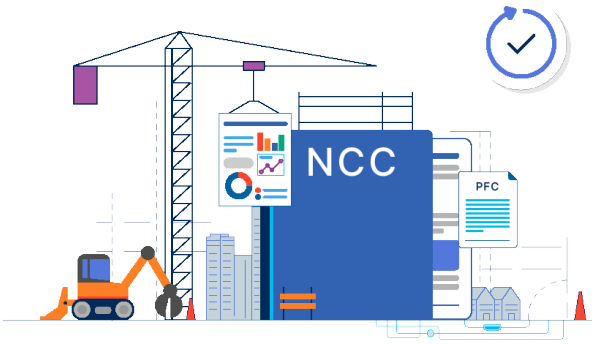
Australian Building Codes Board

NCC Volume One NCC Public Comment Draft – Energy Efficiency



Response Sheet

Your details

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NCC Volume One Part J

Response(s)

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Provisions ☐ Livable Housing Design Standard

Clause/Figure/Table: J1P1

Focus questions to consider when suggesting any changes:

What drafting changes (if any) should be made to clarify that embodied carbon is excluded from this Performance Requirement?

Recommended change to draft:

J1P1 Energy use and greenhouse gas emissions
A building, other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, including its services, must have features that ~~facilitate the efficient use of energy appropriate to~~—
(a) facilitate the efficient near zero use of operational energy and operational greenhouse gas emissions appropriate to—

(i) the function and use of the building; and
(ii) the level of human comfort required for the building use; and
~~(b) solar radiation being —~~
~~(i) utilised for heating; and~~
~~(ii) controlled to minimise energy for cooling; and~~
~~(c) the energy source of the services; and~~
~~(d) the sealing of the building envelope against air leakage; and~~
~~(e)~~(b) for the ~~a~~ conditioned space, achieve an hourly regulated energy consumption and associated operational greenhouse gas emissions, averaged over the annual hours of operation, of not more than—
a. for a Class 6 building~~, 80~~40 kJ/m².hr and 4 g of CO2-e/m2.hr; and
b. for a Class 5, 7b, 8 or 9a building other than a ward area, or a Class 9b school, ~~43~~22 kJ/m².hr and 2.2 g of CO2-e/m2.hr; and

c. for all other building classifications, ~~15~~8 kJ/m².hr and 1 g of CO2-e/m2.hr.

(Note: J1P1 does not impose any requirements to measure or reduce the embodied emissions arising from the construction of a building).

Comment/reason for change:

Clarifies it is for operational GHG only in the text of the clauses, and the Note to confirm

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Clause/Figure/Table: J1P4

Focus questions to consider when justifying any changes:

What drafting changes (if any) should be made to clarify what is meant by “the maximum practicable extent” of renewable energy generation equipment? Consider consistency and quantification.

This is a difficult question - it relies just as much on the planning restrictions imposed on a site as the technical limitations on installation of renewable energy; as well as they type of renewable energy envisaged. Rooftop solar has obvious limitations as applied in the associated DTS provisions. Other than rooftop installations will be heavily influenced by the local planning and council authorities.

Recommended change to draft:
J1P4 Renewable energy and electric vehicle charging
(1) A building must have features that facilitate the future installation of—
(a) on-site renewable energy generation and storage equipment, except where on-site renewable energy generation equipment is already installed ~~to the maximum practicable extent~~; and

(b) in a Class 2 building, electric vehicle charging equipment sufficient to serve the daily driving needs of all building occupants; and

(2) A Class 3 building or Class 5 to 9 building must contain electric vehicle charging equipment capable of serving at least 20% of the daily driving needs of all building occupants.

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Comment/reason for change:

The maximum practical extent is ambiguous and defies quantification.

The need for onsite renewable energy to a maximum extent is unnecessarily duplicative and will result in over-provision. This likely penalises building users where time of use tariffs are now much more likely in states and announced in NSW and foreshadowed under the NEPS, but ignored by the provision.

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Clause/Figure/Table: J1V3

Recommended change to draft:

J1V3 Verification using a reference building
(1) For a Class 3, 5, 6, 7, 8 or 9 building or common area of a Class 2 building, compliance with J1P1 is verified when—
(a) It is determined that the annual operational greenhouse gas emissions of the proposed building are not more than the annual operational greenhouse gas emissions of a reference building ~~when~~—
~~(i) the annual greenhouse gas emissions of the proposed building are not more than 90% of the annual greenhouse gas emissions of a reference building when the proposed building is modelled with the proposed services; and~~
~~(ii) the annual greenhouse gas emissions of the services of the proposed building are not more than the annual greenhouse gas emissions of the services of the reference building when the proposed building is modelled with the same services as the reference building;~~
and…
(b) in the proposed building—.

…
(2) The annual operational greenhouse gas emissions of the proposed building may be offset by—
(a) renewable energy generated and used on site; and
(b) another process such as reclaimed energy, used on site, where
(c)the renewable or reclaimed energy is in excess above the minimum requirements of J9D5
(3)~~(2)~~ The calculation method used for (1) and (2) must comply with—
(a) ANSI/ASHRAE Standard 140; and
(b) Specification 34; and
~~(b)~~(c) Specification 49.

Comment/reason for change:

(1) Requiring the proposed building not exceed 90% of the reference building is ‘double dipping’ on stringency. The new DTS provisions require a reference building to be modelled under are already reflective of the increased stringency of the performance requirements.
(2) Justification is alignment with other verification methods (which are optional) not reflective of stringency under NCC 2019.
(3) These were recognised in NCC 2019 as a reduction in regulatory burden where a performance solution to recognise their equivalence despite the market choosing to

exceed the NCC stringency. They therefore represent an aspirational level of performance – not a minimum standard.

(4) Further, there is a concern with the nominated climate files will drive the modelled outcomes, as an artefact of assumption choice rather than justified by current or near-term loads. Climate scenario RCP 8.5 which represents the highest emissions scenario forces higher temperatures on buildings relative to other equally plausible futures and HIA hold strong reservations the technical modelling has been influenced by similar choices (see comments under J4D4 and J4D6 and Specification 37).

(5) The assumption has been made that all buildings have all addressable roof space for solar PV taken up, and therefore none left for offsetting.

(6) Not all buildings have large, air-conditioned space respective to available roof space, and this also ignores other alternative energy sources.

(7) Removal of offsetting moves industry further away from a 'net' analysis of energy and GHG emissions – we should be moving toward more holistic measures including allowable trade-offs, not to a more piecemeal element by element approach.

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Clause/Figure/Table: Specification 34

Recommended change to draft:

(1) The annual greenhouse gas emissions must be calculated for the proposed building and the reference building using
the same—
(a) annual greenhouse gas emissions calculation method; and
(b) greenhouse gas emissions factors in accordance with (2); and
(c) location in accordance with (3); and
~~(d) climatic data, using a projection at year 2050 made under a Representative Concentration Pathway with an 8.5 W/m² increase in radiative forcing; and~~
(d)~~(e)~~ adjacent structures and features; and

Comment/reason for change:
Nominated climate files RCP 8.5 represents the highest emissions scenario forces higher temperatures on buildings relative to other equally plausible futures. HIA hold strong reservations the technical modelling has been influenced by similar choices. Perverse impacts on energy outcomes in currently cool climates (heating dominant) by assumed increasing heating load and building occupant energy bills in the short term.

It is likely claimed (and actual) benefits would not be as high under other equally plausible scenarios.

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Clause/Figure/Table: J3D5 J3D3, J3D7

J3D3

(1) The sole-occupancy units of a Class 2 building or a Class 4 part of a building must—

a. for reducing the heating or cooling loads—
    i. collectively achieve an average energy rating of not less than 7 stars, including the separate heating and cooling load limits; and
    ii. individually achieve an energy rating of not less than 6 stars, including the separate heating and cooling load limits; and
b. for thermal breaks, comply with J3D5 ~~and J3D6;~~ and
c. for compensating for a loss of ceiling insulation, other than where the house energy rating software has compensated for a loss of ceiling insulation, comply with Table J3D7w; and
d. for general thermal construction, comply with J4D3; and
e. for floor edge insulation, comply with J3D10(3), J3D10(5) and J3D10(6); and
f. for building sealing, comply with Part J5.

Recommended change to draft:

J3D5 Roof thermal breaks of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

(1) A metal-framed roof that—

(a) has metal sheet roofing directly fixed to metal purlins, metal rafters, or metal battens; and
(b) does not have a ceiling lining or has a ceiling lining fixed directly to the same metal purlins, metal rafters, metal battens or the like, must have a thermal break, consisting of a material with an R-Value of greater than or equal to R0.2, installed between the metal sheet roofing and the same supporting metal purlins, metal rafters, or metal battens or the like.

Comment/reason for change:

The proposed change is significant for sections of the industry, requiring thermal breaks in scenarios without strong evidence.

This proposed change recognises the explanatory information that when a metal framing member directly connects the external cladding to the internal lining or the internal environment. Thermal losses in energy are now addressed under compensation for thermal bridging and local losses are only likely where the cladding is directly fixed to the same member (e.g. studs).

The location of the thermal break is critical for its effectiveness but there the clause suggests several thermal breaks are required. More clarity is required in the drafting.

If there is a drained and ventilated cavity created by the batten, top hat or similar item, then the interior of that cavity should approximate the temperature of the external environment fairly rapidly over time, less any shading effect. If the thermal break is located between the top-hat or batten and the cladding (i.e. cladding>thermal break>top hat>framing>lining), then it is not continuous with the bulk insulation and also leaves the face of the structural framing

the internal lining is attached to exposed to the conditions within the ventilated cavity. This may lessen the effectiveness of the thermal break or promote condensation risk.

It is more effective to have the thermal break against the framing member, then the top hat, then the cladding (i.e. cladding>top hat>thermal break>framing>lining)

Suggest appropriate clarification including diagrams, supported by modelling to prove the solution performs adequately.

However, the structural impact of including a thermal break in these systems must also be assessed prior to enforcing a thermal break; HIA is concerned the various approaches and lack of connection details could lead to attachment issues. Particularly where the thermal break might be located between cladding and the frame providing bracing for the frame.

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Clause/Figure/Table: J3D14

Recommended change to draft:
Adopt a simple concordance method which excludes the need to offset pump energy for CEHW with PV.

Comment/reason for change:

HIA welcome the recognition of centralised hot water systems as an option. Hhaving to reference an ‘equivalent water heater’ and then applying a series of calculations and adjustments makes the proposed approach overly complicated for very small improvement in accuracy and discourage its use leading to higher emissions overall.

The methods to adjust for energy use a method which requires finding an approximate and adjust for known differences.

There are two areas where stringency can be overshot or undershot:

- **Simple concordance**, as the name suggests, could lead to **over complying** on the basis (backed by evidence) most would have superior performance for both gas burner and heat pump.
- CHW have lower storage loss due to less water per unit stored and lower loss as volume increases.
- Distribution losses based on Swedish data put losses between 18-25% from small and large apartments which is comparable with Class 1.
- **Concordance with adjustment** requires offsetting pump energy loss. Pump energy loss is small (2-4%), is more than the margin of error in the comparison between stand-alone HW and CHW
- This will likely require dedicated PV equivalent to 6kW for a 50 apartment building, which as J9 and other HIA comments already establish is difficult in many class 2 scenarios, and not mandatory make PV more likely despite electrification.

HIA is aware of work underway to develop a set of dedicated factors for centralised water heater systems, we favor a simplified assessment to reduce the burden on industry, designers, certifiers in the interim.

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Clause/Figure/Table: J4D3

Recommended change to draft:

Suggest provision of some informative diagrams demonstrating J4D3(1)(a) and J4D3(1)(b)

Comment/reason for change:

Diagrams help remove any potential ambiguity in interpretation of the written clause. What is a ‘continuous barrier with a ceiling’?. What is ‘continuous below and around a box gutter’?

Box gutters are not always in line with the bulk insulation and may occur 2-300mm above the line of the insulation. The clause may not be practical to achieve.

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Clause/Figure/Table: Schedule 1

Recommended change to draft:

Envelope: For the purposes of—

(a) Sections J and Part F8 in NCC Volume One, the parts of a building’s fabric that separate a conditioned space or habitable room from—

(i) the exterior of the building; or

(ii) an internal non-conditioned space where the temperature is primarily determined by external ambient conditions due to the presence of unsealed openings and/or wall, floor or roof elements that are not required to be insulated or airtight, and thermal loads are not addressed by the air conditioning and ventilation services.

Comment/reason for change:

The proposed updated drafting added “temperature primarily determined by external ambient conditions” but this seems ambiguous and prone to differing interpretation. HIA suggest an example of a space which is not conditioned but not determined by external ambient conditions be included.

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Clause/Figure/Table: Schedule 1

Recommended change to draft:

House Energy Rating Software: House energy rating software: For the purposes of—

(a) Volume One—,

(i) applied to J~~1~~1V5—software accredited under the Nationwide House Energy Rating Scheme (NATHERS) ~~and~~ (including where that software has the additional functionality provided in non-regulatory mode); and;

(ii) applied to J2D2, J3D3 or J3D15—software accredited under the Nationwide House Energy Rating Scheme (NATHERS); or

(b) Volume Two—

(i) applied to H6V2—software accredited or previously accredited under the Nationwide House Energy Rating Scheme (NATHERS) and the additional functionality provided in non-regulatory mode; and

(ii) applied to Specification 42—software accredited under the Nationwide House Energy Rating Scheme (NATHERS).

Comment/reason for change:

J1V5 formerly prevented use of house energy rating software. The new addition of “and the added functionality provided in non-regulatory mode” to the definition for the purpose of J1V5 could suggest NATHERS could be used for J1V5 as long as the non-regulatory functionality was not included, which we don’t believe to be the intent. If the intent is to prevent use of the NATHERS software even if it includes appropriate features in non-regulatory mode, then the suggested wording may be clearer.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Provisions ☐ Livable Housing Design Standard **Clause/Figure/Table:** J4D4

Recommended change to draft:

Revert back to previous measures while more research is undertaken into impact of change to roof reflectivity targets on products in the Australian supply chain, and interactions with other changes within the NCC for example rooftop waterproofing and provision of rooftop PV

Comment/reason for change:

The RIS analysis did not consider the impact of the proposed installation of solar PV on all rooftops, and how this interacts with the roof micro-climate and impacts the modelling around required roof solar reflectance targets.

Nor does the drafting provide a new exemption for warehouses, industrial buildings and similar where there is no requirement for internal air-conditioning; or an exemption where highly reflective materials are precluded by legislation e.g. a local planning instrument.

The new requirements create difficulties in measurement for certain materials such as bare-coated metal, particularly emittance testing (Zincalume for example, but any metal where the metallic surface is exposed). Zincalume is frequently used in industrial buildings, preventing its use will force a move to painted products, adding approximately 20% to cost.

There is also suggestion from manufacturers of roofing products that the new settings are more limiting on product colour than previous settings and a methodology shift leads to fundamental differences in testing outcomes. Only five colours of Colorbond meet the base target, and only 1 product on market meets the upgraded target under new subclause (3) required where there are services installed above the roof.

The change extends to cool climates (CZ7), which again are based on the RCP8.5 modelling which, may be driving and perverse outcomes, as dark colours assist with offsetting heating loads in climates with cold winters.

There are a limited range of light-coloured tiles with a solar reflective index greater than 61 across all manufacturers to satisfy J4D4(2). This may represent a supply chain bottleneck in at least the short term.

- For Climate zones 1, 2, 3, 5 and 6 there is only one BlueScope product that will achieve and SRI greater than 92, and it is doubtful other common roof materials including concrete will meet this either. Tile products are likely intended to be excluded (although the clause does not prevent this) as no tile roofs could meet clause J4D4(3), only one tile with a solar reflectance greater than 0.75 and a thermal emittance greater than 0.87. None will achieve an SRI greater than 92.
- No waterproofing materials will meet an SRI > 92, and it is unknown how many would achieve SRI >61 under J4D4(2), or if waterproofing membrane manufacturers would have tested for this value. Flat deck concrete roofs would require waterproofing membrane under NCC waterproofing provisions.

Concerns with other NCC interactions include:

- SRI doesn't take into account the thermal mass of material and only considers the surface temperature.
- No recognition given to green roofs.
- Solar panels are dark and will cover much of the roof area, yet no concession is given for the effect of shading on the performance or concession for a reflective roof brings modelled outcomes into question (no point making the surface have an SRI > 92)
- This is inconsistent with residential requirements where for climate zones 6 and 7 darker roofs can assist with reducing heating loads in winter,

There are also numerous regions where highly reflective surfaces are precluded. Within the airspace around airports, reflective surfaces can be a risk to safe aircraft operation and are banned in legislative instruments or planning policies.
For example:

- Gold Coast Airport Constraint Codes PC6 and AS6.1, PC8 and AS8.1, require roofs of buildings to be of non-reflective materials within certain zones.

- Western Sydney Airports Airport Plan, 3.2.8 requires ensuring materials do not interfere with flight operations (e.g. due to reflectivity).

- Sydney Airport Master Plan 2033 notes the intensity of reflected sunlight may be considered controlled under Airports Act (per Sec 182 of the Airports Act 1996, Protection of prescribed airspace, controlled activities).
- Some Victorian councils are mandating light roofs for urban heat island effects.

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Clause/Figure/Table: J4D6, Specification 37

Recommended change to draft:

Revert to NCC 2022 targets; particularly for Class 3 and 9 buildings

Comment/reason for change:

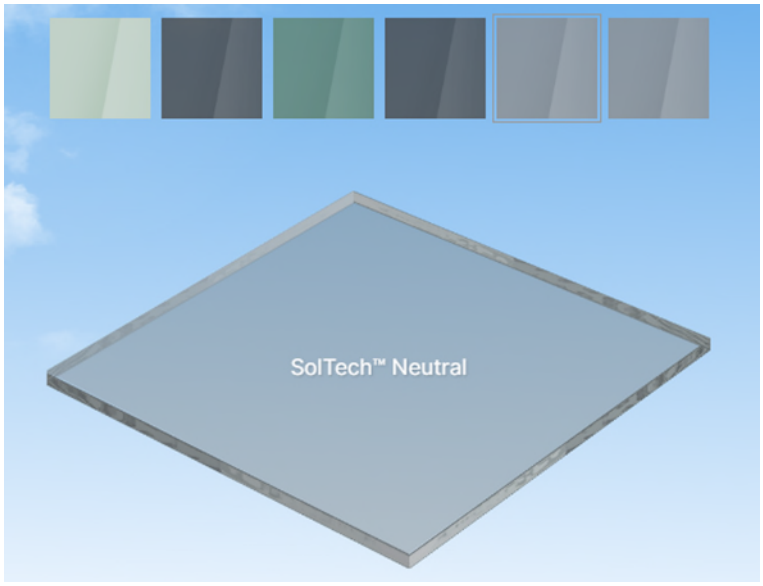
These changes will result in exceedingly low SHGC figures for glazing in these buildings, even in heating dominant (cold winter CZ 8 and 7) and mixed climate zones (e.g. CZ 6), where solar heat gain is vital in winter to offset heating loads. SHGC of as low as 0.3 has been determined in some example buildings, which also raises questions around supply

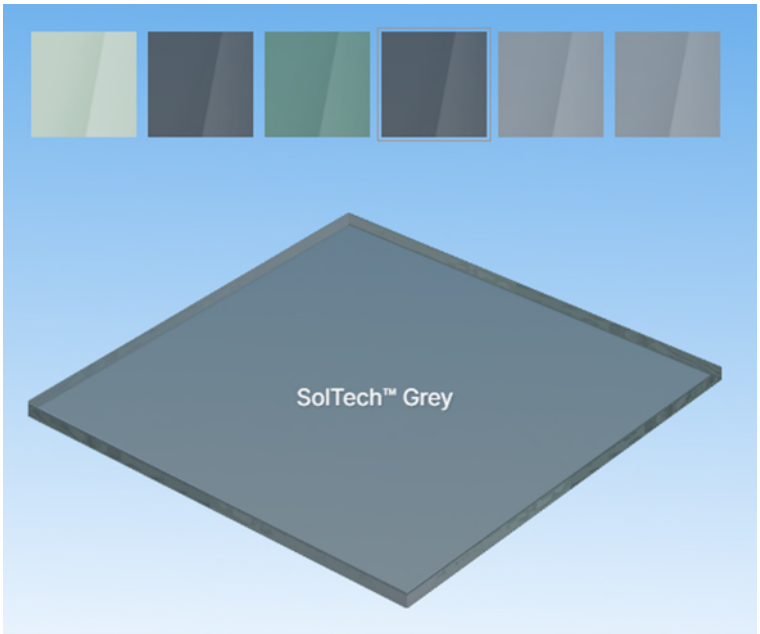
chain capacity to deliver. HIA hold concerns this is an outcome. A solar admittance of 0.04 for a disability accommodation, and aged care in the northern aspect in CZ 8 would significantly affect occupant amenity in winter.

If this is being driven by future climate assumptions, the changes may be sacrificing heating/cooling load changes in the short term and not deliver expected savings under other equally likely scenarios. These building types often serve host to people with higher amenity needs (disabled and aged care facilities fall within Class 3 and 9).

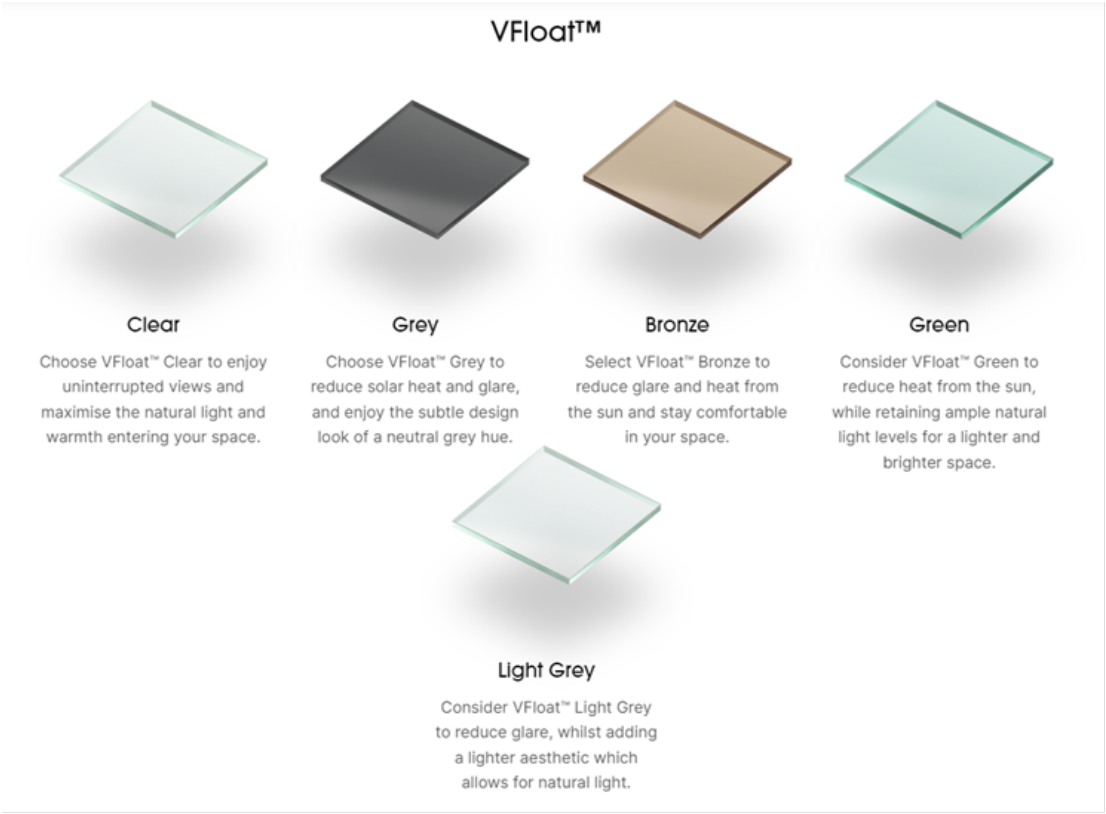
To highlight the difference in glazing required, the following from the Viridian Glass website:

- SolTech™ Neutral (SHGC 0.53) vs Soltech™ Grey (SHGC 0.37)





- Lightbridge double glazing using VFloat glass: VFloat Grey 6mm in the outer pane is required to achieve SHGC 0.32. Light grey will achieve SHGC 0.42. Substantial difference in glazing darkness



Amenity impacts include a reduction in natural lighting in Class 3 and Class 9 buildings appear not to have been considered (in part at least) due to an incorrect assumption that the NCC contains no natural light requirements.

Further analysis considering the above factors must be carried out before these changes are progressed.

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Clause/Figure/Table: J9D3

Focus questions to consider when suggesting any changes:

1. The NCC could include specific requirements on a building's demand response capabilities and building energy management system. For example, requiring a building to have the capability to automatically increase or decrease its electricity consumption or solar PV production in response to specific grid conditions, or to allow a third party to take control of a building's key energy using equipment.

a. Would you support such a requirement? Why/why not?
b. What specifically should this entail if written as a Deemed-to-Satisfy Provisions?
c. Should the provisions apply to all buildings or only those of a certain size or energy consumption

Recommended change to draft:

Not without a fundamental reanalysis of assumptions which underlie the current proposal. The question highlights technical uncertainty that issues can be managed, mandating onsite generation to the extent proposed is premature. Such a proposal (to allow energy flows to be controlled by a third party) is both in recognition of omitted costs only triggered due to the of the current proposal's ambition

The analysis is predicated on the assumption that unused energy has a nominal value, has already been undermined by changes in feed in tariffs in NSW, a lack of cost consideration for energy supply capacity and augmentation to overcome grid constraints.

Adding this level of dynamic is only likely to serve the interests of those who control it, not those who have paid for the infrastructure on the assumption it will offset other costs or emissions in buildings which is a key benefit on which the policy assumptions rely. Such a proposal recognises these issues have potential to affect outcomes, but the RIS currently takes no account of their effect. Coupled with limited archetypes which bear little resemblance to buildings today, models are already highly stylistic. Such sophisticated management is unlikely to accord with the simplistic outcomes of models used to set the technical provisions.

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Clause/Figure/Table: J8D3 – Heated water supply

Recommended change to draft:

Re-word J8D3(3) to read:

(3) A building with gas heated water for food preparation and sanitary purposes must be provided with—

(a) reserved electrical supply capacity sufficient to support future installation of air-source heat pump water heating equipment for food preparation and sanitary purposes with a coefficient of performance of 3.25; and

(b) reserved space within the main electrical distribution board, and main riser and/or supply pathway —

(i) ~~comprising at least one empty three-phase circuit breaker slot and 4 DIN rail spaces per 35 kW of water heating capacity;~~ sized in accordance (a) and suitable for the future equivalent design load and installation of heated water supply; and

(ii) labelled to indicate reservation for future installation of heated water supply; and

~~(c) reserved space in the electrical riser or supply pathway to supply water heating equipment, sized in accordance (a); and~~

~~(d)~~(c) ~~reserved~~ plant area within, attached to, or detached from, the building with—

(i) appropriate space to accommodate future installation of heating plant ~~of 7 m²~~ plus 0.04 m²/kW of heating capacity for the future installation of air-source heat pump water heating equipment for food preparation and sanitary purposes; or
~~and~~

(ii) if the plant area is located within a building, sufficient ventilation to achieve airflow for future air-source heat pump water heating equipment for food preparation and sanitary purposes of 115 L/s per kW of heating, with no recirculation of air.

(4) The capacity and space required by (2) must be sufficient to serve the same design load used to specify any gas-powered water heating equipment for food preparation and sanitary purposes.

Comment/reason for change:

1) Proposed metrics at (3)(b)(i) do not consider improving appliance technology and electrical efficiencies may not be adequate for a chosen replacement outcome or may be excessive for a chosen replacement outcome.
2) Anticipated design load needs to be calculated for an equivalency of future technology which can't be known, the outcome is likely to be less efficient or trigger a Performance Solution against alternative metrics.
3) 'Reserved' plant area at (3)(d) disregards any current area being utilised by any decommissioned appliances. The key metric is to allow for enough plant area for the replacement appliances – this should include any combination of areas being utilised by appliances to be decommissioned.
4) Plant area at (3)(d)(i) is inferred to be within a building, which is often not applicable to many commercial buildings. For the avoidance of ambiguity, it is important for appropriate and flexible site planning and design constraints to allow this space either within a building, around a building, remote to a building, as a shared common facility or even as part of a roof-top installation.
5) The ambiguous application of the prescribed 7m² otherwise represents a net tangible loss of lettable area which has ongoing and increasing cost impacts for a future development that is not demonstrated in the economic modelling.

   The proposed changes provide for greater flexibility and economy in planning and design.

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Clause/Figure/Table: J9D4 - Facilities for electric vehicle charging equipment

Recommended change to draft:

Re-word J9D4 to read;

(1) Subject to (2), a carpark associated with a Class 2, 3, 5, 6, 7b, 8 or 9 building must be provided with—

(a) electrical distribution boards dedicated to electric vehicle charging—

(i) in accordance with Table J9D4 in each storey of the carpark; and

(ii) labelled to indicate use for electric vehicle charging ~~equipment.~~; and

(iii) installed such that anticipated future design load and installation method is accommodated when a cable run from the distribution board to the car spaces described in (2)(e) will be ~~no~~ longer than 50 m; or

(b) labelled busduct dedicated to electric vehicle charging provision; or ~~—~~

~~(i) labelled to indicate use for electric vehicle charging equipment; and~~

~~(ii) installed such that the car spaces described in (2)(e) are within 10 m of busduct; or~~

(c) a combination of (a) and (b).

(2) Electrical distribution boards or busduct dedicated to electric vehicle charging in a carpark must—

~~(a) be equipped with a charging control system with the ability to manage and schedule charging of electric vehicles in response to total building demand; and~~

~~(b)~~*(a)* when associated with a Class 2 or 3 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of ~~12~~ *7* kWh from 11:00 pm to 7:00 am daily; and

~~(c)~~*(b)* when associated with a Class 5 to 9 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of ~~12~~ *7* kWh from 9:00 am to 5:00 pm daily; and

~~(d) when associated with a Class 3 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 48 kWh from 11:00 pm to 7:00 am daily; and~~

~~(e)~~*(c)* be sized to support the future installation of a ~~7 kW (~~32 A~~)~~ ~~type 2~~ electric vehicle charger in—

(i) 100% of the car parking spaces associated with a Class 2 building; or

(ii) 10% of car parking spaces associated with a Class 5 or 6 building in addition to electric vehicle chargers required by J9D4(3)(a); or

(iii) 5% of car parking spaces associated with a Class 3, 7b, 8 or 9 building in addition to electric vehicle chargers required by J9D4(3)(b); and

~~(f)~~(d) if within a distribution board~~—~~

~~(i)~~ contains labelled space ~~of at least 36 mm width of DIN rail per outgoing circuit~~ for individual sub-circuit electricity metering to record electricity use of electric vehicle charging ~~equipment~~ provision~~; and~~

~~(ii) be labelled to indicate the use of the space required by (fi) is for the future installation of metering equipment.~~

(3) In a carpark with more than 40 carparking spaces, electrical vehicle charging ~~equipment~~ provision with a capacity of at least ~~7 kW (~~32 A~~)~~ must be installed to serve at least—

10% of carparking spaces associated with a Class 5 or 6 building; or

15% of carparking spaces associated with a Class 3, 7b, 8 or 9 building; and

10% of carparking spaces required to be accessible associated with a Class 3, 5, 6, 7b, 8 or 9 building.

(5) The electric vehicle charging ~~equipment~~ provision required by (3) must incorporate or be connected to~~—~~

~~(b)~~ the distribution boards or busduct required by (1)~~; and~~

~~(c) the charge control equipment required by 2(a).~~

Notes

(1) For the purposes of J9D4(1), (3) and (4), a carpark or carparking area is associated with another building if it is on the same allotment as the building and is provided to serve that building.

(2) J9D4(3)(a) and (b) do not apply to carparking spaces that are *required* to be accessible.

Comment/reason for change:

1) Note of 'equipment' at (1)(a)(ii) requires supply of a proprietary charging appliance (as *equipment*) with the construction of a building, which should reflect the 'provision' of services as intended.
2) The limitation of cable runs to 50m at (1)(a)(iii) is an arbitrary measure that may contradict allowances within AS/NZS 3000 when designed to accommodate any additional load or efficiency irregularities. This provision should be worded in a way that design and installation methods for longer runs of supply must be considered up front.
3) (1)(b) could be better worded for simplification, and the note of 'equipment' at (1)(b) requires supply of a proprietary charging appliance with the construction of a building, which should reflect the 'provision' of services as intended.
4) The requirement for a 'charging control system' at (2)(a) should be removed. This will likely have unintended consequences for users of a system, including pre-determined lock-out periods by body corporates and otherwise not function as intended for occupants whose charging needs fall outside of mainstream needs.
   It is also inappropriate to prescribe what is essentially a tenancy agreement within a construction code.
5) The need for 12kW/h of design load capacity at (2)(b) and (c) is excessive when considering the time period is eight (8) hours – to which seven (7) kilowatt hours is more appropriate for trickle charging the most common battery size for a full EV, and is excess load capacity for charging a PHEV.

   This design load capacity would also align with the load capacity for a 32A circuit, rationalising this circuit sizing across all EV charging supply infrastructure.

6) All references to "7kW of design load capacity" is better expressed consistent with terminology and metrics at 13.7.10(3) of the ABCB Housing Provisions, offering only 32A.
7) There is no rationale for prescribing fast-charging capability for a Class 3 building as a stand-alone classification.
   A majority of Class 3 buildings in Australia are targeted at NDIS / SDA accommodation, which have significantly reduced vehicle needs, and can otherwise accommodate regular charging options for visiting specialists akin to Class 1 or 2.
8) Proposed metrics at (2)(f) do not consider improving appliance technology and electrical efficiencies.
9) Requiring a EV charger to be installed in any carpark or carparking area with less than 40 spaces is overly onerous. As proposed evenly if a carpark had a single space, an EV charger would need to be provided. The minimum trigger for the provision of chargers should be 40 spaces and thus subclause (5) should be deleted.
10) References to carparking area in subclause (3) and (4) should be deleted as subclause (1) only applies to a carpark and subclause (5) cannot be satisfied for carparking areas.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Provisions ☐ Livable Housing Design Standard

Clause/Figure/Table: J9D5

Focus questions to consider when suggesting any changes:

1. In addition to the proposed requirements for onsite photovoltaics (PV), should there be other requirements to minimise a building's impact on the grid, such as by maximising on-site use of generated energy and minimising export. If yes:
    a. Should this requirement sit in a different regulatory instrument to the NCC, given it relates to how a building is operated?
    b. What would this entail if written as a Deemed-to-Satisfy Provision?

2. What role do existing regulations or PV system equipment standards play in enabling electricity network operators to manage the impact of commercial building PV systems on the network? Will the proposed NCC changes create a need to change these regulations and standards?

3. In the context of the building approvals process, how should a local building control authority assess issues related to the potential impact of a building's excess PV generation on the regional or local energy network. Consider:
    a. Timing of the assessment?
    b. Factors to enable the assessment (e.g. skill set)?
    c. Any other issues?

4. What should a local building control authority do when a Distribution Network Service Provider does not allow connection of a system of the required size

HIA do not support this proposal. Also see HIA RIS Response.

1. No. The questions suggest a technical uncertainty that benefits will be achieved or that costs have been adequately assessed, and mandating onsite generation is premature.
2. Such a proposal (to allow energy flows to be controlled by a third party) is recognition of omitted costs only contemplated due to the of the current proposal's ambition again indicates mandates are premature. A fundamental reanalysis of assumptions which underlie the current proposal would be required.
3. The NCC could allow exemptions from clauses using the unjustifiable hardship test. However, this is not a process currently central to approval but also undermines economics of design and technical assumptions. Allowing a design to be exempt after commencement or changing fundamentals of the clauses undermines feasibility of projects and therefore these changes.
4. The analysis is based on the assumption that unused energy has a nominal value, has already been undermined by changes in feed in tariffs in NSW, and a lack of cost consideration for these issues. The question highlights technical uncertainty that issues can be managed, mandating onsite generation to the extent proposed is premature. Such a proposal (to allow energy flows to be controlled by a third party) is both in recognition of omitted costs only triggered due to the of the current proposal's ambition.

Recommended change to draft:

- Delete (2) and (4) and Table J9D5a in recognition of the above issues with energy modelling and assumptions (Also see RIS response);
  IF
- (3) is retained and (2) is not delete (4); and
  IF
- If (1), (2), (3) and (4) are retained, the following clarifications are required:

(1) The main electrical switchboard of a building must:

(a) contain at least 2 empty three-phase circuit breaker slots and 4 DIN rail spaces labelled to indicate the use of each space; or

(b) be designed to accommodate the anticipated future design load and installation method for a suitable battery system.

(2) A building must be provided with an on-site solar photovoltaic system—

(a) that covers 100% of the roof space, excluding areas—

(i) ~~(a)~~ shaded for more than 10% of average annual daylight hours; or,

(ii) ~~(b)~~ where the roof pitch exceeds 45° relative to horizontal; or,

(iii) ~~(c)~~ used as a terrace, carpark, roof garden, roof/sky light or the like; or

(iv) ~~(d)~~ designated as trafficable area, access for height safety systems or plant maintenance access; or

(v) ~~(e)~~ used for plant equipment, services installations or the like; or

(vi) ~~(f)~~ above exhaust air flows from heat rejection equipment: or

(vii) ~~(g)~~ where provision of solar photovoltaic panels is impractical on account of panel size or mounting system limitations; or,

(b) ~~(h)~~ with a peak system output rating per m2 of building conditioned area not less than those specified in Table J9D5a.

(3) In addition to (2), a building where gas is used for building services must be provided with ~~further~~ on-site photovoltaic system peak output capacity not less than the value specified in Table J9D5b.

(4) ~~If the on-site solar photovoltaic system~~ The requirements of (3) do not apply where an on-site solar photovoltaic system in (2) ~~is placed on a building~~ occupies the available roof space. ~~the panels must~~

~~(a) not be shaded for more than 10% of daylight hours; and~~

~~(b) not have a pitch of more than 45°.~~

Limitations

(1) The requirements of J9D5(1) do not apply to a building with battery systems designed as part of an installation or already installed.

(2) The requirements of J9D5(2) and (3) do not apply to a building—

(a) where 100% of the roof ~~or site~~ area is shaded for more than 70% of daylight hours; or

(b) provided with an on-site renewable energy generation system, other than a solar photovoltaic system, with a generation capacity at least equivalent to a solar photovoltaic system described under J9D5(2).

(3) The requirements of J9D5(2) do not apply to a building that predominantly operates overnight, or buildings in remote and isolated areas where security and maintenance are not practicable.

(4) For the purpose of Table J9D5a and Table J9D5b the conditioned space does not include the space within a Class 2 sole occupancy unit or a Class 4 part of a building.

Comment/reason for change:

1. Proposed metrics at (1) do not consider improving appliance technology and electrical efficiencies.
2. It must be considered that there are many instances where PV arrays will occupy the entire roof under (2) so the opportunity to accommodate more PV requires it can be attached or detached from a building. This could be difficult to achieve on an inner urban site. Or areas where planning or other restrictions prevent the installation of solar other than on a roof.

3. J9D5(4) requires amendment. The exclusions that would disallow the additional offset for gas are in recognition that the additional PV is small relative to the required under 2(a), and will have minimal overall impact on performance in aggregate.

The RIS analysis would need to factor these issues into its analysis of comparison between rooftop solar PV versus grid scale installations (including both solar and non-solar grid-scale alternatives). Noting that controlling feed-in and use of electricity onsite versus the grid for rooftop solar PV would generally require more installation of management systems and potentially storage systems that the RIS found were not supported from a cost-benefit perspective.

We also note the RIS and targets are set to provide enough solar PV for 50% generation to be exported to the grid. This proposal ignores the Australian Energy Regulator rule changes to allow two-way tariff pricing and the subsequent move by the energy network operators (starting in NSW) to charge small-scale generators for infeed during high generation times (i.e. daytime) to offset the impacts on grid instability due to high unplanned solar PV generation.

Buildings that predominantly operate overnight will consume most of their power outside of solar generation time, – the RIS proves this is cost-prohibitive.

Changes to two-way tariff pricing mean these buildings are likely to be charged for the energy they generate and feed to the grid during the day.

Buildings in remote and isolated areas are prone to theft and vandalism. Security or maintenance costs will be higher for these installations which was not factored into the RIS.

For the Stringency 3 requirement for additional solar to offset gas, the modelling suggests that for a large range of buildings all addressable roof capacity will be consumed for the base solar PV requirement, and the additional generation will therefore be installed elsewhere. The RIS suggests this will be on-ground. In a wide range of circumstances on-ground installation of solar PV will be precluded through lack of addressable space on site, or planning restrictions and similar obstacles to construction of these facilities at ground level. The opportunity costs of this space have not been adequately explored in the RIS.

The entire Section J9 does not apply to Class 2 SOU or Class 4 parts, as stated in J9D2. It would be useful to clarify that here to assist those using the Tables to determine their PV

requirement. Energy efficiency of Class 2 SOU and Class 4 parts are dealt with elsewhere in the NCC.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Provisions ☐ Livable Housing Design Standard

Clause/Figure/Table: J8D3

Recommended change to draft:

(3) A building with gas heated water for food preparation and sanitary purposes must be provided with—

(a) reserved electrical supply capacity sufficient to support future installation of air-source heat pump water heating equipment for food preparation and sanitary purposes with a coefficient of performance of 3.25; and

(b) reserved space within the main electrical distribution board—

(i) comprising at least one empty three-phase circuit breaker slot and 4 DIN rail spaces per 35 kW of water heating capacity; and

(ii) labelled to indicate reservation for future installation of heated water supply; and

(c) reserved space in the electrical riser or supply pathway to supply water heating equipment, sized in accordance (a); and

(d) reserved plant area with—

(i) space to accommodate heating plant of 7 m² plus 0.04 m²/kW of heating capacity for the future installation of air-source heat pump water heating equipment for food preparation and sanitary purposes except where such provision is impractical due to space limitations and system size or installation limitations, or where separate compartments of the building are serviced by unitary equipment ; and

(ii) sufficient ventilation to achieve airflow for future air-source heat pump water heating equipment for food preparation and sanitary purposes of 115 L/s per kW of heating, with no recirculation of air.

(4) The capacity and space required by ~~(2)~~ (3) must be sufficient to serve the same design load used to specify any gas-powered water heating equipment for food preparation and sanitary purposes.

Comment/reason for change:

The reference to (2) in (4) is erroneous. It appears that a new clause (2) was created shifting the clause numbering down, but this was not fixed in the text of clause (4).

There may be size and space limitations that preclude the provision of the full required area of space set aside for future electrification, for example where the roof space is already consumed by other essential building services, or where space is extremely limited and often the roof design means rooftop installation is not practicable (i.e. pitched roofs).

This concession in principle is the same as the concessions granted to the provision of solar PV under J9D5. This same concession should also apply to space heating under J6D10(6)(a)(i), swimming pool heating under J8D4(6)(d)(i), and spa pool heating under J8D5(6)(d)(i).

For some smaller commercial developments, individual compartments or spaces within that development may be serviced by smaller unitary system for space heating or water heating. In these cases, a plant room would be unnecessary if the gas unitary system is to be placed

by an equivalent electric unitary system servicing that space or compartment. This change should also be reflected in the text of J6D10(6)