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Bonnie Simeonov

Charter Hall
1 Martin Place
Sydney NSW 2000

Dear Bonnie,

**Re: 520 Gardeners Road – SSDA Comments**

We note that the City of Sydney has raised concerns with relation to the 520G development and its alignment to the targets set out in their Development Control Plan. The City of Sydney nominate that there is a desire for new developments incorporating more than 1000m$^2$ of NLA should be capable of achieving a Base Building NABERS rating of 5.5 Stars. For an office development this should be demonstrated through a NABERS Commitment Agreement.

This development is predominantly a logistics and warehousing facility. As such the nominated NABERS for Office Base Building rating would only assesses a small portion of the overall building and would narrow the scope of improvement to only the operational energy performance of the base building systems. To allow for a more holistic sustainability outcome it was determined by the project team that a Green Star commitment was more appropriate for a development of this type.

Noting that City of Sydney has raised specific concerns relating to the operational energy commitment around NABERS, Northrop provides the following comments relating to the expected operational performance as noted within the National Construction Code (NCC) 2019 verification pathways.

- JV1 nominates that a NABERS Base Building Energy for Offices star rating at a 5.5 Star Level and a thermal comfort model nominating a Predicted Mean Vote (PMV) of between +1 and -1 is equivalent to compliance against Part J of the NCC.
- JV2 nominates that a Green Star Design & As Built rating that achieves minimum compliance with Credit 15 – Greenhouse Gas Emissions (a 10% improvement in energy consumption compared to a code compliance building) and a PMV of between +1 and -1 is also equivalent to compliance against Part J of the NCC.

From the examination of these pathways, the Australian Building Codes Board identifies that the requirements of Section J of the NCC are broadly equivalent to the likely performance of a 5.5 Star Base Building NABERS Energy rating (excluding tenant supplementary systems.) Furthermore, the fact that Green Star minimum expectations is that project teams demonstrate a 10% improvement on the NCC minimum standard, City of Sydney should be reassured that the project will likely exceed their desired operational performance for the office.

Furthermore, it is noted that the submitted design is committed to the achievement of both Credit 6, Metering & Monitoring, and the achievement of over 10 points in Credit 15, Greenhouse Gas Emissions, under the nominated Green Star Pathway. The Green Building Council of Australia nominates 10 points as equivalent to a **6 Star NABERS rating** and the metering required for Credit 6 will ensure that the systems are adequately monitored to achieve the operational NABERS targets.

Noting the above the pursuit of an additional NABERS Commitment Agreement would simply increase the administrative burden of the project and if this were to replace the Green Star commitment the overall sustainability outcomes of the project would be significantly reduced.

Yours faithfully,

**Ian Van Eerden**
Principal | Senior Sustainability Consultant
NABERS Accredited Professional | GSAP | CPD

On behalf of Northrop Consulting Engineers Pty Ltd

Attachments
- Verification Using NABERS
- Verification using Green Star

# Verification using NABERS energy for offices (JV1)

JP1

The Performance Requirements of the National Construction Code (NCC) can be met using either a Performance Solution, a Deemed-to-Satisfy (DTS) Solution, or a combination of both. The following demonstrates the performance-based design process, aligning with the ABCB' s Development of Performance Solutions guidance document.

## Scenario

The property developer/owner has signed a 5.5-star base building NABERS Energy Commitment Agreement for a new Class 5 office building. This Commitment Agreement contractually obliges the property developer/owner to design, build and commission the building to a 5.5-star level. Modelling associated with this commitment is used as part of showing compliance with part of the NCC Volume One Performance Requirement JP1.

## Prepare a performance-based design brief

### What are the design objectives?

Beyond meeting the applicable NCC Performance Requirement, the design objective is an energy efficient building achieving a high NABERS Energy star rating, without compromising the occupants' comfort. The rating is used to attract tenants appreciating the benefits of an energy efficient building or requiring an office with a minimum NABERS Energy star rating to meet an organisational policy objective.

### Who should be consulted?

Property developer/owner, design team, builder, environmentally sustainable design (ESD) consultant and the Appropriate Authority are the key stakeholders.

A member of the NABERS Independent Design Review Panel must be involved in reviewing the NABERS Rating Estimate.

### What is the basis of the Performance Solution?

The NABERS building energy benchmarking program administered by the New South Wales Government Department of Planning, Industry and Environment.

### What evidence is proposed?

- A NABERS Commitment Agreement[1] targeting a minimum 5.5-star NABERS Energy for Offices base building rating between the NSW Department of Planning, Industry and Environment and the building owner. This agreement will include a peer-reviewed energy model that shows that the building will meet the minimum 5.5-star NABERS target.
- A second energy model, created using software that meets the ANSI/ASHRAE Standard 140 that shows that the annual greenhouse gas emissions[2] of the proposed building are not more than 67% of those of the Commitment Agreement's 5.5-star level when excluding tenant supplementary heating and cooling systems, external lighting and carpark services. For example, if the emissions results of the total building energy model including those items was 100 kW per $m^2$, then the energy model without these items must be no more than 67 kW per $m^2$.
- A thermal comfort model that achieves a Predicted Mean Vote (PMV) of -1 to +1 for not less than 95% of the floor area of all occupied zones for not less than 98% of the hours of operation of the building, determined in accordance with ANSI/ASHRAE Standard 55.
- Documentation of how compliance with the additional DTS requirements of Specification JVa.

[1] Note, a Commitment Agreement is said to have been 'obtained' when the property owner/developer receives the countersigned Commitment Agreement from the NABERS National Administrator.

[2] Per the NABERS Energy for Offices base building Online Calculator and Handbook for Estimating NABERS ratings. Emissions should be calculated using the emissions factors provided in Table 3a. Where a building is located in the ACT, NSW emissions factors should be used.

## Which DTS Provisions are applicable?

Specification JVa details the relevant DTS Provisions that must be separately complied with. These include the elements not covered by NABERS (J5.7, J5.3, J5.4, J6.2 and J6.3) as well as those relevant to thermal construction (J1.2, J1.6(b), J1.6(c), building sealing (JV4 or J3), the control of air-conditioning (J5.2, J5.3, J5.5, J5.6 and J5.8), control of lighting (J6.3 to J6.6) and other building services (J7.3, J7.8 and J8).

## Which Performance Requirement is applicable?

JP1 in NCC Volume One Section J — Energy efficiency.

Note: for brevity, the applicable Performance Requirements and DTS Provisions have been limited. This solution may also impact other Performance Requirements and DTS Provisions, and must be considered in accordance with Part A2 of NCC 2019.

# Carry out analysis, modelling or testing

## Which Assessment Methods are most suitable, and where are they found?

Assessment Methods listed in A2.2 of Part A2 and state that any Assessment Method or combination of them may be used to determine that a solution complies with the Performance Requirements. In this scenario, Verification Method JV1 is the Assessment Method.

To ensure that the building satisfies the requirements of JV1, the project team completes the following:

**Step 1: A Commitment Agreement** targeting a minimum 5.5-star NABERS Energy for Offices base building. This Agreement includes the requirement to undertake energy modelling and reporting in accordance with the Handbook for Estimating NABERS Ratings and as reviewed by a NABERS Independent Design Reviewer.

**Step 2: Further Energy modelling** based on that required for the Commitment Agreement that demonstrates that the proposed development's base building greenhouse gas emissions are not more than 67% of the 5.5-star level, when excluding tenant supplementary heating and cooling systems, external lighting and carpark services.

**Step 3:** An assessment of **Thermal comfort** to demonstrate the achievement of a PMV of -1 to +1 for more than 95% of the floor area of all occupied zones for more than 98% of the hours of operation of the building. This equates to a prediction that approximately 75% of people report that they are comfortable, and is required to ensure that occupant comfort is not compromised by energy efficiency.

**Step 4:** As assessment of **additional DTS Provisions** to demonstrate compliance of Specification JVa Parts 2 and 3.

The project team, consisting of the ESD consultant, the design team and a representative of the property developer worked collaboratively to refine the design as part of this modelling process.

# Collate and evaluate results

Based on the analysis, the calculated greenhouse gas emissions for the proposed building, when input into the NABERS Energy for Offices base building Online Calculator, demonstrate that the proposed building achieves a 5.5-star base building NABERS Energy rating. A NABERS Independent Design Reviewer reviews and validates this analysis. Steps 2, 3 and 4 demonstrate that the building also meets the greenhouse gas emissions performance criteria of JV1(a)(ii)(A), thermal comfort and additional DTS Provisions of Specification JVa Parts 2 and 3.

Satisfactory completion of this analysis demonstrates that the proposed building design complies with Verification Method JV1 and thus satisfies JP1.

# Prepare a final report

## What should be in the final submission?

During the modelling process, the ESD consultant develops a report detailing the modelling inputs, the greenhouse gas emissions and thermal comfort assessment done to show that it is in accordance with Verification Method JV1. This report and the energy model are retained as evidence that the design has met part of the Performance Requirement JP1. The ESD consultant also prepares a report demonstrating the compliance of the building to Specification JVa Parts 2 and 3.

The supporting evidence includes:

- A signed copy of NABERS Energy for Offices base building Commitment Agreement at a minimum of 5.5-stars;
- An overview and outline of and thermal comfort modelling carried out by the ESD consultant in accordance with JV1;
- NABERS Energy Modelling Report in line with Section 4 'Report Requirements for Estimator' of the Handbook for Estimating NABERS Ratings; and
- Additional reporting demonstrating that the other requirements of JV1(a)(ii)(A) and (B) and the DTS requirements detailed in Specification JVa Parts 2 and 3 have been achieved.

# Verification using Green Star (JV2) JP1

The Performance Requirements of the National Construction Code (NCC) can be met using either a Performance Solution, a Deemed-to-Satisfy (DTS) Solution or a combination of both solutions. The following demonstrates the performance-based design process, aligning with the ABCB's Development of Performance Solutions guidance document.

## Scenario

The energy efficiency of a new Class 5 office building, proposed to be built in Melbourne, is being assessed. The project is registered for and targeting a Green Star — Design & As Built rating. The Verification Method JV2 will be used as the method of demonstrating compliance with the energy efficiency Performance Requirement JP1. This prevents the doubling up of work that would have occurred to satisfy both the Green Star — Design & As Built Greenhouse Gas Emissions Reduction — Reference Building credit pathway and the JV3 Verification Method.

## Prepare a performance-based design brief

### What are the design objectives?

Meeting the relevant Performance Requirements and to design an energy efficient building that achieves a Green Star — Design & As-Built rating. The rating will be used to attract tenants that appreciate the benefits of a holistically sustainable building and fulfil contractual commitments to a future owner about the building's environmental performance.

### Who should be consulted?

The key stakeholders are the property developer/owner, design team, builder, environmentally sustainable design (ESD) consultant and the Appropriate Authority.

### What is the basis of the Performance Solution?

- The building is registered for a Green Star — Design & As-Built rating.
- The annual greenhouse gas (GHG) emissions reduction of the proposed building is more than 10% when compared to the annual GHG emissions of the reference building as per the Green Star — Design & As-Built GHG Emissions Reduction — Reference Building credit pathway conditional requirement.
- A thermal comfort level of between a Predicted Mean Vote (PMV) of -1 to +1 is achieved in the proposed building for not less than 95% of the floor area of all occupied zones for not less than 98% of the hours of operation of the building.
- The proposed development complies with the additional requirements of Specification JVa Parts 2 and 4 and Specification JVb.

### What evidence is proposed?

A written report consistent with Section 11 'Greenhouse Gas Emissions Report Content' of the Green Star Energy Consumption and Greenhouse Gas Emissions Calculation Guide; explaining: the approach used; the differences to the proposed design compared to a DTS approach; and the total GHG emissions, as determined by the thermal modelling software simulations for both the reference building and the proposed building design. A report detailing the PMV results and compliance with the additional DTS requirements of Specification JVa Parts 2 and 4 and Specification JVb is also required.

### Which DTS Provisions are applicable?

In most cases, meeting the Green Star rating requirements are sufficient to meet the Performance Requirement JP1. However, in addition to the Green Star rating, the building must comply with Specification JVa Parts 2 and 4. If the Green Star rating only applies to the base building elements, it may also need to comply with the relevant DTS Provisions for tenant area lighting and services.

### Which Performance Requirement is applicable?

JP1 in NCC Volume One Section J — Energy efficiency.

Note: for brevity, the applicable Performance Requirements and DTS Provisions have been limited. This solution may also impact other Performance Requirements and DTS Provisions and must be considered in accordance with Part A2 of NCC 2019.

# Carry out analysis, modelling or testing

## Which Assessment Methods are the most suitable and where can they be found?

Assessment Methods are listed in clause A2.2 of Part A2. Any Assessment Method or combination of them may be used to determine that a solution complies with the Performance Requirements. In this scenario, the Verification Method JV2 is used as the Assessment Method, as the project is targeting a Green Star — Design & As-Built Rating.

## What analysis, modelling or testing is used?

To ensure that the building satisfies the requirements of JV2, the ESD consultant completes the following:

**Step 1: Register for a Green Star — Design & As-Built rating.** Registering the project ensures that the most recent Green Star — Design & As-Built rating tool is being used, reinforces the commitment to following through with the energy requirements, and adds a layer of oversight from the Green Building Council of Australia (GBCA).

**Step 2: Assess reference building.** A theoretical reference building is assessed using the Green Star reference methodology. This establishes the base performance for the building's envelope and services. The annual GHG emissions of the reference building are calculated using energy modelling software meeting the requirements of ANSI/ASHRAE Standard 140 and Specification JVb. The reference building GHG emissions are multiplied by 90% to obtain the GHG emissions allowance for Verification Method JV2.

**Step 3: Assess proposed building.** The annual GHG emissions of the proposed building with the proposed services is calculated to be less than the GHG emissions allowance.

**Step 4: Assess the PMV.** The PMV of the building is also checked in the same thermal model used in Step 3. It needs to meet the thermal comfort acceptance criteria of PMV -1 to +1 for more than 95% of the floor area of all occupied zones for more than 98% of the hours of operation of the building.

# Collate and evaluate results

Based on the analysis by the ESD consultant, the results of the analysis demonstrate that the building meets both the annual GHG emissions reduction criteria and the thermal comfort acceptance criteria, and that the proposed revised building design complies with performance Verification Method JV2 and thus satisfies JP1.

# Prepare a final report

## What should be in the final submission?

During the modelling process, the ESD consultant develops a report detailing the modelling inputs, the GHG emissions and thermal comfort assessment. This shows that the proposed building satisfies the requirements of the Verification Method JV2. In line with Section 11 'Greenhouse Gas Emissions Report Content' of the Green Star Energy Consumption and Greenhouse Gas Emissions Calculation Guide, the ESD consultant signs and submits this report.

The report verifies the suitability of the proposed building's design against the relevant elements of the Green Star — Design & As-Built Submission Guidelines and Calculator Guide, which are then used by the allowance to establish that the building meets the Performance Requirement JP1. The final report includes:

- The scope of the solution, the Performance Requirement assessed and the assessment method used;
- An overview and outline of the GHG emissions and thermal comfort modelling carried out by the ESD consultant, in accordance with JV2;
- A comparison of the annual GHG emissions of the reference building and the proposed building design with the allowance derived in JV2;
- A summary of the PMV for the building with the acceptance criteria in JV2; and,
- A copy of the Green Star Registration certification email.