

DESIGN AND PLACE SEPP

Sustainability in Residential Buildings

8. Will the higher standards increase the cost of construction?

Modelling from the cost-benefit analysis by ACIL Allen found that an average house in Western Sydney will cost an additional \$7,152 to build, and an average high-rise apartment unit an additional \$831 to \$953 to satisfy the higher standards. However, these costs over the lifetime of a mortgage are offset by the lower ongoing energy bills, which will also increase the household's disposable income. Examples of projected energy bill savings are outlined in the response to Question 9 below.

9. What are the benefits of the higher standards?

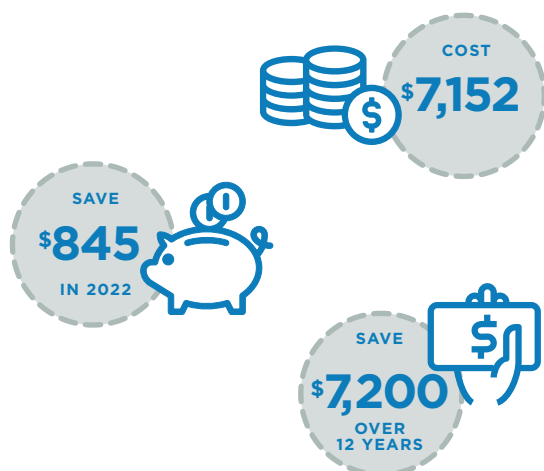
Cheaper energy bills

Occupants of homes meeting the proposed higher standards will use less energy. Estimated energy bill savings, based on forecast 2022 energy prices, will vary with locations and building types:

- Occupants of new high-rise apartment blocks in suburban Sydney could save between \$91 and \$196 on yearly energy bills.
- Occupants of houses in Western Sydney can save \$840 to \$850 on yearly energy bills in 2022. Those living in large houses in Western Sydney could save \$365 on yearly energy bills.
- Energy bill savings for people living in regional areas varies with locations. Those in Wagga Wagga will save \$330 and those in Dubbo could save \$981 on yearly bills.

The energy bill savings will also reduce financial stress on households.

An average home meeting the higher BASIX standards will:



More comfortable homes

Homes meeting the proposed higher thermal performance standards will be naturally cooler in summer and warmer in winter. Occupants won't need to turn on the heater or air conditioner as often.

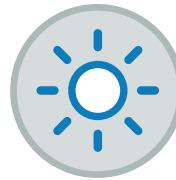
Lower carbon emissions

The proposed higher standards will reduce emissions by another 150,000 tonnes a year, which is equivalent to planting 485,000 trees.

Living in homes meeting higher BASIX standards will:



Save money



Be more comfortable



Feel better

10. Does the proposed higher BASIX standard allow all-electric homes?

Yes. Homes with electric heat pump hot water systems, efficient reverse cycle air conditioners and induction cooktops can achieve the higher BASIX standard. These homes are net zero carbon-ready as renewable energy systems such as solar panels can offset their greenhouse gas emissions.

Cost-benefit analysis – overview

ACIL Allen prepared a report that investigates the costs and benefits of increasing BASIX standards. Frequently asked questions about the report are answered below.

1. What is the purpose of the cost-benefit analysis?

The purpose of the BASIX cost-benefit analysis is to evaluate the advantages and disadvantages of setting higher thermal performance requirements and energy standards for buildings. These proposed BASIX standards align with the proposed increases in energy-efficiency requirements in the National Construction Code, which are planned for 2022.

In its analysis, ACIL Allen follows a similar methodology to the Consultation Regulation Impact Statement for the proposed increases in National Construction Code 2022 requirements, released on 20 September 2021.

2. What options did the analysis consider?

BASIX cost-benefit analysis models the extra upfront costs and benefits from the higher thermal performance and energy standards based on the 2 options (Options A and B).

Table 1 summarises the specifications for the 2 options.

The BASIX water standards stay the same and are not considered in the cost-benefit analysis.

3. What does the analysis show?

The cost-benefit analysis estimated the costs and benefits associated with the higher BASIX standards at the statewide and individual household levels.

The cost-benefit analysis found that both Options A and B produced a benefit-to-cost ratio (BCR) of less than one at the statewide level. A BCR of less than one means that the option is not cost beneficial and results in a net cost.

Option A has a BCR of 0.36 after benefits from energy savings, carbon emission offsets and quantifiable health benefits are included. In other words, Option A is estimated to bring \$0.36 of benefits to NSW from each dollar spent.

The BCR of Option B is lower at 0.16, or a benefit of \$0.16 from each dollar spent.

Table 1. Options A and B in the BASIX cost-benefit analysis

OPTIONS	SPECIFICATIONS
Option A: A higher increase in standards	Thermal performance: – Equivalent to 7 stars, as defined by the Nationwide House Energy Rating Scheme (NatHERS)
	Energy standards: – 30% lower energy use budget than Option B – Two scenarios with gas and electric hot water systems were considered
Option B: A lower increase in standards	Thermal performance: – Equivalent to 7 NatHERS stars
	Energy: Consider the outcomes equivalent to the central case specifications in the Consultation Regulation Impact Statement for the National Construction Code: – Heating and cooling equipment: equivalent to 3-star rated air conditioners – Hot water system: 5-star gas instantaneous system – Lighting: 4 Watts per square metre

In contrast, the BCRs of the options at an individual household level are much higher, especially under Option A. The BCRs for dwellings considered in the cost-benefit analysis are higher than one, except for the house modelled in Ballina (North Coast climate zone) (DH9*) and the low-rise apartment building (LR*) across NSW.

BCRs between the statewide and individual household levels are significantly different because:

- wholesale energy prices are used to estimate the benefits of reduced energy consumption at the statewide level, while retail prices are used to measure BCR at the household level
- other energy users may need to pay more in energy bills to compensate for the bill savings from households in new homes that meet the higher standards, as energy retailers need to recover the fixed network costs and other overhead costs
- the cost-benefit analysis does not quantify some of the benefits to health and wellbeing of occupants, and indirect effects on the energy system and public spending.

Based on results at the individual household level, higher BASIX standards could apply to locations and building types with BCRs higher than one under Option A – that is, new homes across NSW, except houses in the North Coast climate zone and apartment buildings of 5 storeys and lower.

4. Are there any differences between the National Construction Code impact statement and the BASIX cost-benefit analysis?

Yes. The BASIX cost-benefit analysis examines the effects of the proposed increases in more detail. This includes;

- expanding the dwelling sample to cover more locations in NSW.
- investigating the extra costs and benefits relative to the current BASIX requirements in NSW.

Apartment buildings

The BASIX cost-benefit analysis considers the energy standards for apartment buildings. This includes the energy efficiency of units as well as shared services. For example, central hot water systems and solar panels.

The impact statement for the National Construction Code considered apartment units only.

**These are codes used in the CBA report*

Proposed changes to the National Construction Code 2022 only cover the energy efficiency requirements of units.

Calculations in the BASIX cost-benefit analysis are consistent with the impact statement for the National Construction Code.

The BASIX calculation method was used to calculate energy savings between the options and the business-as-usual scenarios. The calculations will be different from those reported in the impact statement for the National Construction Code.

Appendix B of the BASIX cost-benefit analysis explains how it differs from the impact statement for the National Construction Code.

5. Does the BASIX cost-benefit analysis use the same base case as the National Construction Code impact statement?

For thermal performance, yes.

For thermal performance, the BASIX cost-benefit analysis has the same base case as the National Construction Code impact statement. The base case is set at 6 NatHERS stars for all jurisdictions. Both the BASIX cost-benefit analysis and National Construction Code impact statement recognise that there is a level of over-compliance, and many dwellings are built at ratings higher than 6 stars.

For energy usage, no.

The base cases used in the BASIX cost-benefit analysis were higher than the baseline for the National Construction Code impact statement because:

- the 2019 National Construction Code provisions do not have the same performance-based requirements for energy usage that covers the entire house as BASIX does
- base cases in BASIX cost-benefit analysis were determined by how BASIX-affected buildings satisfy the current BASIX standard for energy.

6. What greenhouse gas emission factor did the analysis use for grid electricity?

ACIL Allen used the 2021 emissions factor from grid electricity in NSW to calculate the greenhouse gas emissions from operation of the base-case buildings.

They used projected emission factors from 2022 onwards to estimate emissions from the operation of buildings considered under Options A and B.

Emission factor from grid electricity is the amount of greenhouse gas (for its carbon dioxide equivalent, CO₂-e) emitted from a unit of electrical energy generated and transmitted through the grid to households.

7. What energy prices did the analysis use?

Wholesale energy prices were used for the economy-wide modelling of benefits. Retail energy prices were used to model benefits at the household level.

These energy prices were also used in the Consultation Regulation Impact Statement for the National Construction Code.

8. Did the analysis model prices of gas and electricity over time?

Yes. ACIL Allen modelled the price of gas and electricity going up over time from 2022 to 2061. The forecast prices of gas and electricity generally increase from 2022 to 2040 and remain steady from 2040 to 2061.

9. How do the options in the analysis compare with homes being built in NSW now?

The comparisons vary for locations across NSW.

For a detached house in Sydney:
—10% of homes have BASIX energy scores equivalent to Option A or higher
—15% of homes have BASIX energy scores equivalent to Option B or higher.

For houses in Ballina, however:
—70% of homes have BASIX energy scores equivalent to Option A or higher
—All homes achieve BASIX energy scores equivalent to Option B.

10. How do hot water systems and air conditioners in the analysis compare with homes being built in NSW now?

Approximately 76% of houses in NSW have gas instantaneous hot water systems that meet current BASIX requirements.

The analysis considered that most of the houses would still specify gas instantaneous systems in Options A and B.

Less than 5% of houses in NSW have specified air conditioners with the same efficiency as the 3-star rating. The analysis considered that 3-star air conditioners will be specified in Option A (electric hot water system) and Option B.

The heating and cooling system specifications in Option A (gas hot water system) are typical in houses over-compliant with current BASIX requirements. Around 20% of the houses in Sydney are over-compliant with current BASIX requirements.

11. Does Option B require air conditioners? Homes with good passive design do not necessarily need them.

A home with good thermal performance has a reduced need for heating in winter and cooling in summer.

We have assumed in the cost-benefit analysis modelling that installing an efficient air conditioner will service the modest heating and cooling needs of a NatHERS 7-star home. Of course, installation of an active heating and cooling system (such as an air conditioner) is a choice for those building a new home. Upfront costs could be reduced by relying on the sun to warm the home in winter, and shading and good air flow to cool in summer.

12. Did the analysis consider how the extra costs might be offset, such as choosing to build smaller houses?

The extra upfront cost of meeting the proposed BASIX standards has little effect on disposable income when factored into the average mortgage over 25 years. This is because a small increase in monthly mortgage payments is offset by energy bill savings.

A smaller build would reduce both the upfront cost of construction and energy bills because less energy would be required to heat and cool the home.



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