DEVELOPMENT CONTROL PLAN 39

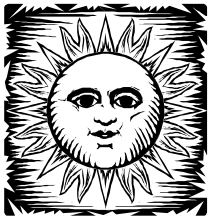
ENERGY SMART BUILDINGS

Adopted by Wingecarribee Shire Council on 13th December 2000

Effective from the 1st March 2001

Amended Effective from the 1st December 2004

Amended Effective from 19 April, 2006



PART ONE - INTRODUCTION

1.1 What does 'Energy Smart' mean?

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

1.2 Why an Energy Smart Building DCP?

This Development Control Plan (DCP) has been developed and amended as part of the growing community desire to achieve greater efficiency in energy use. It stems from a general concern about the effects of greenhouse gases generated by energy use on the environment and, in particular, global warming.

This DCP has been prepared in accordance with Section 72 of the Environmental Planning and Assessment Act, 1979. Its purpose is to provide detailed provisions to ensure the energy efficiency of development within the Wingecarribee Shire.

The objectives are to:

§ Improve the quality and energy efficiency of buildings.

§ Assist professionals, technicians and trades persons by providing relevant information, and resources.

§ Foster partnerships between the Shire Council, State government and industry.

§ Form part of a single comprehensive and integrated set of performance and prescriptive standards to cover all aspects of energy efficient development in NSW.

§ Promote water conservation by requiring AAA rated shower heads, aerators on basin taps, dual flush toilets and rainwater tanks.

1.3 Purpose of this DCP

The purpose of this Development Control Plan is to ensure that development in the Shire is:

- more comfortable to live or work in
- uses less energy.
- costs less to run.
- contributes positively to an overall reduction in greenhouse gas emissions.

1.4 Where does the DCP apply and to which buildings?

This DCP applies to all land in the Wingecarribee Shire.

This DCP shall be cited as Energy Smart Buildings Development Control Plan 39 and was originally adopted by Wingecarribee Shire Council on 13th December 2000 and has been further amended in December 2004 and again in February 2006.

This edition applies to development and/or Construction Certificate applications for relocated building houses, Commercial, Office, retail, Educational and Industrial development (see part 5 for specifics). The requirements for dwelling houses and multi-unit housing like townhouses, villa homes, residential flat buildings, cluster housing and other attached buildings are covered by the New South Wales State Governments BASIX regulations that came into effect on the following dates:

- New dwellings – 1st July 2005
- Multi unit housing – 1st October 2005

For alterations and additions to dwellings, the deemed to satisfy provisions listed in this DCP apply until the BASIX regulations come into effect (expected to be from the 1st July 2006).

The land affected by this DCP is subject to the provisions of Wingecarribee Local Environmental Plan 1989 and a range of other environmental planning instruments including State Environmental Planning Policies and the Illawarra Region Environmental Plan No. 1. Other applicable Development Control Plans are:

- Development Control Pan 44 – Requirements for the Erection of Buildings
- Development Control Pan 41 – Rural and residential Subdivisions
- Development Control Pan 14 – Historic Berrima
- Development Control Plan 47- Robertson
- Development Control Plan 54 - Exeter
- Residential Development Control Plan

1.5 Contents

The DCP is divided into 5 sections.

Part One – Introduction

Part Two – General Principles of Solar Access & Design (Apply to all development)

Part Three –Exemptions

Part Four - Requirements for Relocatable dwellings and alterations and additions to dwellings

Part Five– Requirements for Commercial, Retail, Industrial and Educational developments

1.6 How to determine compliance

Each Development or Construction Certificate application must demonstrate compliance with the requirements and standards set out in this DCP .

Compliance is to be determined by each application satisfactorily addressing the Principles, Intent and satisfying the Performance Criteria specified for the particular usage.

1.7 Definitions

The following terms are referred to throughout this DCP:

Ecologically Sustainable Development (ESD).

A commonly accepted definition of ESD in Australia is development which 'uses, conserves and enhances the community's resources so that ecological processes on which life depends are maintained and the total quality of life, now and in the future, can be increased' (*ref*. *National Strategy for Ecologically Sustainable Development*).

North Point.

In any discussion relating to orientation of a building or part thereof, a reference to 'north' is a reference to true solar north and not magnetic, or compass north. True solar north varies from magnetic north depending upon the location. In Sydney, for example, magnetic north is approximately 13 degrees east of true solar north.

Passive Solar Energy Systems.

Systems which combine the sun's energy with local climate characteristics, to achieve thermal comfort inside buildings without the use of mechanical devices. In a passive system, the building itself is a solar collector, as well as a heat storage and transfer medium.

Solar Collectors.

Any building element, designated space or appliance specifically designed to capture or collect the sun's rays for the benefit of the occupants eg. Windows including clerestory (or highlight) windows, solar hot water collector panels, photovoltaic (solar-electricity) cells/panels.

Gross Leaseable Floor Area means the sum of the areas of each floor of a building where the area of each floor is taken to be the area within the internal faces of the walls including stock storage areas and aisles but excluding stairs, amenities, lifts, corridors and other public areas, but only, where they are not to be used for usages associated with the use of the site, eg dining area, display of goods.

Gross floor area means the sum of the areas of each floor of a building where the area of each floor is taken to be the area within the outer face of the external closing walls as measured at a height of 1400 mm above each floor level excluding:

(a) columns, fin walls, sun control devices and any elements, projections or works outside the general line of the outer face of the external wall;

(b) lift towers, cooling towers, machinery and plant rooms and ancillary storage space and vertical air-conditioning ducts;

(c) car parking needed to meet any requirements of the Council and any internal access thereto;

(d) space for the loading and unloading of goods (source – Environmental Planning & Assessment Act Model Provisions 1980);

2.1 Intent of Energy Efficiency Requirements

Building envelope: to maximise the thermal performance, thermal comfort, and energy efficiency of all new buildings where achievable.

Minimise unwanted winds and draughts in summer and winter while optimising natural ventilation.

Water: to require the installation of energy efficient hot water systems and water efficient devices, that minimise greenhouse gas generation.

Lighting: to encourage maximum use of natural light and minimise energy use for lighting.

Space heating and cooling: to encourage building design which eliminates or reduces the need for fuel based heating or cooling (ie. through insulation, shading, thermal mass, ventilation etc.) and ensures that any mechanical heating or cooling will be energy efficient and minimise the generation of greenhouse gas.

Appliances: to encourage the installation of energy efficient appliances that minimise greenhouse gas generation.

2.2 Performance criteria The intent can be achieved where:

Building envelope: each building is to be designed to try and maximise comfort levels and reduce reliance on artificial lighting and ventilation. Orientate building windows to the North with overhang measures to protect from Summer sun.

Water heating: a hot water system with a greenhouse score, (see Table 1) of 3.5 or greater is installed and which suits the needs of the building.

Lighting: the building should be designed so that reliance upon artificial lighting is minimised in living , office, work spaces and paths of travel during daylight hours.

Space heating and cooling: the selection of an energy efficient heating/cooling system should be made during the building design stage.

Heating/cooling systems should target only those spaces which require heating or cooling, and ensure efficient distribution/redistribution of warm/cool air. Where a space heating and cooling system is installed, it should be selected for maximum energy efficiency.

Appliances: appliances with maximum energy efficiency should be installed.

***Water supply*:** install at least AAA rated water efficient shower roses and aerators on bathroom and kitchen hand basins and sinks and dual flush water closets. Provide rainwater storage tanks for use in watering of on site landscaping and for water closets within the building(s). If water is to be reticulated to basins and kitchen sinks appropriate precautions need to be taken for the disinfection of water and warning sign notation at outlets. Appropriate backflow prevention measures will need to be put in place for the reticulation system for top up facilities.

Table 1 - Typical Greenhouse Scores for Water Heaters

Water Heater Type		**Star Rating**	
Solar Gas Boost*	Storage	5	
Gas	Instantaneous	4	
Gas – storage	High Efficiency	4	
Electric – Storage	Heat Pump	4	
Gas – storage	Low Efficiency	4	
Solar – Electric Boost*	Continuous	4	
Solar – Electric Boost*	OP2	4	Complying ↑
Electric	Instantaneous	2	Non Complying ↓
Electric	Continuous	1	
Electric - storage	Storage (OP1,OP2)	1	

**greater than 50% solar contribution*

The Green house score for water heaters has been determined by DEUS and should not be confused with the star ratings found on gas water heaters.

Background on Possible Design Solutions - Water heating, space heating and cooling, lighting and fixed appliances

Energy consumption is not only a function of the design, orientation and construction of a building. It is also a function of choice of appliances used in a building to heat water or spaces, for lighting, for cooling, for refrigeration, cooking and for washing or drying clothes or dishes. This section addresses energy use in the building, through the systems where there are opportunities for improvements in energy efficiency.

Choice of systems for water heating, or space heating and cooling, should be made in conjunction with the design for a building.

Water heating

In many instances water heating is the biggest greenhouse gas generator. Table One rates hot water systems in terms of greenhouse gas emissions. Generally it shows that gas systems are rated higher than all electric systems except heat pumps and that the most efficient systems are gas-boosted solar. Further, gas systems are comparably priced with continuous supply electric systems with regard to up-front and on-going costs. To increase efficiency, water heating systems should be positioned close to the major points of use such as the staff kitchen or showers.

Space heating and cooling

If a building is designed to optimise its passive solar potential, it is possible to minimise the need for artificial space heating or cooling.

Where they are necessary, ducted air conditioning systems should be 'zoned' to allow targeting of specific spaces. Where financially feasible, zoned control systems should be employed with programmable thermostats in each zone.

To maximise energy savings the control system can be employed to regulate the flow of air between zones by adjusting mechanised dampers in duct work and regulating fan speed according to the number and size of zones being heated or cooled.
Ductwork should be insulated to at least R1.5 and any refrigerant lines insulated with a least 20mm of foam insulation.
Energy efficient or renewable energy space heating and cooling systems are recommended. For example, an active solar system or gas system combined with solar, heat pump reverse cycle air conditioning systems, solar heated hydronic floor heating or heat redistribution system.

Lighting

A building should be designed to maximise the availability of natural light without creating major heat gain or heat loss pathways. Work and pedestrian pathways should maximise the use of natural lighting through the use of windows and skylights.
Light fittings with high efficiency reflectors that are suitable for compact fluorescent lamps or fluorescent tubes can be used. These consume up to four times less electricity than standard incandescent light bulbs to provide the same level of light, and last up to eight times longer.

Some ideas to facilitate planning of efficient layouts and fittings are: Light switches located at room exits encourage the switching off of lights when people leave a room; dimmer switches to provide flexibility; motion-detectors for lighting doorways, entrances or outdoor security lighting; automatic turn-off switches used for other outdoor purposes.

2.3 Landscaping

Performance criteria: Intent can be achieved where:

- Specific areas of a building are targeted to receive sunlight in winter and shade in summer through locations and types of trees, shrubs, vines, creepers etc.
- Landscaping is used to protect against cold winter winds, or to channel summer breezes.

Possible design solutions

This section suggests possible solutions to meet the performance criteria. Adoption of any one or range of suggestions will not necessarily achieve compliance but may contribute.

- Deciduous trees should be planted to the north of the building.
- Tall cylindrical-shaped trees in row plantings are ideal for shading low-angle sun on the eastern and western sides of a building.
- Consider use of mature trees that do not cast a shadow over solar collectors at any time of the year.
- If evergreens are planted within the northern quadrant of a building, they should be spaced well away from the building itself so as not to obstruct the winter sun of any building.
- Variations in mature heights of different species of trees and shrubs should be taken advantage of for shading walls and windows.
- Consider including courtyards sheltered by vegetation (summer only). Vegetation can provide strong shadow over courtyards in summer (eg. deciduous vine over a pergola) and should contribute significantly to comfort levels within a building.

Background principles

Landscaping principles for all buildings are based upon the location and species selection of trees. Trees will influence seasonal solar access, shade and shadows, provide wind breaks, and channel or deflect breezes to suit the needs of the inhabitants.

Deciduous trees to the north will shade a building in summer and help keep it cool. They can also shade the eastern and western sides of a building. In winter, without leaves, deciduous trees will admit sunshine to warm the building.

At midday in mid-winter in Sydney, a tree will cast a shadow approximately twice as long as it is tall, (the length of the shadow will vary with latitude). The higher the latitude (closer to the equator) the shorter the shadow in mid winter and vice-versa.

Tall trees with high, wide canopies and bare trunks (eg. many species of eucalypt) will shade a roof but not walls and windows, if planted near enough to a building such that its walls are not in the canopy's shadow. However, care should be taken to ensure they do not grow tall enough to shade solar collectors to the south.

Vines and creepers can provide an insulative effect if planted close to a building. They trap air between the leaves of the vines and the walls or windows. The process of transpiration, by which leaf moisture is converted to vapour, also provides a cooling effect in summer.

2.4 Building materials selection

This DCP, in specifying particular materials or their applications does not intend to restrict the range of complying materials. Materials not mentioned by this Plan will be dealt with on their merits by the provision of appropriate information at the discretion of Council. The Building Code of Australia provisions need to be considered with regard to Fire Safety.

2.5 Rainwater Tanks

The rainwater tank must comply with the following:-

A tank is to include any prefabricated or modular device designed for the storage of rainwater.

The tank must be designed to capture and store roof water from gutters and downpipes.

The tank must be located behind the building line setback to any street and where visible from a street shall be suitably screened with vegetation or a trellis.

The tank must be located at least 900mm from any property boundary. In situations where all of the State Government's criteria for exempt development under State Environmental Planning Policy No 1 is met or 450mm setback is acceptable.

The tank must not be installed over an easement or other encumbrance or within the zone of influence of any Council main.

The tank and any tank stand must be structurally sound. The height of any tank including tank stand shall not exceed 2.4m above natural ground level without separate Council approval.

The tank shall not be constructed of any reflective materials.

Overflow from the tank shall be directed to an existing stormwater system where it is deemed appropriate for receival of the overflow.

The tank inlet shall be screened or filtered and tank maintained to prevent mosquitos breeding.

Any motorised or electric pump associated with the tank shall not cause a noise nuisance.

If the rainwater tank is to be used for human consumption, the tank is to be installed and maintained in accordance with the NSW Health publication titled 'Guidance on the use of Rainwater Tanks, 1998' including the fitting of a first flush diversion device.

A minimum 50% roof area that must be connected to the rainwater tank.

This requirement does not apply to new relocated dwellings without access to town water. In these locations a larger water tank (minimum 20,000 litres) is required.

2.6 Site analysis

A site analysis may be required to be submitted with the Construction Certificate application in accordance with this section.

Site analysis involves consideration of a range of environmental factors that will influence the site and the building/s to be developed on it (see Figure 2). These factors may well be both internal and external to the site. The complexity of the site analysis will depend on the size and complexity of the project and the characteristics of the site and adjoining land and development.

For small infill projects, a simple annotated plan/diagram showing key site characteristics including true solar north, and relationships to existing trees, buildings and streets may be all that is necessary. For larger sites a more complete analysis including infrastructure, like electricity facilities, will be required.

A typical site analysis diagram comprises:

- Physical characteristics of the site, such as slope, drainage etc.
- Site context: such as adjacent buildings or structures affecting the site, relationship of the site to the street, identification of key features (views, orientation, etc.).
- The overshadowing caused by existing buildings, on or adjacent to the site.
- The orientation of true solar north, and a range of 30o east and 20o west of true north.
- Trees on or affecting the site, identifying location, type, size and condition.
- Prevailing seasonal winds, sun and shade characteristics.

Figure One – Site Analysis Factors for Consideration – Source Leichhardt Council 1994

Part 3 Which developments are exempt from the achievement of Energy Efficiency performance criteria

There are six special conditions under which an exemption can be claimed from the achievement of this policy

1) Allotment overshadowing - the adverse slope of an allotment, existing obstruction or planned or existing development resulting in overshadowing of northerly windows, private or communal open space.

2) Novel construction - where the prescribed assessment techniques do not address or reliably assess the performance of the construction being adopted and there are prima facie grounds for believing the prescribed techniques significantly underestimate the construction's performance.

3) Conflicting guidelines - existing lease and development conditions, other Development Control Plans, Australian Standards or any other Policy or Guidelines that Council determines will have priority over this Plan eg. heritage requirements, which preclude the attainment of the minimum rating requirement.

4) Uneconomic requirements –where it can be demonstrated that the attainment of the required performance measures would require additional expenditure which is not cost effective within a five year period.

5) Uneconomic requirements - Water heater - where it is demonstrated that the installation of a low greenhouse gas emission water heating system (greenhouse score 3.5 or greater) would require additional expenditure which is not cost-effective within a five year period. The technique to establish the uneconomic nature of the requirements is the subject of a guide note available from Council.

6) Adverse impact on material amenity of adjoining land and buildings.

PART FOUR – Requirements for relocated dwellings and alterations and additions to dwellings

The details required with a ***Construction Certificate*** application for relocated homes or alterations and additions to dwellings are:-

Building Envelope

The minimum requirements for:
• **Ceiling insulation** to the minimum level specified in AS 2627.1 – 1993* for your climate zone (www.standards.com.au or contact DEUS) OR **Roof insulation** eg reflective foil if sarking under roof or foil backed anti-condensation blanket for metal roof
• **Wall insulation** to the minimum level specified in AS 2627.1 – 1993 for your climate zone – for both brick veneer and cavity brick. This may not always be practicle for resited buildings and therefore each case will be assessed on its merits.
• **Floor insulation** to the minimum level identified under AS 2627.1 – 1993 for your climate zone
• Provision of appropriate **shading** of living and bedroom and/or north, east and west facing glazing (e.g. eaves, blinds, window tinting, shade cloth, trees) .
References: *Australian Standard for Insulation: AS 2627.1-1993 'Thermal insulation of dwellings – thermal insulation of roof/ceilings and walls in dwellings' [www.standards.com.au]
R-value: An R-value is a numerical value given to insulation. The higher the R-value, the more insulating the product.

Water saving fixtures and tanks

- Relocated homes – 4 000 litres minimum.
- AAA rated water saving devices as specified in Section 2.3 of this DCP

Hot Water system

A minimum 3.5 star rated hot water system as per table one of this DCP.

Note : In respect of Heritage Conservation areas; items of environmental heritage and land in close proximity thereto the requirements of this section shall be considered in conjunction with clauses 27 to 31 (inclusive) of the Wingecarribee LEP and DCP No 14 (Historic Berrima) as they may apply.

PART FIVE – Requirements for Commercial, Retail, Industrial and Educational developments

The following minimum performance measures are required for the separate categories of buildings nominated. See the performance measures outlined in Section 2 of this DCP. Where materials are being proposed that have an inherent insulation value to the equivalent rating specified, details should be submitted for assessment as required.

The following details shall be submitted and shown on development application plans and specifications.

Commercial/Office

Insulation to walls with a minimum R1.5 rating or equivalent

Insulation to ceilings with a minimum R2.5 rating or equivalent

Natural lighting to minimum 50% of office areas and corridors and walkways

Water storage for reticulated usage and water saving fixtures

- Office buildings over 1000 metres square Gross Leaseable Floor area provide 10 000 litres of water storage and add an extra 10 000 litres for every additional 1000 square metres GL floor area.
- AAA rated water saving devices

Hot Water system

A minimum 3.5 star rated hot water system as per Table one of this DCP.

Retail

Insulation to walls with a minimum R1.5 rating or equivalent

Insulation to ceilings with a minimum R2.5 rating or equivalent

Natural lighting to corridors and walkways

Water storage for reticulated usage and water saving fixtures

- Office and retail buildings over 1000 metres square Gross Leaseable Floor area provide 20 000 litres and add an extra 10 000 litres for every additional 1000 square metres
- AAA rated water saving devices

Hot Water system

A minimum 3.5 star rated hot water system as per table one of this DCP.

Industrial Buildings

Insulation to ceilings with a minimum R2.5 rating or equivalent

Translucent roof sheeting over work spaces to a minimum of 20% of the work floor area.

Water storage for reticulated usage and water saving fixtures

- Industrial buildings over 1500 metres square Gross Floor area provide 10 000 litres and add an extra 10 000 litres for every additional 1500 square metres over this figure.
- AAA rated water saving devices

Hot Water system

A minimum 3.5 star rated hot water system as per table one of this DCP.

Educational Establishments

Insulation to walls with a minimum R1.5 rating or equivalent

Insulation to ceilings with a minimum R2.5 rating or equivalent

Water storage for reticulated usage and water saving fixtures

- Educational Establishments to the rate of 10 000 litres per 50 students
- AAA rated water saving devices

Hot Water system

A minimum 3.5 star rated hot water system as per table one of this DCP.