy of the printed report, a copy of the rating on disk, and a copy of the assessed plans stamped with the accredited energy rater's stamp.

It is suggested that the energy efficiency rating assessment should include the printed report issued by the rating software, signed and dated by the assessor. In the case of a FirstRate report this is defined as:

- the summary of the rating (p. 1 of the report)
- detailed point scores (p. 4)
- data list (p. 5)

**Do I need an energy rating on each dwelling?**

Each dwelling in a multi-unit development should be individually energy rated. However, where dwellings are identical in plan, orientation and shading, one rating may be presented to represent the performance of all identical units.

**What if the design is changed after lodging a planning permit application?**

If the design is changed after a planning permit application is lodged and the changes affect the energy efficiency rating, then it may be reasonable for a council to request a supplementary rating. Every effort should be made by councils to limit the number of requests to applicants to reassess the energy efficiency of a development proposal.

**What if a four-star rating cannot be achieved?**

The energy efficiency objectives in the planning scheme must always be met and it should be possible for most multi-unit designs to achieve the standard of a four-star rating using a range of different cost-effective design strategies. However, the decision guidelines take account of constraints including:

- the size, orientation and slope of the lot
- the existing amount of solar access to abutting properties
- the availability of solar access to north facing windows on the site.

Examples of difficult circumstances include:

- no solar access for north facing glass – either completely overshadowed by a neighbouring dwelling or the north wall is shared with a neighbouring dwelling
- poor solar access to developments on a south-facing slope that has a gradient equal or greater than 20 per cent (1:5)
• soil conditions and slope which preclude the use of a concrete slab floor.

The case studies in this practice note demonstrate that a four-star energy efficiency rating can be readily achieved even in these circumstances.

Conversions of warehouses to residential use may also pose difficulties in meeting the minimum energy rating because insulating existing walls may prove costly.

**What are the benefits of aiming above four stars?**

A high star rating can be a valuable marketing tool for new dwellings. New home buyers are becoming increasingly aware of the benefits of living in an energy efficient house.

Research by the Sustainable Energy Authority indicates that annual heating and cooling energy bills for occupants may be significantly reduced, resulting in a reduction of greenhouse gas emissions averaging more than one tonne per house each year.

The Sustainable Energy Authority of Victoria can provide a list of energy efficient designers.

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**HOW CAN A FOUR-STAR RATING BE ACHIEVED WHEN A DESIGN IS RATED POORLY?**

**CASE STUDY 1:**

Two attached single-storey dwellings – one of the units is rated at 1.5 stars. The poor rating is contributed to by:

• no north facing windows as the north wall of the 80 sq. metre unit is shared with the neighbouring unit
• the dwelling gains little benefit from sunlight during winter
• the elevated timber floor.

**Design strategy 1**

Assuming that neither the shared north wall nor the elevated timber floor can be changed:

1. increase ceiling insulation from R2.5 to R4 using bulk insulation above the ceiling and foil under the roof
2. increase wall insulation from R1 to R2.5
3. add floor insulation to the value of R1 under the floor

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4. remove one west-facing window
5. remove one south-facing window
6. replace aluminium window frames with improved aluminium or timber window frames
7. add blinds to the west windows
8. replace the exhaust fan with one that seals when not in use
9. fit draught excluders under all external doors
10. fit draught excluders under the laundry and bathroom doors
11. fit weather strips to windows
12. seal gaps and cracks around window and door frames and other points of air leakage through the walls.

**Comments**

To achieve a four-star rating, many of the options involve simple and inexpensive measures to reduce air leakage. As insulation is already required under the Building Regulations, increasing the performance of insulation by purchasing a slightly thicker insulation material will add little to the cost.

The use of an improved aluminium frame which reduces heat loss through the windows will assist the design to meet the four-star rating.

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**east elevation**

Scale 1:100
An improved aluminium frame is one which has either a thermal break between the outside and inside frames or is a slender frame.

**Design strategy 2**

Assuming the shared north wall cannot be changed, but the elevated timber floor can be changed:

1. change the floor to concrete slab-on-ground
2. increase ceiling insulation from R2.5 to R4 using bulk insulation above the ceiling and foil under the roof
3. increase wall insulation from R1 to R2.5
4. remove one of the west-facing windows
5. replace aluminium window frames with improved aluminium or timber window frames
6. fit draught excluders under all external doors
7. seal gaps and cracks around window and door frames and other points of air leakage through the walls.

In addition to the above, select one of the following:
- install external blinds to the west
- replace the exhaust fan with one that seals when not in use

**CASE STUDY 2**

An apartment with another apartment above, a garage below and side boundary wall abutting an existing building is rated at 1.5 stars.

The main reason for the poor rating is winter heat loss through:
- the apartment floor into the garage
- the external wall to the west
- large south-facing aluminium-framed windows.

**Design strategy 1**

1. Add R1.0 wall insulation.
2. Add R0.5 insulation under the floor.
3. Replace aluminium window frames with improved aluminium or timber window frames.
4. Replace the exhaust fan with one that seals when not in use.
5. Fit draught excluders under all external doors.
6. Seal gaps and cracks around window and door frames and other points of air leakage through the walls.
To achieve a four-star rating, the most effective measure is to insulate the small section of external wall which is not shared with the neighbouring dwelling to the west. To reduce heat loss to the garage, bulk insulation is fitted under the slab floor.

**Design strategy 2**

1. Add R1.0 wall insulation.
2. Carpet 75 per cent of the floor.
3. Trim south facing windows by a total of two sq. metres.
4. Replace aluminium window frames with improved aluminium or timber window frames.
5. Replace the exhaust fan with one that seals when not in use.
6. Seal gaps and cracks around window and door frames and other points of air leakage through the walls.

**Comments**

Wall and floor insulation are the most effective measures. Rather than insulating the floor, add carpet to 75 per cent of the floor and reduce the size of the south-facing windows from a total of ten sq. metres to eight sq. metres.

**MORE INFORMATION**

Other related Practice Notes include:
- Making a planning application for a dwelling in a Residential Zone
- Assessing a planning application for a dwelling in a Residential Zone
- Understanding neighbourhood character

For information about:
- the FirstRate software
- FirstRate training courses
- accreditation for energy raters
- other energy efficient housing programs

contact the Sustainable Energy Authority
1300 363 744 or (03) 9655 3232.
www.sen.vic.gov.au
advice@sen.vic.gov.au

Planning Practice Notes provide practical advice on planning and urban design matters.

For copies of other planning practice notes in the series contact:

- Internet address: www.doi.vic.gov.au/planning
- Department of Infrastructure
  - Planning Information Centre
  - Upper Plaza
  - 80 Collins Street
  - Melbourne 3000
  - Telephone 03 9655 8830
  - Fax 03 9655 8847

**FOR FURTHER DETAILS CONTACT:**

- **South East Metropolitan Region**
  - Telephone 03 9881 8895
- **North West Metropolitan Region**
  - Telephone 03 9313 1333
- **Eastern Region**
  - Telephone 03 5172 2677
- **North Eastern Region**
  - Telephone 03 5761 1857
- **Northern Region**
  - Telephone 03 5434 5150
- **South West Region**
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