

# 2.16

## GENERIC PROVISIONS ENERGY EFFICIENCY







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## Part 2 Generic Provisions

### 2.16 Energy Efficiency

This section applies energy efficiency provisions to developments which are **not** covered by *State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004* (BASIX), including the non-residential components of mixed use developments.

BASIX operates in conjunction with provisions in the *Environmental Planning and Assessment Regulation 2000* (the Regulation) to implement BASIX as a mandatory component of the development approval process for residential development. Both the BASIX and relevant provisions in the Regulation commenced on 1 July 2004.

The BASIX SEPP only applies with respect to development for which a BASIX certificate is required. The Regulation currently provides that a BASIX certificate is required in relation to development involving the erection of, or change of use of a building to:

- Any building that contains one or more dwellings, not including a hotel or motel; and
- For which a development application or an application for a complying development certificate is lodged on or after 1 October 2005.

Energy efficient buildings are those that, through their design, construction and choice of appliances, maximise the use of renewable sources (such as sunshine), and use less energy. They are 'smart' because they simultaneously help preserve scarce resources, reduce the level of greenhouse gas emissions and provide significant savings.

#### 2.16.1 Objectives

- O1** To improve the energy efficiency of buildings in the area .
- O2** To protect the natural environment by reducing resource waste and the amount of greenhouse gas emissions.
- O3** To provide advice on the principles of energy efficient building design, to improve comfort levels to occupants of living, working and business environments, and reduce energy consumption.
- O4** To ensure buildings are well designed to achieve the efficient use of energy for internal heating and cooling.
- O5** To ensure design for good environmental performance and amenity is considered in conjunction with other design and amenity considerations.

#### 2.16.2 Energy efficiency requirements

- C1** Development must comply with the energy efficiency requirements prescribed in Table 1.  
NB The requirements outlined below are also applicable where the relevant development type forms part of a mixed use development.

Table 1: Energy efficiency requirements

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Development type	What must be complied with	Information to be submitted with development application
New commercial and industrial buildings (involving a gross floor area of greater than 1,000m <sup>2</sup> )	<ul style="list-style-type: none"> <li>• The total anticipated energy consumption must be no greater than 450 MJ/am<sup>2</sup> (commercial) and 900MJ/am<sup>2</sup> (retail).</li> <li>• New or replacement hot water systems that are rated for energy efficiency under the MEPS (minimum energy performance standards) scheme must have a minimum energy rating of 3.5 stars.</li> <li>• The design principles and controls in Sections 2.16.6 to 2.16.8 (must be discussed in the Statement of Environmental Effects (SEE)).</li> <li>• Where natural ventilation is not possible and new or replacement air-conditioners (of domestic/ residential scale) are to be installed; they must be MEPS (minimum energy performance standards) rated. Minimum 4 star rating for cooling only, and minimum 4 star on one cycle and 3 star on the other cycle for reverse-cycle models.</li> </ul>	<ul style="list-style-type: none"> <li>• Energy efficiency performance report including evidence from a suitably qualified consultant to confirm compliance with the total anticipated energy consumption.</li> <li>• Discussion of design principles and controls in Sections 2.16.6 to 2.16.8 in SEE.</li> </ul>
Commercial and industrial developments between 100m <sup>2</sup> and 1,000m <sup>2</sup> (including new developments and alterations and additions)	<ul style="list-style-type: none"> <li>• New or replacement hot water systems that are rated for energy efficiency under the MEPS (minimum energy performance standards) scheme must have a minimum energy rating of 3.5 stars.</li> <li>• Design principles and controls in Sections 2.16.6 to 2.16.8 must be discussed in the SEE.</li> <li>• Where natural ventilation is not possible and new or replacement air-conditioners (of domestic/ residential scale) are to be installed; they must be MEPS rated. Minimum 4 star rating for cooling only, and minimum 4 star on one cycle and 3 star on the other cycle for reverse-cycle models.</li> </ul>	<ul style="list-style-type: none"> <li>• Discussion of design principles and controls in Sections 2.16.6 to 2.16.8 in SEE.</li> </ul>



<p>New developments and alterations and additions to tourist and visitor accommodation and boarding houses</p>	<ul style="list-style-type: none"> <li>• New or replacement hot water systems that are rated for energy efficiency under the MEPS (minimum energy performance standards) scheme must have a minimum energy rating of 3.5 stars.</li> <li>• MEPS rated electrical appliances must be supplied.</li> <li>• Insulation of additional or replacement ceiling or roof must be R3 rating.</li> <li>• Air conditioning in new hotels must operate on a demand or room occupation basis only.</li> <li>• Where natural ventilation is not possible and new or replacement air-conditioners (of domestic/ residential scale) are to be installed; they must be MEPS rated. Minimum 4 star rating for cooling only, and minimum 4 star on one cycle and 3 star on the other cycle for reverse-cycle models.</li> </ul>	<ul style="list-style-type: none"> <li>• Discussion of core design principles under 2.16.4 within the SEE.</li> </ul>
<p>All other developments</p>	<ul style="list-style-type: none"> <li>• Core energy efficient design principles must be met:             <ul style="list-style-type: none"> <li>• orientation</li> <li>• overshadowing</li> </ul> </li> <li>• New or replacement hot water systems that are rated for energy efficiency under the MEPS (minimum energy performance standards) scheme must have a minimum energy rating of 3.5 stars.</li> <li>• Where natural ventilation is not possible and new or replacement air-conditioners (of domestic/ residential scale) are to be installed; they must be MEPS rated. Minimum 4 star rating for cooling only, and minimum 4 star on one cycle and 3 star on the other cycle for reverse-cycle models.</li> </ul>	<ul style="list-style-type: none"> <li>• Discussion of core design principles within the SEE (see later Section 2.16.4).</li> </ul>

### 2.16.3 Anticipated energy consumption certification

An energy target must be incorporated into an anticipated energy consumption certificate as a guideline to provide a basis for the assessment of the annual estimated energy consumption of new commercial and retail buildings with gross floor areas exceeding 1,000m<sup>2</sup>. In line with current practice, the energy targets of 450 megajoules/annum/m<sup>2</sup> (MJ/am<sup>2</sup>) for commercial buildings and 900 MJ/am<sup>2</sup> for retail buildings have been set. A report from a suitably qualified energy consultant must confirm that those targets can be achieved.

### 2.16.4 Information required to be submitted with development applications

#### Compliance with energy efficiency requirements

- C2** The development application must provide an accompanying Statement of Environmental Effects (SEE). The SEE must include a written

assessment of how the proposal complies with the requirements in Table 1 and the anticipated energy consumption certification requirements.

### Energy efficiency performance report

- C3** The development application must be accompanied by a report by an accredited energy consultant that discusses how a proposal incorporates the design principles in Sections 2.16.5 to 2.16.6 and relates these to the energy rating assessment findings.

### Site and context analysis

Refer to Section 2.3 (Site and Context Analysis) of this DCP for detailed controls on site and context analysis.

## 2.16.5 Passive design principles

### 2.16.5.1 Orientation

#### Design principles

1. As with residential buildings, non-residential buildings should be designed to maximise the benefits of solar energy through appropriate orientation.
2. The size and placement of windows should correspond to the areas that require the highest lighting levels.
3. Windows should be Window Energy Rating Scheme (WERS) rated.

*The WERS rating covers Building Code of Australia (BCA) Section J – Part 2 Glazing.*

#### Good design practice

1. Orient the main facades of the building to the north; and
2. Reduce areas of east, west and south facing glass to the smallest practical amount, still permitting views, daylight and market appeal.

### 2.16.5.2 Use of natural light

#### Design principles

1. Natural light can be used to minimise reliance on artificial lighting, thereby cutting energy costs.
2. The shape of a building influences the amount of floor area that can benefit from daylight through windows.

#### Good Design Practice

1. Design non-residential buildings to ensure that much of the floor area is within 4 metres to 6 metres of an external window;
2. Use an elongated plan shape, preferably with maximised northern and southern facades, to produce greater access to daylight; and
3. Consider the use of atria and courtyards.





### 2.16.5.3 Shading

#### Design principles

1. Solar orientation should be controlled to cater for seasonal variation in the sun's angle and intensity.

#### Good design practice

1. Shade north facing windows from direct summer sun by external, horizontal devices such as awnings, upper floor balconies, eaves and overhangs;
2. Minimise east and west facing windows as they are difficult to shade and are vertical shading devices such as blinds, shutters, adjustable awnings and landscaping for this orientation; and
3. Use shading devices such as flexible canvas devices to shade shopfronts that receive direct summer sunlight.

### 2.16.5.4 Thermal mass

#### Design principles

1. Thermal mass, the measure of a building material's ability to absorb and store the sun's heat, is an energy efficient way to improve the thermal comfort of a development.

*Refer to BCA Section J – Part 1 Building Fabric*

#### Good design practice

1. Use building materials that have a higher “thermal mass”, such as bricks, concrete and stone;
2. To be more effective, locate the materials within north-facing rooms, where they can benefit from winter heat gain, whilst ensuring there is appropriate shading from direct summer sun; and
3. Use lighter, more reflective colours for external walls and roofs to reduce heat gain in summer.

### 2.16.5.5 Insulation

#### Design principles

1. Insulation should be used in external walls and roofs to reduce heat escaping from a building in winter, and to maintain lower internal temperatures in summer.

*Refer to BCA Section J – Part 1 Building Fabric*

#### Good design practice

1. Insulate buildings to achieve an “R” value of:
  - R 2.5 for roofs and ceilings; and
  - R 1.5 for walls.
2. Insulate pipes and storage tanks for hot water systems.

### 2.16.5.6 Ventilation

#### Design principles

1. Methods of natural ventilation should be encouraged where practical. They can also be used in combination with artificial ventilation appliances.

*Refer to BCA Section J – Parts 4 and 5 Air conditioning and Ventilation*

### Good design practice

1. Position internal walls and partitions to allow for any prevailing passage of air through the building;
2. Where mechanical ventilation is needed for specific office equipment, or plant in an industrial unit or warehouse, locate it away from other activities;
3. In restaurants or buildings where mechanical ventilation is needed, use those which operate directly above cookers, rather than generating high ventilation rates throughout the kitchen; and
4. In buildings required to incorporate noise-proofing measures to address aircraft noise, use the absence of aircraft noise between 11.00pm and 6.00am to bring fresh air into a building and expel stale air.

### **2.16.5.7** *Space heating and cooling*

#### Design principles

1. As with ventilation, attempts should be made to combine environmentally friendly methods of space heating and cooling with any mechanised system.
2. The usage patterns and location of a building's occupants should be considered in the initial design.

*Refer to BCA Section J – Parts 4 and 5 Air conditioning and Ventilation*

### Good design practice

1. If air-conditioning is required, ensure it has sufficient controls so it is used only when required, including on/off programming schedules, after hours and holiday scheduling, and cooling and heating based on occupancy;
2. Ensure any air-conditioning system is well insulated, particularly those located in roof space;
3. Consider directing air-conditioning only to areas where it is needed, and relying on natural ventilation for the remainder of the building;
4. Use a combination of passive methods, such as direct solar access, window shading, appropriate insulation and sealing, and natural ventilation to reduce the overall use of mechanised systems;
5. Ensure cooking exhaust systems are not oversized in respect of their proposed use, and fit time controls to exhaust fans so that they switch off after a few minutes, or sensors to activate them during cooking;
6. In industrial units and warehouses, locate goods doors away from areas that may require mechanised heating or cooling;
7. Depending on the amount of movement, consider rapidly closing doors, plastic strip curtains or pneumatic seals for commercial and industrial buildings;
8. Cool small office buildings by reverse cycle air-conditioning units that can be controlled individually and operated independently of the rest of the building if needed out-of-hours;
9. Hotels should use a card system so air-conditioning and lighting in each guest room is switched off when the room is vacated;
10. Install appropriately sized cooling and heat plant and equipment; and



11. Investigate the use of cooling and heating energy efficiency opportunities including economy cycles, night purging, variable speed drives, humidity controls and electronic expansion valves.

## 2.16.6 Active design principles

### 2.16.6.1 Heating and energy systems

#### Design principles

1. Solar energy can be used as the primary energy source for a range of functions in both commercial and industrial buildings, thereby reducing the consumption of non-renewable resources.

#### Good design practice

1. Choose the solar energy technology which best suits operations.
2. Ensure hot water systems have thermostatic controls, and insulate hot water tanks and pipes;
3. Design and locate any solar energy systems to complement the overall building envelope and materials; and
4. Refer to the NSW Government's Green Power Program for larger business operations which provide an opportunity for businesses to use energy derived from renewable resources, rather than fossil fuels. Visit <http://www.greenpower.gov.au>

### 2.16.6.2 Appliances and lighting

#### Design principles

1. The use of more energy efficient lighting and electrical appliances in commercial and industrial developments can result in major energy cost savings and subsequent reductions in greenhouse gas emissions.
2. In excess of 50% of energy consumed in commercial buildings is for the occupant's thermal and visual comfort.

*Refer to BCA Section J – Parts 6 Artificial Lighting and Power and Part 7 Hot Water Supply.*

#### Good design practice

1. Submit a report from an energy consultant that demonstrates general energy efficient principles are addressed;
2. For retail, commercial and industrial developments involving a gross floor area of greater than 1,000m<sup>2</sup>, submit a report from a suitably qualified consultant that the estimated energy consumption of the proposal will not exceed 900 MJ/am<sup>2</sup> and 450 MJ/am<sup>2</sup> respectively (See Table 1);
3. Use energy efficient lighting to achieve the required energy consumption rating, including:
  - The use of high energy efficient lamps including LED lights, compact fluorescent lights or tubular quad phosphor and troposphere fluorescent lamps with high frequency ballasts instead of tungsten light bulbs (i.e. standard bulbs);
  - Using appropriate lighting lux levels relative to the use of different areas (for example, high lighting levels should be provided for workstations and service areas. (Refer to AS1680 Lighting Standards));

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- Fitting controls to ensure lights are not left on when not required, including automated lighting controls, movement sensors, lux level sensors and voltage reduction units; and
  - Providing energy efficient lighting such as solar, metal halide or sodium discharge lamps for the security of external spaces, such as car parks and controlling external lighting by time and movement sensors;
4. Use energy efficient appliances in offices, such as computers, printers, photocopiers, fax machines, and microwave ovens;

*Refer to the Energy Star website: [www.energystar.gov.au](http://www.energystar.gov.au)*

5. Separate appliances which give off high degrees of heat from the main work areas;
6. Ensure the internal layout of shops is designed so cooling devices such as fridges and freezers do not receive direct sunlight;
7. For businesses which involve food preparation and/or sales of food, use energy efficient cooking and refrigeration appliances;
8. Fit fridges doors; and

*Refer to MEPS website: [www.energyrating.gov.au](http://www.energyrating.gov.au)*

9. Fit open fridges with insulating night covers.

### 2.16.7 NABERS rating scheme

The National Australian Built Environment Rating Scheme (NABERS) is a national rating system that measures the environmental performance of Australian buildings, tenancies and homes and is managed by the Office of Environment and Heritage.

The NABERS scheme covers offices and commercial tenancies, selected hotels, shopping centres and homes. The scheme is being developed for hospitals, schools and data centres.

The key environmental categories covered under NABERS include:

- Energy use and greenhouse emissions;
- Water use;
- Waste; and
- Indoor environment.

The NABERS scheme is voluntary; however, Federal Legislation will require building owners selling or leasing commercial office space greater than 2,000m<sup>2</sup> to disclose their NABERS rating through a Building Energy Efficiency Certificate (BEEC).

*For information on the NABERS scheme visit [www.environment.nsw.gov.au/government/nabers.htm](http://www.environment.nsw.gov.au/government/nabers.htm).*

### 2.16.8 Green Star rating system

Run by the Green Building Council of Australia, Green Star is a national, voluntary environmental rating system that evaluates the environmental design and construction of buildings and communities.



Green Star rating tools are currently available or in development for a variety of sectors, including commercial offices (design, construction and interior fit outs), retail centres, schools and universities, multi-unit residential dwellings, industrial facilities and public buildings.

Businesses and organisations are encouraged to have buildings rated under the Green Star system to help reduce the environmental impact of buildings, improve occupant health and productivity and achieve real cost savings and showcase innovation in sustainable building practices.

*For information on the Green Star Rating system visit [www.gbca.org.au](http://www.gbca.org.au)*