

NSW BUILDING & SUSTAINABILITY INDEX (BASIX)

ABOUT BASIX

The New South Wales Department of Infrastructure and Natural Resources have introduced the Building and Sustainability Index (BASIX) for residential buildings. A BASIX Certificate is now required as part of the development approval process for all new residential buildings (including new multi-unit residential developments such as villas, townhouses and low-rise, mid-rise and high-rise developments) anywhere in NSW. From October 2006 alterations and additions requiring a development application will also require a BASIX Certificate.

BASIX sets sustainability targets for new residential buildings. The requirements are based around set improvements compared to a deemed average residential dwelling. BASIX currently covers three sustainability indices.

- (1) Water – Most new residential dwelling are required to use 40% less water than an average residential dwelling. The water requirement is reduced in Western New South Wales to account for reduced rainfall.
- (2) Energy –The initial energy target for BASIX was set at a 25% reduction in greenhouse gas emissions compared to an average dwelling. In July 2006 that energy target increased to 40% for most new homes. The maximum target applies to 80% of all new NSW dwellings.
- (3) Thermal Comfort – Ensures that the heating and cooling efficiency of the home is acceptable. Can be satisfied through a number of deemed to comply (DTC) measures¹ or whole of home verification using software such as NatHERS². The heating and cooling links into the Energy index.

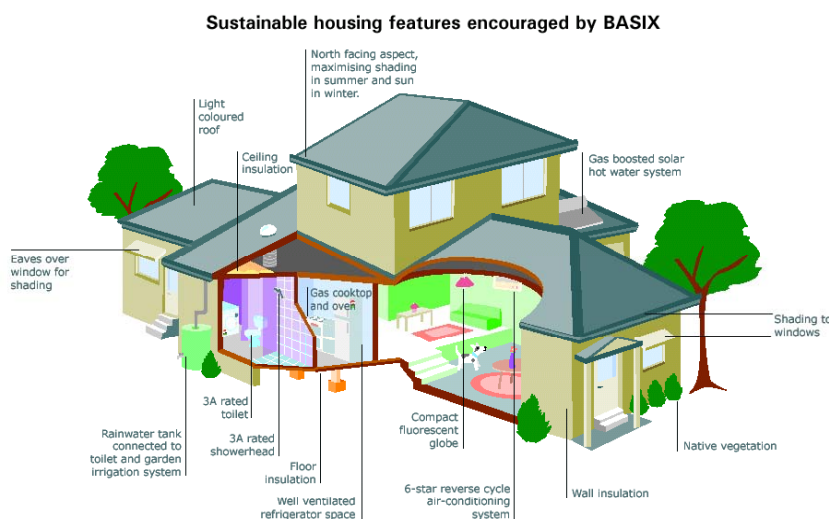
The current factors that affect the BASIX indices are:

BASIX Index	Affected By:
Water	landscape, rainwater tank, stormwater tank, irrigation, evaporative cooling, showerheads, tap fittings, toilets, swimming pools
Energy	active cooling and heating, hot water, lighting, cooking, swimming pool and spa, design enhancements, alternative energy supply
Thermal Comfort	construction, added insulation, glazing, shading, ventilation, roof colour

The impact of appliances on the indices is currently ignored.

BASIX applied in full has many other indices, including stormwater, landscape, waste, materials, transport and social. There is currently no firm timeframe for the implementation of other BASIX indices.

A BASIX Certificate can only be obtained from the BASIX web site using the BASIX interactive tool³.



- 1 BASIX provides two DTC thermal comfort methods. (A) DTC Rapid is a simple option to cater for basic single storey, slab on ground, brick veneer or fibro homes. (B) DTC DIY (Do-it-yourself) is a more comprehensive and flexible option.
- 2 NatHERS (Nationwide House Energy Rating Software) is the current Australian benchmark computer software for assessing the thermal performance of houses.
- 3 BASIX Assessment Tool web site: http://www.basix.nsw.gov.au/basix_home.jsp

BASIX IMPLICATIONS

In order to comply with the water requirement most new homes will require water efficient fixtures and a water tank connected with the toilet and garden irrigation system.

In order to comply with the energy requirement new homes will require low energy low greenhouse gas emission features. Compliance measures would typically include a gas instantaneous or solar hot water system, energy efficient lighting and a high performance air-conditioner if one is to be installed. Very large homes may also need to install renewable energy, such as photovoltaic panels.

Compliance with thermal comfort can be demonstrated using one of two deemed to comply (DTC) methods, Rapid or DIY (Do-it-yourself), or use a whole of home verification method. The DTC methods have a series of requirements that must all be satisfied to demonstrate compliance. DTC Rapid is designed to be simple and is limited to basic single storey, slab on ground, brick veneer or fibro homes. DTC Rapid sets minimum eave width to all glazing, insulation in walls, ceilings and roofs and a maximum glass area based on the floor area based on the climate zone. DTC Rapid requires sarking or wind driven ventilators under the roof regardless of the colour. DTC DIY is more comprehensive and flexible than DTC Rapid. DTC DIY requires more information however can result in a more economical design. For instance, DTC DIY allows for light coloured roofs to omit foil at the roof and will compensate for blanket and foil, whereas DTC Rapid will not. Whole of home verification requires computer simulation of the thermal performance of the home to demonstrate compliance using software such as NatHERS.

Specific impacts from the thermal comfort requirement on building practice for the steel market include:

- The practice of using conventional blanket and foil insulation alone as the preferred means to insulate steel roofs in most parts of NSW will change.
 - DTC Rapid requires ceiling insulation irrespective of the presence of blanket and foil at the roof.
 - DTC DIY only allows this practice for homes with light coloured roofs and slab-on-ground in Sydney (Zone 5) and northern coastal NSW (Zone 2). However, the blanket thickness required may limit the choice of cladding profile.
 - This practice may be possible in limited cases when using whole of home verification, such as NatHERS modelling, depending upon the design of the home and its location.
- BASIX encourages light coloured roofing to minimise cooling costs and peak summertime power demand. COLORBOND® steel has a number of qualifying light colours in its standard product range. These are clearly identified at the BlueScope Steel and SteelSelect website⁴.
 - Under DTC DIY light colours require no insulation at the roof, whereas foil must be installed at the roof as a minimum for dark and medium coloured roofs.
 - Medium and dark coloured roofs could also qualify for no insulation at the roof, however this would require verification using whole of home verification, such as NatHERS modelling.
- For roofing, a thermal break is required for the rare case where both lightweight roof cladding and ceiling lining are directly attached to the supporting metal purlin or batten. This may be encountered for some roofs with exposed rafters. In this case blanket and foil between the roof cladding and batten provides an acceptable thermal break. Alternatively any other material that has an R-Value of at least 0.2 may be used between the roof cladding and metal purlin or batten.
- For most of populated NSW (Zones 5 and 6) an additional R1.5 insulation is required in brick veneer and clad walls. Cavity brick walls now require additional insulation otherwise the stringency on glazing is increased accordingly, which may impact on window areas or the need for double-glazing. The requirement for cavity brick walls makes framed wall construction more favourable.
- The colder climate zones of NSW require more insulation. Where bulk insulation is used between framing the frame depth must be suitable to accommodate the thicker insulation.
- Lightweight cladding, such as weatherboards, fibre cement or metal sheeting fixed directly to a metal frame must have in place a thermal break. Having a material between the metal frame and cladding of at least R0.2 satisfies the thermal break. This can be satisfied using board insulation, 12mm thick EPS strips along the studs or battening out the cladding.
- Other than northern coastal NSW (Zone 2) all suspended floors require insulation. The insulation requirement would typically be met using a foil-based solution.

⁴ See <http://www.bluescopesteel.com.au> or <http://www.steelselect.com>

STEEL RELATED BASIX FAQ'S

- Q** How can steel products help meet the BASIX water requirements?
- A** In order to comply most homes will require a water tank connected with the toilet and garden irrigation system. BlueScope Steel can provide a water tank and all accessories, including a COLORBOND® steel roof, which is the ideal material for capturing rainwater, to maximise the quantity and quality of collected rainwater.
- Q** What size water tank is required under BASIX?
- A** BASIX does not demand that a water tank is installed, however in most cases it would be difficult to economically meet the 40% water reduction target without a rainwater tank. When used as part of water saving strategy to meet BASIX, the minimum tank size will depend upon other water saving strategies that you have adopted, the rainfall in your region and the area of roofing used for collecting rainwater. According to information contained at the BASIX web site a typical 3 bedroom home in Sydney would require an average rainwater tank size of 5000 litres⁵.
- Q** Does roof colour make a difference to the energy efficiency of a home?
- A** Yes. In warm and moderate climates light coloured roofs have less total heating and cooling compared to darker coloured roofs. In all climates using a light coloured roof reduces the total and peak-cooling load. This will reduce air conditioner use, which can greatly reduce the infrastructure strain of meeting peak summertime electrical loads.
- Q** Does roof colour make a difference to BASIX?
- A** Yes when using DTC DIY. Dark and medium coloured steel roofs require foil installed directly beneath the roof, whereas light roof colours do not.
No when using DTC Rapid. The method does not allow colour as a variable.
Yes when using NatHERS – but it may not influence the final insulation details. NatHERS modelling only accounts for annual energy loads. For cooler climates and with high levels of roof insulation the benefit of light colours on annual energy is reduced. A small benefit may not lead to a practical difference in the required insulation. The DTC method leads to practical differences as it also accounts for the benefits of reduced peak cooling loads.
- Q** Can I use blanket and foil alone as a means to insulating the roof and ceiling?
- A** No when using the DTC Rapid. Insulation must be placed at the ceiling level.
In some cases when using DTC DIY. This practice may apply to dwellings with light coloured roofs and slab-on-ground construction in northern coastal NSW (Zone 2) and Sydney (Zone 5). In Sydney 100 mm blanket and foil is required, which will create issues for installation beneath many pierced fixed profiles.
Possible but unlikely when using whole of home verification, such as NatHERS. In most cases additional insulation would be required at the ceiling. It is difficult to model the full benefit of blanket and foil within NatHERS. NatHERS limits the amount of insulation at the roof and underestimates the summer time performance of foil at the roof. NatHERS is limited to R1 blanket and foil at the roof. Conventional 75 mm blanket can have an insulation value about twice that allowed in NatHERS. A new version of the software, AccuRate, is being developed that will better account for the value of blanket and foil. AccuRate should be released late 2006.
- Q** If I use blanket and foil do I receive a concession on ceiling insulation?
- A** No when using DTC Rapid.
Yes when using DTC DIY. The required ceiling insulation is progressively reduced as blanket and foil insulation is increased. In some instances blanket and foil can eliminate the need for ceiling insulation. Blanket and foil insulation can be selected up to a thickness of 100 mm. Note that installing 100 mm blanket and foil will create issues for installation beneath many pierced fixed profiles.
Yes when using whole of home verification. NatHERS partially accounts for blanket and foil and it is likely that ceiling insulation may be reduced. Note that NatHERS currently does not cater for blanket and foil thicker than 55 mm and it treats the value of foil conservatively (assumes its upward heat flow resistance). A new version of the software, AccuRate, is being developed that will better account for the value of blanket and foil. AccuRate should be released late 2006.

⁵ *Changes to the BASIX tool from 1 July*, New South Wales Department of Infrastructure, Planning and Natural Resources, June 2005.

- Q** Should I use blanket and foil beneath the roof even though BASIX only requires foil?
- A** Only if you want to minimise rain noise. Whilst the blanket and foil will increase the thermal performance of the roof the main benefit of installing blanket and foil in this case is to reduce rain noise. Blanket and foil also represents a better solution to noise created from thermal movement, particularly for dark coloured roofs.
- Q** Should I use foil beneath the roof even though it is not required under BASIX?
- A** Yes it is advisable if the home is located in a cold region of NSW or in an area known to have moisture problems – otherwise it is your choice. Foil offers condensation protection, improves thermal performance and roof space conditions, and reduces noise from thermal movement. If you want to also minimise rain noise then you should consider using a thin layer of blanket and foil.
- Q** Does steel wall cladding make a difference under BASIX?
- A** No. Under the DTC methods the insulation required for metal wall cladding is the same as required for timber, weatherboard, cement sheet and brick veneer walls.
- Q** Does all metal framing require a thermal break?
- A** No, most forms of common metal frame construction do not require a thermal break. Thermal breaks are only required when a low resistance external cladding and an internal lining are directly fixed to a metal frame and insulation is placed within the cavity created by the frame. The metal frame acts as a heat bridge through the insulation. For the purpose of BASIX, this only applies to metal frame walls with lightweight cladding, such as weatherboards, fibre cement or metal sheeting, and roofs with exposed rafters where the metal batten or purlin is directly fixed to the lightweight roofing and internal lining.
- Q** Why do some metal frames require a thermal break?
- A** Metal and timber framing are both subject to conductive bridging through the frame and convective bridging around insulation edge gaps. Metal has a high conductivity and therefore when the metal frame directly links the external cladding and internal lining excessive heat leakage can occur through the metal frame. In this instance a thermal break is required to ensure good thermal performance. The thermal break also provides other benefits. The inclusion of the thermal break on the external side of the metal frame helps keep the frame warm. The warm frame reduces the potential for condensation within the wall cavity thereby improving the durability of the building. In walling applications the use of EPS strips can also provide your building with secondary protection from moisture by creating a cavity behind the external cladding, which is a requirement in New Zealand for direct fixed cladding, such as weatherboards.
- Q** Where required, how do you meet the thermal break requirement?
- A** The direct path through the metal frame between the external cladding and internal lining must be broken. The break must have an R-Value of at least 0.2. This can be achieved in various ways
- by using board type insulation attached to the metal frame, such as EPS board, or
 - by creating an air space, such as battening out the cladding, or
 - by placing strips of material along the frame, such as 12 mm EPS strips.
- It is preferable to place the thermal break on the external face of the metal frame as this ensures that the frame remains warm, reducing condensation risk thereby improving the durability of the building.

