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.