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Building Simulation Procurement

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green building council australia

AIRAH

Building Simulation Procurement

Preface

The Building Simulation Procurement Guidelines provide advice for anyone intending to engage a consultant to perform a building simulation. Developers, architects, building owners, facility managers, and managing agents will all benefit from a close perusal of this document.

A fundamental component of sustainable building design, building simulation is a powerful tool in the right hands. Yet a lack of regulation can make securing the services of a competent practitioner harder than it needs to be.

This document is, as its title suggests, intended to provide guidelines around the procurement of building simulation services. It covers a considerable range of subjects, from understanding the building simulation process to getting the most out of building simulation.

It also touches upon a broad range of simulation types. As an industry guide, however, it covers particular issues, and should be seen as an introduction to the subject of building simulation procurement rather than a definitive resource.

Contributors

The Building Simulation Procurement Guidelines were prepared by AIRAH in partnership with the Green Building Council of Australia (GBCA). The following participated in the development of the guidelines:

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About AIRAH

The Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) is an independent, specialist, not-for-profit technical organisation providing leadership in the HVAC&R sector through collaboration, engagement and professional development.

About the GBCA

Established in 2002, the Green Building Council of Australia (GBCA) aims to develop a sustainable property industry in Australia and drive the adoption of green building practices through market-based solutions.

Contents

1. Introduction

Building simulation is a fundamental component of sustainable building design. Driving early design decisions, complying with NCC Section J through to submitting for Green Star certification, meeting tenants' energy performance requirements or simply proving the effectiveness of the proposed design, simulation is a powerful tool used on many new build and refurbishment projects.

However, the lack of regulation in the building simulation industry can make it difficult to engage a quality consultant to complete the task. Common problems clients face include lack of understanding of the type of simulation required, the outcome needed and the steps necessary to achieve that goal; poorly defined modelling scope, creating difficulty in comparing quotes; and lack of confidence in the skill of the modeller and the quality of the simulation.

This document provides advice for parties[1] intending to engage a consultant to complete a building simulation. Topics covered include:

- Understanding the building simulation process
- Identifying the purpose of the simulation e.g., NCC, NABERS, Green Star
- Understanding the type of simulation required e.g., daylight, energy, thermal comfort
- Outlining the steps required to complete the simulation
- Quality assurance
- Ongoing building performance
- Information required in the brief to consultants
- What to look for in a consultant
- Information you will need to provide to a consultant
- Getting the most from your simulation.

The main body of this document provides broad information relevant for most simulation types. The appendices cover each simulation type (e.g. NABERS Energy, daylight for Green Star) in more detail, including a description of what each tool entails.

Types of simulations covered include:

- Natural ventilation, façade optimisation and HVAC optimisation
- NABERS Energy Base Building
- Green Star energy, daylight, thermal comfort
- NCC JV3.

This document does not cover CFD, tenancy energy consumption nor water consumption modelling. It does not cover any NCC Class 1 or 2 residential modelling, which are covered by the NatHERS protocol.

[1] The "client": developer, architect, building owner, facility manager, managing agent, etc.

1.1 Nomenclature

CFD	Computational fluid dynamics – modelling used to determine air flow inside a space. Very involved simulation process used for detailed natural ventilation studies, atrium design, smoke flow, etc.
Commitment Agreement (CA)	A contract between a building owner and the NABERS administration stating the intention for a building to achieve a certain NABERS rating once works are completed. This allows the owner to market the improved performance of the building prior to a formal rating being awarded.
GBCA	Green Building Council of Australia, the administrative body for Green Star.
Green Star	Suite of voluntary environmental rating tools covering offices, schools, healthcare, public buildings and others. Ratings are based on the building design, construction and/or performance, and are based on a range of criteria including management, energy, water, indoor environmental quality, transport, materials, ecology, emissions and innovation. Ratings are awarded from 4 to 6 Stars.
HVAC	Heating, ventilation and air conditioning.
JV3	The modelling protocol used to show compliance with Section J of the NCC.
NABERS	National Australian Built Environment Rating System (previously ABGR). Covers energy, water, waste and indoor environmental quality, with rating tools for offices, retail centres, hotels and data centres. Uses actual energy consumption over 12 months to calculate a rating from 0 to 6 Stars. See also "Commitment Agreement".
NCC	National Construction Code (previously BCA) – regulatory requirement for new and refurbished buildings.
Off-axis studies	Simulation of "what if" scenarios to test a building's robustness to unforeseen circumstances e.g. large vacant areas, incorrectly commissioned equipment, etc. Mandatory for Commitment Agreements.
RMY	Reference metrological year – weather files used in NABERS or NCC simulations. The RMY is based on more recent weather data than the TRY.
Section J	Section J of the NCC pertaining to energy efficiency of new and refurbished buildings.
TRY	Test reference year – the weather file used for most energy simulations (mandatory for Green Star simulations). Represents average weather conditions, and does not include the extremes seen in reality.

2. What is a building simulation?

A building simulation is a computational model that approximates the performance of the actual building in practice, be this for energy consumption, thermal comfort, daylight or ventilation. It has inherent limitations, functions as a valuable tool to inform the design process, and assesses a building design for benchmarking, rating and compliance.

How closely the model approximates the "real world" will be governed by a variety of factors. These include the purpose of the simulation, the simulation software used, the weather data used, the accuracy of the model's geometry and inputs, and assumptions made regarding building operation compared to actual use. A building simulation is generally a compromise between achieving absolute fidelity and delivering a cost- effective and timely result. All building simulation models will apply certain assumptions and simplifications, around factors such as occupancy and operation schedules, external features and adjacent structures, local climate conditions, building services specifications, construction and fit-outs. A competent and experienced building modeller is able to intelligently apply such simplifications to obtain realistic results from the simulation that satisfy its intended purpose, in an efficient and therefore cost-effective way.

Some simulations, in particular those used for regulatory compliance or, to a degree, Green Star assessments, are intended as a standardised comparison rather than predicting real-world performance.

3. Building simulation – why, what, how and when

3.1 Simulation as a design tool

Regardless of the purpose for which you require a building simulation, be it NABERS, Green Star, JV3 or other types of evaluation, an often overlooked but significant benefit of a simulation is how it can be used to inform and optimise a design. It enables quick evaluation of the "what if" scenarios to provide reliable comparisons between design options; variables in a building simulation are much more easily controlled than in real-world full or part scale models. A simulation is also far more cost-effective than fixing a bad design post construction.

Examples where simulation can be used to improve a building's design include:

- Building façade – materials, extent of glazing, shading features
- Comparison of various HVAC systems such as variable air volume (VAV), chilled beams, displacement ventilation
- Comparison of equipment selection, e.g. chiller, pump or fan selection
- Development, testing and validation of the building control strategy
- Testing the comfort of occupants – thermal comfort, glare, etc.
- Developing natural ventilation strategies.

3.2 Ratings and compliance

Building simulation is most commonly used to demonstrate compliance with Green Star, NABERS and NCC JV3 (Section J). While these are often a "tick the box" exercise, simulation early in the design process can have significant benefits for ultimate building performance. Starting a simulation late in the piece, when building design and systems are already finalised, is to waste an opportunity.

3.3 Levels of accuracy

The accuracy of the end result is directly proportional to the information provided and the detail of the model. The further developed the design, the more accurate the model can be. This doesn't mean, though, that you can't model until documentation is complete. Fortunately, the level of accuracy of the model is also proportional to the need at that design stage.

When modelling to drive services design, a "ballpark" figure is often enough to determine which system is the most effective. When assessing various façade options, comparing heating and cooling loads without even considering the HVAC design is appropriate. In both these cases, the simulation is used as a comparison tool where numeric accuracy may not be as important as developing an understanding of the impact of various measures. However, at the end of construction, with a formal rating in sight, the model needs to predict the energy consumption of all building systems as accurately as possible. No program or model can be absolutely accurate because of the complexity of the heat transfer calculations. The results can always only be regarded as an estimate.

When commissioning and reviewing a model, keep in mind the level of documentation you can provide and what results are really needed. Asking the modeller to tell you exactly how much energy you will use when you have no idea what hours the building will be operating or how the building will be used is unlikely to produce satisfactory results (particularly when modelling non-office buildings).

3.4 Types of simulation

Simulations are done for a variety of reasons and in various ways. Refer to the table overleaf.

3.5 What goes into a simulation?

Stage 1 – 3D building model

Firstly, a modeller creates a 3D model of the building. This can be considered the "architectural form" and includes the shape and layout of the building, location of windows and shading, construction materials (including insulation and glazing), surface finishes and ventilation openings. The building is located in the correct place and climate, usually using a test reference year (TRY), or reference metrological year (RMY), weather file. This is a weather file constructed by the CSIRO to represent an average year and may not accurately reflect peak weather conditions normally experienced.

At this point, daylight, shading and glare can be calculated. Façade loads can be predicted and design decisions made.

Stage 2 – Internal heat gains

This is the "building operation" stage, where the building is filled with people, equipment and lighting – usually using set default profiles determined by the modelling protocol (e.g. NABERS, Green Star, JV3). Higher loads will increase energy consumption. It is therefore important to ensure that the values used accurately reflect the known tenant loads if the model is to be used to predict actual energy or comfort. Operation of windows is usually included at this stage, depending on the software.

At this point, the thermal comfort of naturally ventilated buildings can be predicted. Building fabric performance can be predicted and optimised.

Stage 3 – HVAC plant

The building's HVAC system is modelled and can predict air flow and temperatures, occupant comfort (using air temperature, radiant temperature, humidity and potentially air movement), building and plant heating and cooling loads, water-side temperatures and flow rates, fan and pump activity, chiller, boiler and cooling tower operation and plant energy consumption. The level of output depends on the modeller, the tools used and the level of detail required.

At this point, thermal comfort can be predicted. HVAC energy consumption can be predicted and the design and/or equipment selection can be optimised. It is generally necessary to calculate the capacities of the air handling plant, chillers, boilers, pre-conditioners, etc., prior to doing an energy simulation. This will usually be done by the building services consultant (often using a separate load estimation program) and can result in a number of re-calculations/iterations depending on the results of the energy simulation.

Stage 4 – Non-HVAC energy consumption

The modeller calculates the energy consumption of non-HVAC items such as lighting, domestic hot water, lifts, ventilation fans (e.g. toilet exhaust, carpark exhaust), control panels, hydraulic systems, etc. This is usually done in a spreadsheet; however, some modelling software packages

3.4 Types of simulation

Simulation	Type of model	Purpose	Regulatory requirement?	Defined protocol?	Design stage	Comments
Façade design	Energy, thermal comfort, daylight	Improve and optimise building design.	No	No	Concept through to design development	The earlier the better!
HVAC optimisation	Energy	Improve and optimise building design.	No	No	Schematic design through to construction	Early modelling can compare various HVAC systems; later modelling can help select specific equipment.
Natural ventilation	Thermal comfort	Predict comfort conditions, develop natural ventilation control strategies, window openings, etc.	No	No	Concept, design stage	Natural ventilation reliant on occupant control is very difficult to model accurately because you can't exactly predict human behaviour. "Comfort" is also highy subjective.
JV3	Energy	Mandatory code that must be complied with to obtain a building permit.	Yes, for building permit certification if Deemed-to-Satisfy provisions cannot be complied with.	Yes	"For construction" documentation (although early assessment strongly recommended to identify any issues achieving compliance).	Not intended to predict energy consumption of the building actual operation.
NABERS	Energy	Optional rating scheme based on the measured energy consumption of the building. Consultants may often be asked to predict the energy consumption using average or real-time climatic data or check the measured energy consumption against a simulation using actual weather data.	Yes, if entering in a Commitment Agreement	Yes	Concept through to As-Built.	Model must very accurately reflect the building to properly predict the actual NABERS rating in operation.
Green Star	Energy, daylight, thermal comfort, CFD	Optional rating scheme using average year of climatic data. Building performance is compared to a standard benchmark.	No	Yes	Concept through to contract documentation or As-Built.	Modelling used to verify design against Green Star targets.

perform these calculations automatically. Either method is fine as long as the modeller understands and can justify the process and assumptions made.

At this point, complete building energy consumption can be calculated. Design of auxiliary systems can be optimised. Note that this process can often be done independently of the others, although ultimately the interactions between all the building systems must be simulated.

3.6 Steps for completing a simulation

The steps below are a very broad series of steps because the actual process varies depending on the simulation required. Refer to the appendices for detailed steps for each process.

1. Gather data – architectural, services, tenant, etc.
2. Conduct a site visit if modelling an existing building
3. Build preliminary model and complete initial assessment*
4. Design team reviews model and assumptions
5. Tune model and re-assess*
6. Update model for "For Construction" and/or "As-Built" documentation*
7. Update model post construction (refer Section 5).

* – a report should be produced or updated at this point

Note that these steps may vary depending on your project schedule.

Integration between the modeller and design team is important and needs to be managed if the modelling is to be completed in a timely manner. The project manager/ lead consultant should ensure all disciplines – architectural, mechanical, hydraulics, electrical and lift (at a minimum) – receive copies of any modelling reports and respond within a given deadline set by the project timeline.

3.7 When?

The timing of the simulation depends largely on the type of simulation being completed. However, the modeller should be appointed at the same time as the rest of the design team, for several reasons:

- The earlier modelling is done, the greater its potential to improve the design and affect the building's outcome. Late-stage modelling can only be a "tick the box" exercise
- Involving the modeller from early on improves their familiarity with the building and can expedite the final simulation
- Modellers are expert professionals and may work on a large number of buildings in a relatively short space of time. They have a lot of expertise in building performance and can be a valuable addition to the design team.
- Modellers need to be an integral part of the design team from the beginning. This avoids an adversarial "us-and-them" mentality later if the building doesn't perform as modelled and ensures the team works together to benefit the building rather than points-score against each other to prove superior consultancy skills.

4. How do I know I'm getting a quality simulation?

Building simulation method is the subject of much discussion both between modellers and their clients. Some modellers swear by their software as an all-singing, all-dancing modelling machine. Others prefer to use a combination of software and custom spreadsheets to retain full control and understanding of their model and its inputs.

What matters is not how the model is set up but that the modeller can quantify, justify and defend every assumption, parameter and process used. Ask whatever questions you feel are necessary to be confident that the model accurately reflects the building. If explanations seem too simple, ask for more detail. A good modeller will have no problem in explaining in detail their modelling process (although they may draw the line at providing actual spreadsheets and algorithms – they need to protect their IP!).

It is imperative for both you and the modeller that you are comfortable with the level of detail in the model and that all parameters are correctly accounted for. Don't be afraid to ask for a simulation to be repeated or the method changed if you feel the simulation is overly simple. Also, engage the expertise of the rest of the design team – if the exact relationship between chilled water temperature and cooling tower operation is beyond your capabilities, ask the services consultant for their advice.

Another indication of a quality simulation is the interaction between the simulator and the rest of the team. A good simulator will be pestering the design team for more details and complaining that the specifications provided are inadequate. They will be in constant contact with the other consultants and the suppliers/manufacturers of the proposed building materials and systems.

5. Post-occupancy and ongoing operation

It is extremely important to validate energy models during the building tuning period. This process can identify:

- Whether the energy model needs to be altered to reflect tenant behaviour and usage of facility
- Whether the sub-metering has issues (calibration/faulty)
- Whether the control strategies implemented are providing the expected outcome
- Whether the predicted energy targets are likely to be achieved.

Ideally, the energy model should provide targets against each main sub-meter. There should be an expected maximum/minimum energy usage daily, and monthly demand and consumption target based on ambient conditions. These targets should then be used in the energy dashboard to allow the facility manager to track the energy usage on a daily basis and identify faults quickly.

Most modelling relies upon test reference year (TRY) or reference metrological year (RMY) weather. This is a CSIRO-derived weather file intended to represent average weather conditions. In order to properly calibrate a model against building operation, the modeller should obtain actual weather information from the Bureau of Meteorology for the building tuning period and use this in the model. Actual weather files up to the current previous month are also available commercially to enable the comparison of simulations with recorded energy data for the actual weather conditions that year.

As the energy model gets validated against the tenant behaviour, actual operating restrictions, etc. it becomes a valuable tool in benchmarking the operation of the building and allows for future upgrade simulations.

6. PPP/Energy Performance Contracts (EPC)

The role of an energy model can be extremely important in the context of an EPC. Most public private partnership contracts (PPPs) have a contractual energy volume clause that requires the facility management team to guarantee the energy volumes of base building services for five year periods across a 25-year lifecycle. EPCs also have energy volume guarantees generally across 7–10 years. During the design and post-occupancy stage there is significant investments in the energy modelling.

A "calibrated" simulation model is one of the four internationally accepted methods that can also be used to provide a "baseline" energy usage for measurement and verification of savings. In this approach an energy model is developed, calibrated against the energy bills, tenant usage, etc., to provide an accurate representation of the building.

7. Asking for a quote

To ensure comparable quotes for modelling work, it is imperative to clearly specify the scope of works.

- Itemise the steps to be completed (for example, using the steps outlined in Section 3.6 above). Be clear regarding the stages at which reports are to be produced.
- Identify the number, time and purpose of any site visits.
- State the type of simulation required, the purpose and the stage of design (e.g., "We require a JV3 assessment and are already at contract documentation" vs "We want a 6 Star building and don't know where to start").
- If using the model as a design tool, define the number of options to be modelled (or ask for price per option)
- If modelling is required to achieve a certain target, what happens if this is not achieved with the proposed design? Some consultants will allow for a certain number of reiterations of various options within their basic fee, others will charge additionally. The level of work required in this stage can be uncertain – modelling an alternative pump set is quick and easy compared with a whole new HVAC system. If consultants assume several iterations may be required with major changes, you will pay too much if the initial design achieves the desired outcome. If you don't know how the design will perform, it can be prudent to request a base model fee and then additional fees for various options; these can even be requested on an as-need basis. At the very least ensure quotes clearly state how this scenario is considered in the fee.
- Fees broken up into scope sections or stages can help to compare quotes.
- Identify protocols and tools to avoid misunderstandings (e.g., NCC 2014 JV3 or Green Star Office V3, refer to the appendices for relevant protocols for each simulation type).
- Understand the scheme for which you are requesting a simulation. Visit websites, contact the administrative body or even call several consultants to understand what is required for what you want to achieve. Consultants can easily identify clients who don't understand what they are asking for (e.g., by asking for something impossible such as a NABERS simulation for a school) and some are less scrupulous than others.

The sample simulation processes listed in the appendices can be used as the basis for the scope of work however, note that each project is unique.

8. What to look for in a consultant

- Experience. It is essential that the simulator be able to demonstrate some degree of familiarity and breadth of experience in producing building simulation models. They should also be able to articulate the shortcomings of simulation and take this into account as neccessary for the project at hand.

Practical experience in the design, construction and operation of buildings is also important – a good simulator has spent time in real buildings.

A phone call can help you quickly identify whether or not a simulator knows what they are doing.

- Qualifications. A simulator should hold qualifications that equip them to be familiar with building physics, mechanical and electrical systems and construction technologies. As a minimum a degree in building services/mechanical/electrical engineering or building physics should be sought. Further, certification or demonstrated training in the use of the particular simulation package to be employed is vital.
- Accreditations – there are no specific accreditations for building simulation. However, the simulator should hold accreditation in the tool they are modelling against (e.g., NABERS, Green Star) or be directly overseen by someone who does.
- Independence – while it may seem convenient to have, for example, a services consultant also complete the modelling, for best results the simulator should be independent of the design team in order to maintain integrity and avoid any conflict of interest.
- Person vs company – a consulting company can offer the benefits of pooled experience and maintain cost efficiency for your simulation by employing a more junior modeller who is overseen by a senior mentor. Conversely, hiring an individual can have the benefit of being able to deal directly with the person performing the simulation and obtain a result tailored to your aims. Also, many independent modellers have gained extensive experience as lead modellers at large consulting firms. Ask for a CV if you're uncertain.

  Consider also the term of your contract – continuity is an important factor on long-term projects. Consider the potential impacts of likely staff turnover because the detail of a building model is difficult to pass on when staff leave.
- Ask for testimonials, referees and case studies.

Useful questions to ask a potential simulator include:

- Do they have building design, contracting or commissioning experience?
- How many years has the consultant been modelling?
- What software packages are they familiar with?
- How many commitment agreements have they been directly involved with the delivery of?
- How many buildings does the consultant have modelled data and actual performance data for?
- Have there been any significant design or operational issues with any projects they have been commissioned on?

Although not all of these questions may be important or relevant to you, asking some can at least help you differentiate between prospective candidates.

9. Information required for a simulation

During the design optimisation phase, a competent and experienced modeller will be able to work with whatever information is available. As an integral member of the design team, they can model concept designs and compare various options without detailed input from the architect or services consultants.

However, during the detailed design and certification phase, the modeller will need:

- A full set of plans, sections and elevations including perspectives/renders, in CAD format or vector PDF.
- Full services specifications if defined or contact for mechanical/electrical/façade consultants, etc.
- Part-load performance characteristics or contacts for services equipment such as chillers, boilers, packaged units, VRF units, desiccant wheels, fans and pumps, etc., from suppliers.
- Materials schedules, window/door schedules and wall construction schedules.
- Where tenant is known, and where the modelling protocol allows it, tenants' occupancy profiles and fitout plans.

10. Getting your money's worth

In order to obtain the best value from the simulation process:

- The modeller should be engaged by the building owner directly. Builders may prefer to use their own team but in the case of novated contracts there is an immediate conflict of interest. The same applies for modelling completed by services consultants.
- The modeller must be part of the design team, not an adversary. They should be working with the client and the design team to improve the building's performance. Too often, an "us and them" mentality finds each party blaming and defending their relative positions rather than working together to ensure the model accurately reflects the building.

  This is particularly important in the post-occupancy and building tuning phase. Inevitably, the building will perform differently to how it was modelled. What matters is not who is right but how the model can be used to better reflect the real-world operation of the building and improve its performance.
- Actually read the report, check assumptions and query anything that doesn't look right – get ALL the consultants to do the same!

  Without validating assumptions, the modelling report can read like a series of disclaimers. A small amount of time spent by the design team in checking all modelling parameters ensures a robust model that accurately reflects the building. This is vital at all stages of the modelling process but mostly so after the first iteration of the simulation.
- Provide as much information as possible regarding the intended use of the building – interview tenants if known.

  Most modelling protocols specify W/m² rates and profiles for heat loads from occupants, lighting and equipment. Although these are sufficient for new buildings, they can prove to be inaccurate, particularly for non-typical office applications such as call centres. If the tenant is known, the proposed office layout should be used to accurately reflect occupancy and equipment loads. And of course actual lighting loads from electrical plans should be used in preference to default values.

Using actual occupancy layouts is vital for buildings where thermal comfort is important. Some modelling protocols assume uniform distribution of occupants, where as in reality, "hot spots" can exist.

- If it's an existing building, a site visit is vital. This should be conducted by the modeller together with the design team and most importantly, the facility manager.
- Provide building performance data back to the modeller to enable the calibration of models and improvement of building simulation as a whole.

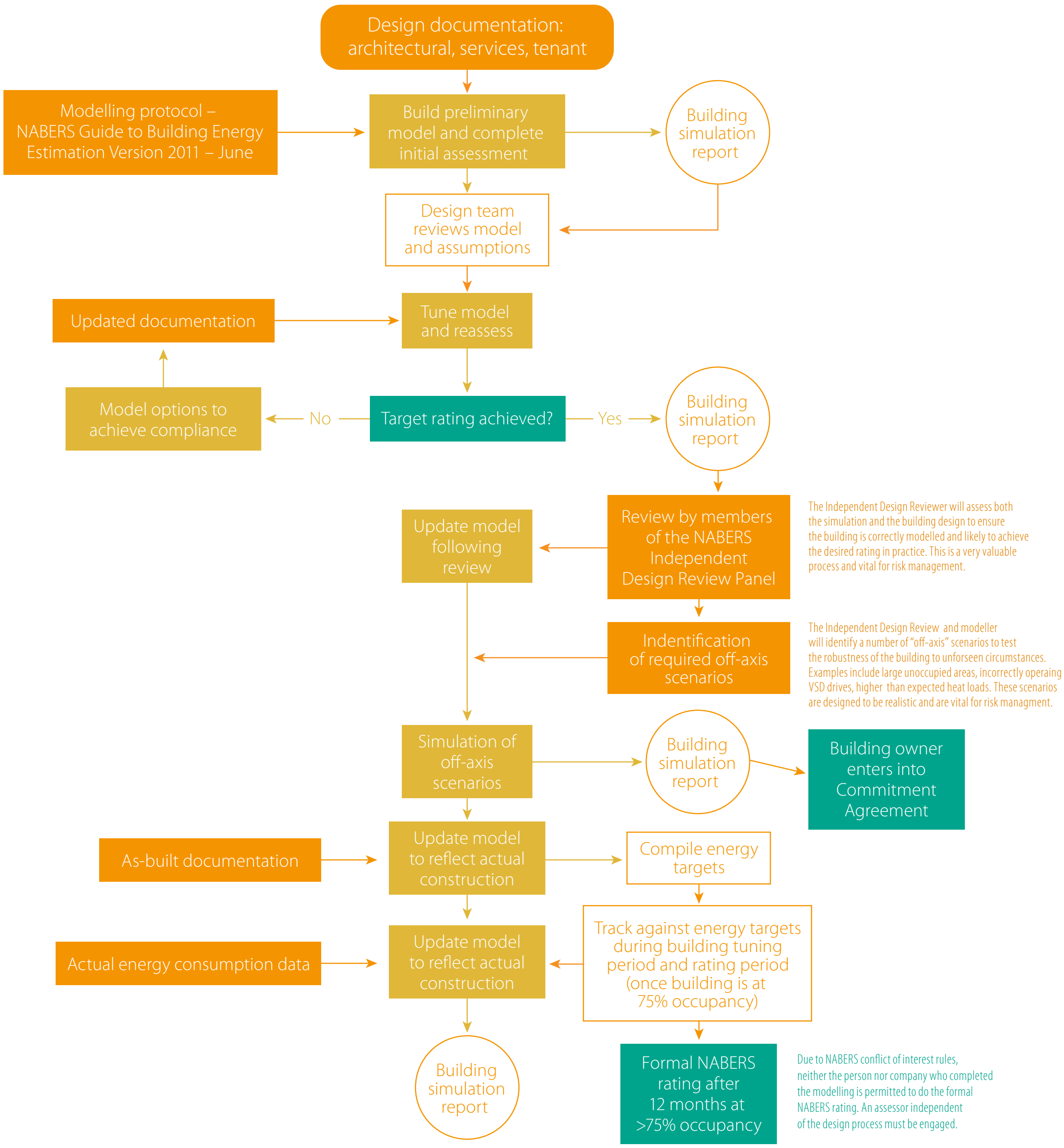
Though this is discussed further in Section 5, the importance of calibration of models cannot be overstated. Building simulators are often forgotten in the post-occupancy phase and many never have the opportunity to find out whether or not their model was accurate. Providing actual energy data back to the simulator enables the industry as a whole to learn and improve the modelling process, which in turn benefits everyone, including you the next time you need a model.

Providing real-world energy data back to the modeller can be included as a contract condition for the design team and can usually be easily set up as a report from the BMS.

Appendix A Process for NABERS energy simulation for a Commitment Agreement

Note: This process is a guide only, and specific project requirements may differ.

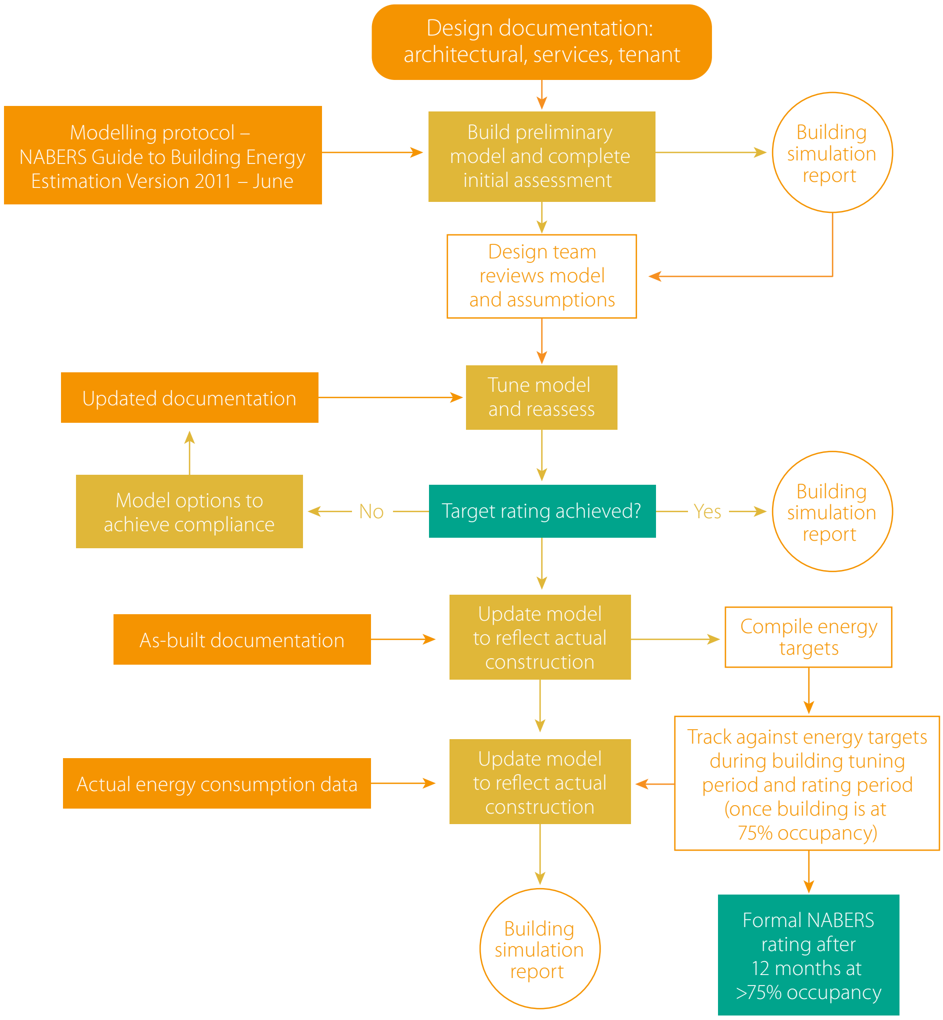
A list of Independent Design Reviewers may be found on the NABERS website under "Resources".



Appendix B Process for NABERS energy simulation

Note: This process is a guide only, and specific project requirements may differ.

Often, building owners need to know they can achieve a certain NABERS rating but do not wish, or need, to go through the Commitment Agreement process.

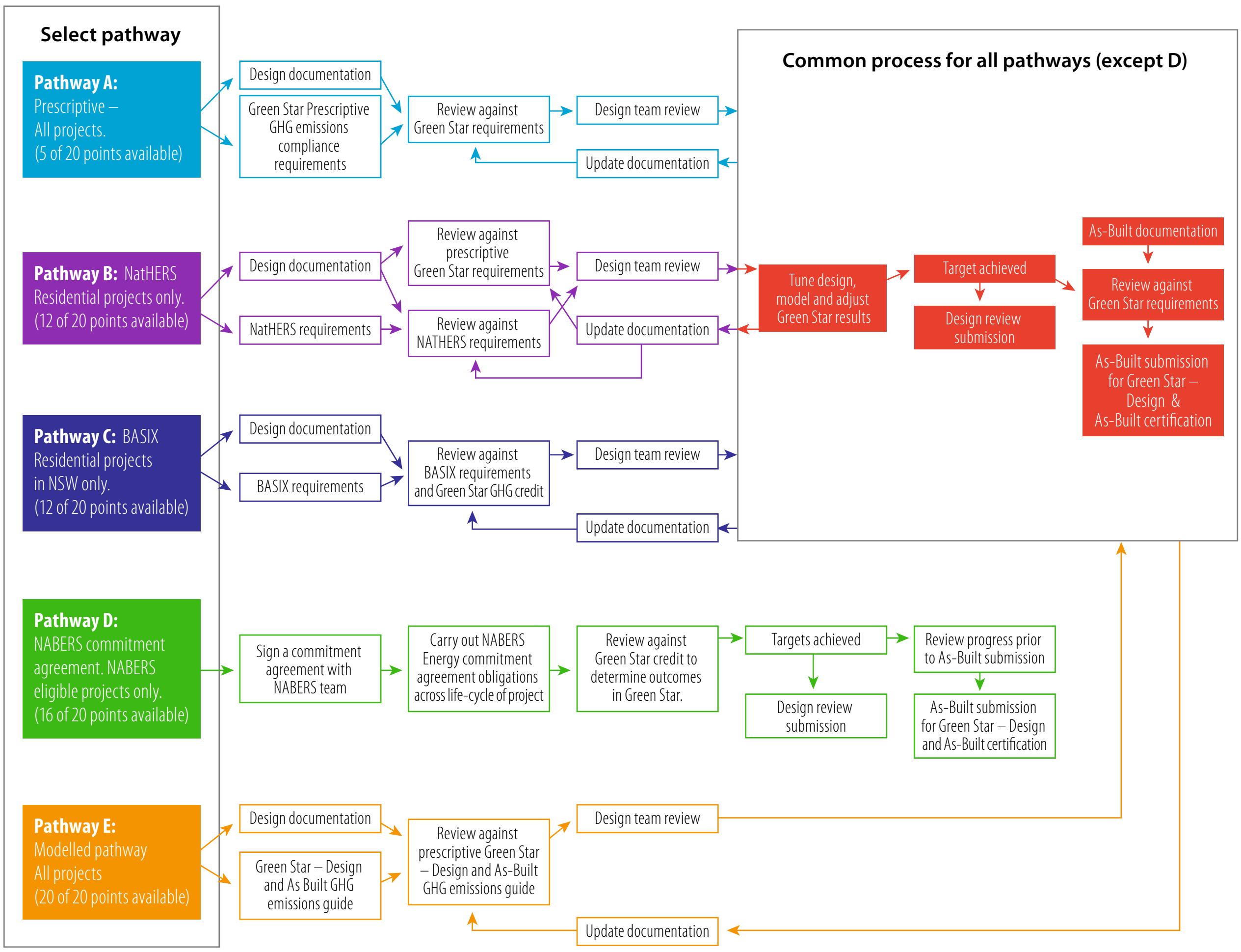


Appendix C Process for Green Star energy simulation

Note: This process is a guide only, and specific project requirements may differ.

The process outlined below refers to Green Star – Design & As Built, the new Green Star rating tool for the design and construction of sustainable buildings.

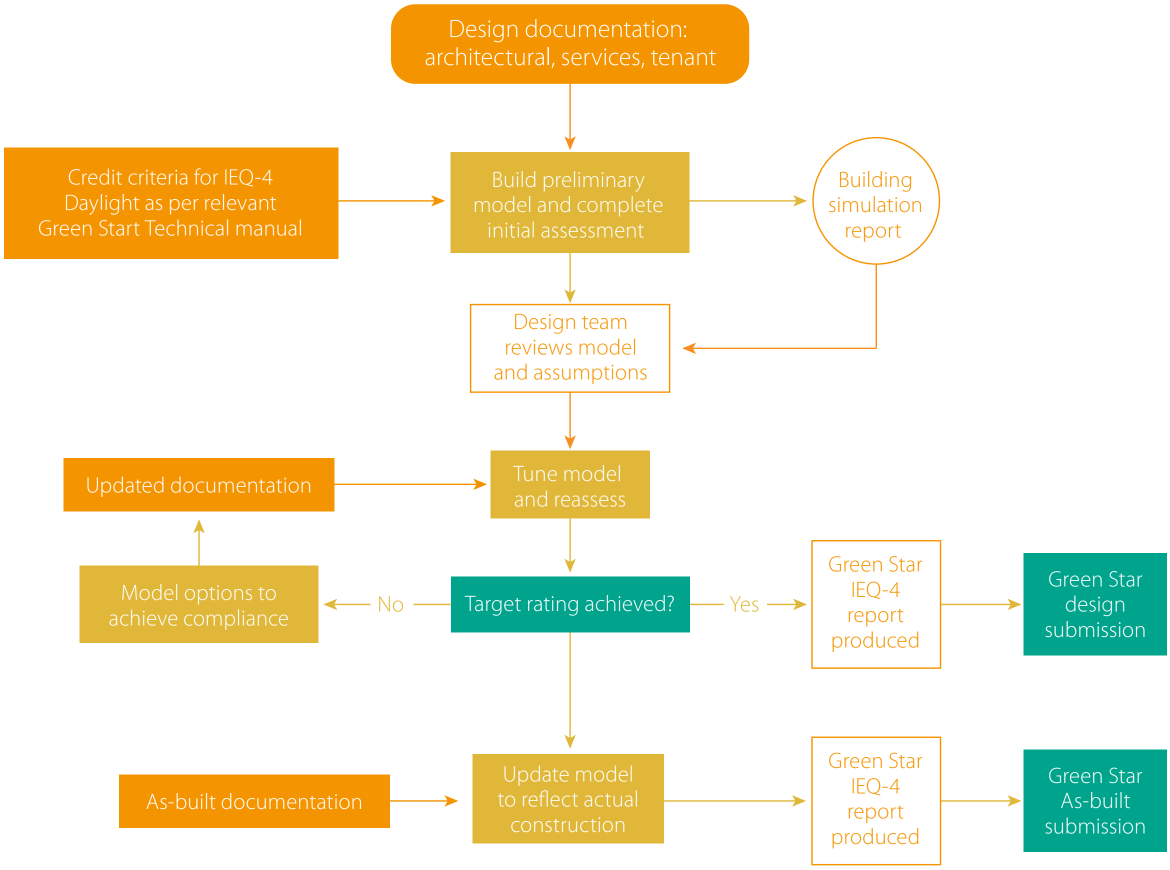
The process for legacy Green Star rating tools for design and construction of buildings may vary. Legacy rating tools (such as Green Star – Office v3) will be discontinued from December 2015.



Appendix D Process for Green Star daylight simulation

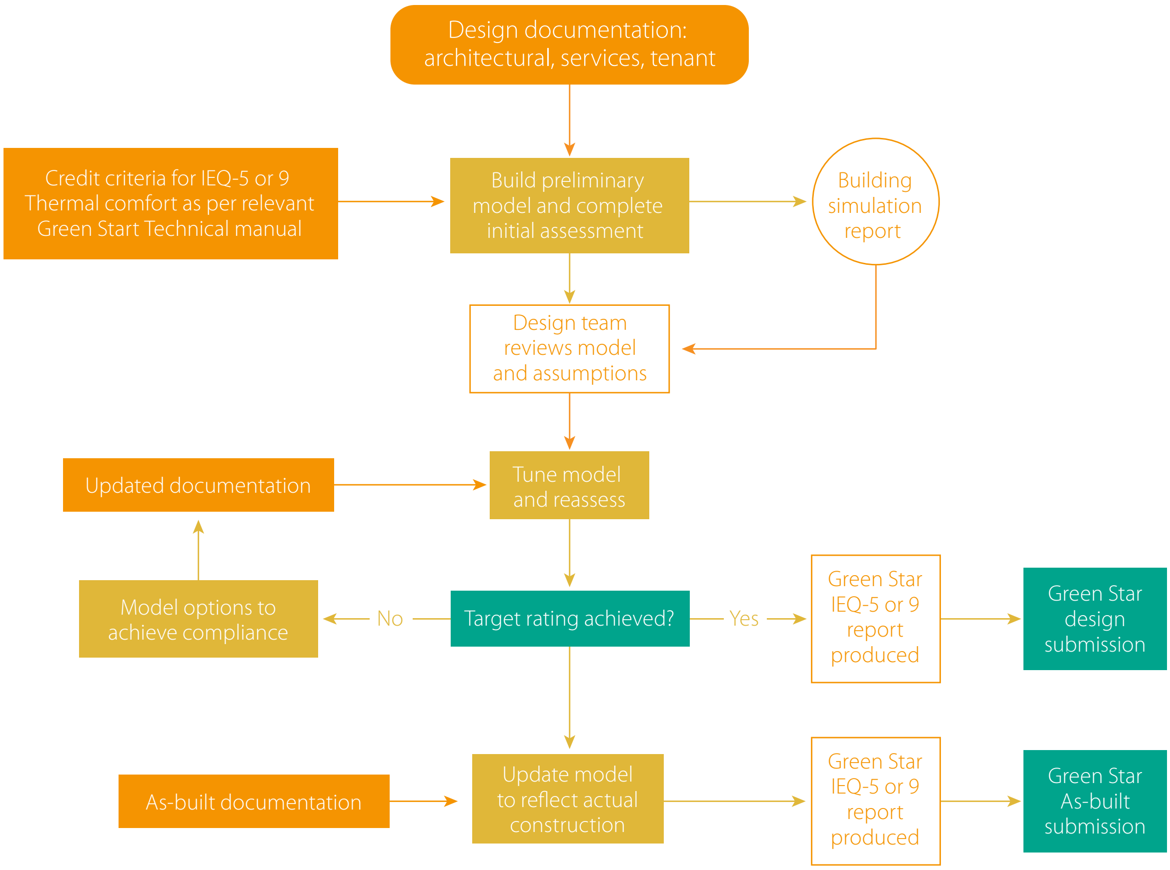
Note: This process is a guide only, and specific project requirements may differ.

The GBCA has released a hand-calculation guide that may be used in lieu of building simulation. Use of this method is outside the scope of this document.



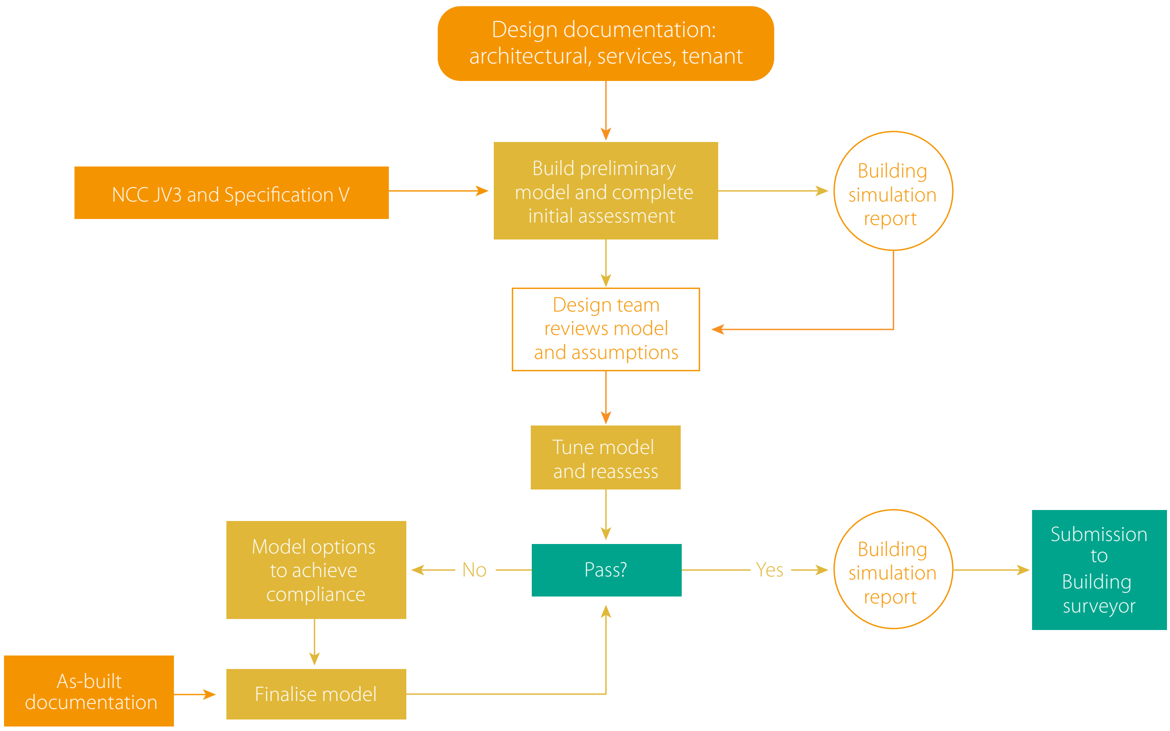
Appendix E Process for Green Star thermal comfort simulation

Note: This process is a guide only, and specific project requirements may differ.



Appendix F Process for NCC JV3 simulation

Note: This process is a guide only, and specific project requirements may differ.



Appendix G Process for design simulation

Note: This process is a guide only, and specific project requirements may differ.

The process for simulations to drive façade design, natural ventilation effectiveness or other design features is fluid, and will depend entirely on the project type and the desired outcome. It is assumed that for this type of project, you will be engaging an ESD consultant who will carry out and use the simulation to inform their design advice. The scope for the modelling is something that the consultant will develop themselves and can be used to differentiate between various consultants.