



**Asia-Pacific
Economic Cooperation**

NABERS Pilot in Indonesia

*A Contribution to the APEC Incubator for Enhancing Building
Energy Performance Project*

APEC Energy Working Group

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Executive Summary

Indonesia's commercial building sector has a key role to play in meeting the nation's emission reduction targets committed to in the Paris Agreement. Its growing energy needs are also putting upwards pressure on energy costs, electricity infrastructure, clean water consumption, and pollution levels in Indonesia.

There is interest within the sector to contribute and be part of the solution to these issues by improving its energy performance, but the sector faces a range of barrier to transformation. One such barrier is that existing tools are not regarded as sufficiently robust to effectively benchmark and demonstrate Indonesian buildings' energy performance and track their progress.

NABERS (National Australian Built Environment Rating System) could fill this gap in Indonesia, as it is a highly regarded and robust tool which has proven instrumental in supporting significant investment in commercial office buildings energy efficiency retrofits in Australia.

On this basis, this Indonesia NABERS pilot project was developed collaboratively by participants in the Australia-Indonesia Commercial Building Collaboration workshop in October 2015. The purpose of the pilot was to investigate NABERS ratings' potential suitability to the Indonesian market, starting with the applicability of the *NABERS Energy and Water for offices rating tools* to Indonesian office buildings.

This report outlines the experience of accredited NABERS assessors Lisa Williams and Ridho Sinuraya in rating five (5) Jakarta office buildings.

This lessons learnt report outlines potential benefits of NABERS to Indonesia, challenges encountered in applying the rating tool during the pilot, key solutions agreed for the pilot, likely longer-term solutions required for a NABERS rollout in Indonesia and next steps.

The NABERS energy and water tool was able to be applied to all the buildings in the study, and ratings were able to be provided. However, a number of challenges were encountered, including:

- Limited demand amongst Indonesian property owners for the introduction of NABERS, without stronger articulation of the business case;
- A range of issues relating to availability and quality of data and documentation required;
- A range of technical issues relating to unique characteristics of Indonesian buildings and the management of energy use within these buildings;
- The need to clarify who could and should administer an Indonesian NABERS scheme.

Identified next steps include:

1. Further discussions between the Indonesian property sector, building industry and the NABERS team focusing on the value proposition for NABERS in Indonesia, and potential solutions to overcome identified issues and challenges;
2. Further NABERS internal discussions to review findings from the pilot and assess what potential next steps could be considered based on the project.

1.0 Project rationale

1.1 Why pilot NABERS in Indonesia?

The growing energy needs of the Indonesian commercial office sector and manufacturing industry are putting upwards pressure on energy costs, electricity infrastructure, clean water consumption, and pollution levels in Indonesia. There is interest within the commercial office sector to contribute to the solutions to these issues by improving its energy performance.

One of the necessary enabling conditions for improved energy performance in buildings is the availability of an energy performance rating tool that is sufficiently robust to support investment in energy efficiency projects. Importantly for Indonesia, this can present a significant barrier to the utilisation of global climate finance mechanisms such as the Green Climate Fund, which are seeking to invest in developing countries, but require trustworthy performance indicators so that investors can be confident that the investments are delivering actual emission reductions.

NABERS has performed this function in Australia. This project was identified as a priority through a multi-stakeholder workshop run by ClimateWorks Australia in Jakarta in 2015. It aims to investigate the potential to adapt NABERS to Indonesia in order to support improved energy performance.

“Every building has an impact on the environment”

The project builds on a number of international applications of NABERS, including an established program in New Zealand, and pilots in Hong Kong, China and India. The goal of NABERS international pilot ratings is to investigate the potential suitability of NABERS in different overseas markets. This includes identifying available data, differences in buildings, analysing differences in climatic conditions and finding a suitable administrator. International pilot ratings can provide a solid foundation for transitioning to a potential License Agreement overseas by providing the Australian Administrator (the New South Wales Government) with:

- A practical understanding of the differences that exist in different regions of the world in terms of the availability of data and building operations;
- An understanding of the changes to the rules that would be required to adapt NABERS for wide use in different countries.

1.2 What is NABERS?

NABERS (National Australian Built Environment Rating System) is an Australian-developed rating system that measures the environmental performance of buildings, tenancies and homes. Put simply, NABERS measures the energy efficiency, water efficiency, waste management and indoor environment quality of a building or tenancy and its impact on the environment.

It does this by using measured and verified performance information, such as utility bills, and converting them into an easy to understand star rating scale from one to six stars. For example, a 6 star rating demonstrates market-leading performance, while a 1 star rating means the building or tenancy has considerable scope for improvement.

NABERS ratings can assess the efficiency and environmental performance of buildings and compare

them to similar buildings. NABERS tools exist for offices, shopping centres, hotels, data centres and hospitals. NABERS Energy for office ratings can be used to measure the performance of an individual office tenancy, the shared services (base building), or the whole building.

1.3 Why has NABERS been effective in Australia?

The key features of NABERS that have led its success are:

- It measures performance, not intention
- It provides relevant information
- It is simple and easy to undertake a rating
- It is reliable
- It is meaningful

Performance: NABERS measures actual building performance by using 12 months of energy and water data, normalising against key building attributes that would influence it. Design intention and 'green features' do not influence the rating except to the extent that they result in actual improvements in energy or water performance, unlike most other rating systems (see below).

Relevance: NABERS provides both base building and tenancy ratings. This allows the building manager to rate the components they have control over, and similarly with the tenant. Performance is not dependent on another party and any improvements to performance can be attributed to the responsible party. In this way, NABERS provides a way for building owners, managers and tenants to accurately measure the energy saving they have achieved (or not achieved) through capital or management improvements.

The base building ratings can also be used by investors and owners to understand the complete performance of the core elements of a building they own or are considering investing in, separate to the tenant energy use for which they would only have limited control. The rating tool also normalises the many operational variables within a building during a year that make it very difficult to compare energy usage from year to year, so a building can equitably compare their results year to year and against other buildings in their region.

Simplicity: Ratings are relatively simple and easy to perform as they rely on existing documentation to complete, such as leasing documents, survey plans and energy / water bills. This keeps the cost of ratings to a minimum.

Reliability: NABERS ratings are performed by an accredited assessor who is trained in applying the NABERS Rules. The Rules are the protocols which the buildings are assessed against and ensures that all buildings are being compared on an equitable basis by outlining what data is required, how it needs to be verified, and how it is used within the rating. The Rules also describe the requirements of a NABERS office rating in detail.

A site visit must be completed by the accredited assessor and is carried out to gain familiarity with the building features and layout, understand how it operates, and to ensure the spaces being rated comply with the rules through a physical check of the premises. Accredited assessors must pass an examination and are subject to ongoing quality control checks in the form of rigorous audits carried out by the NSW Office of Environment and Heritage. Critical decisions regarding the NABERS system are made by a National Steering Committee comprised of representatives from the States, Territories and Commonwealth Governments.

The program regularly seeks feedback from industry through a Stakeholder Advisory Committee

comprised of leading peak bodies, as well as specific technical working groups that are comprised of experts with an interest in specific rating tools. This robust governance approach has built a foundation of trust within the Industry, allowing reliance on the ratings to be accurate and a fair reflection of building performance.

Meaningfulness: Finally, ratings are meaningful because energy and water efficiency is brought to a common language of stars. The more stars, the better the performance is a straightforward concept that is understood far more widely than an abstract energy or water intensity metric.

NABERS is supported by an array of policies that have helped establish the rating system within the commercial property sector, most importantly the Commercial Building Disclosure scheme which requires office buildings above a certain size threshold to disclose their NABERS energy rating at the time of sale or lease, coupled with minimum rating requirements established for government base buildings and tenancies.

NABERS has also demonstrated real environmental benefits, particularly the energy rating tool for offices. More than 2700 office buildings have been rated over the lifespan of the program. This translates to a market penetration of 82% of the total Australian office built environment. An average energy usage reduction of 35% has been observed for buildings that have undergone at least 10 NABERS ratings.¹

NABERS has enabled and supported a transformation in the commercial building sector in Australia, which is now recognised for its global leadership in sustainability. The Australian region has led the world in the Global Real Estate Sustainability Benchmark (GRESB) since inception, and Australian property companies have topped the Dow Jones Sustainability Index (DJSI) in the real estate category for several years running. Both indices are used by investors worldwide to inform their investment decisions. NABERS has played a strong role in enabling these organisations to make credible claims for their energy and water performance.

1.4 Comparing rating tools – How is NABERS different?

There are a multitude of green building rating tools available in various markets around the world. The most common question received from Indonesian building owners during the pilot was how NABERS compares to Green Mark, which is administered by the Singaporean Building Construction Authority (BCA). Similar questions have been asked by some stakeholders about the GreenShip program, which is administered by the Green Building Council of Indonesia. What follows is a brief discussion of the major points of similarity and difference between Green Mark and NABERS – these are also likely to reflect the differences and similarities between GreenShip and NABERS.

1. *Multiple indicator vs single indicator ratings*

Using Green Mark, a building is given a rating (Certified, Gold, Gold Plus or Platinum) based on the number of points scored across several categories:

- Energy efficiency
- Other green requirements, which consists of:
 - Water efficiency
 - Sustainable operation and management
 - Indoor environment quality
 - Other green features.

¹ <https://nabers.gov.au/AnnualReport/2015-2016/life-of-program-statistics.html>.

Out of 180 points 89 points are awarded for energy efficiency and 91 points are awarded for other green features.

Green Mark Score	Green Mark Rating
90 and above	Green Mark Platinum
85 to <90	Green Mark GoldPlus
75 to <85	Green Mark Gold
50 to <75	Green Mark Certified

NABERS in Australia provides individual ratings for energy, water, waste and indoor environment quality on a star rating scale.

NABERS Star rating	Meaning²
0	Very Poor
1	Poor
2	Below Average
3	Average
4	Good
5	Excellent
6	Market Leading

A single indicator rating like Green Mark (and Green Star in Australia) provides a simple and clear measure of sustainability.

A multiple indicator rating like NABERS performs a different function. In Australia, building owners use NABERS to help them understand specific building performance components and set goals for improvement. This is compared to a single indicator rating, where the separate components are merged into a single rating in a standard way which may not reflect the particular building, climate zone or location. With multiple indicator ratings like NABERS, it is therefore possible, for example, for a building to obtain a very high NABERS Energy rating, but a lower NABERS Water rating. This provides information that can be easily utilised to pinpoint areas for potential improvement. In the example above, the building owner can see that they need to focus on introducing measures to reduce water use and obtain a better NABERS Water rating next year. In addition, a separate rating for energy can be directly correlated to energy costs, which can be useful for investors.

2. Features and modelled performance vs metered performance

Using Green Mark, building owners receive points for utilising specific technologies or features (e.g. energy efficient lifts, water monitoring systems) or for modelled performance of technologies (such as the efficiency of chiller plant equipment).

NABERS does not give points for specific features or technologies in a building, but uses only metered performance. To improve their NABERS Energy rating, a building must use less energy during the next 12 months. Likewise, better NABERS Water, Waste and Indoor Environment can only be achieved through using less water, less waste and better indoor environment quality conditions, respectively.

² Benchmark refers to the local (Australian) market.

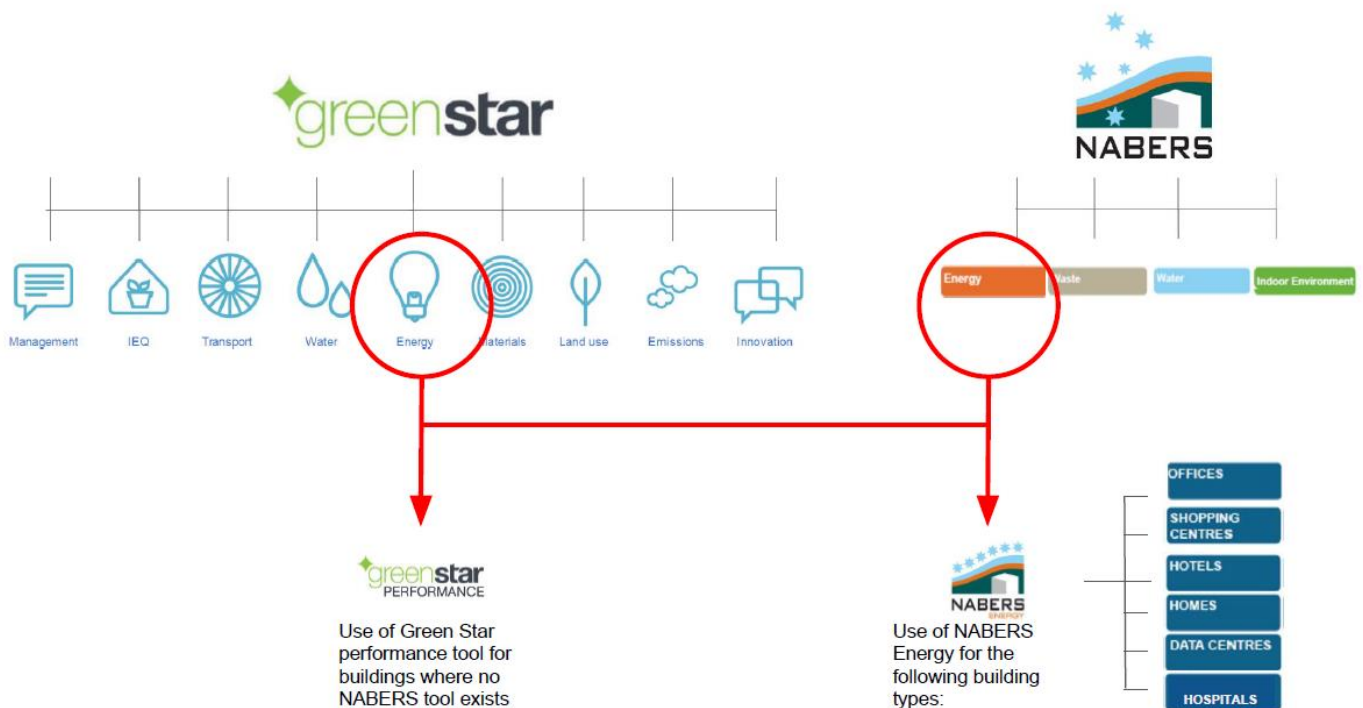
3. Full range of performance vs partial range of performance

To obtain a Green Mark rating a building must achieve a minimum number of points. If a building doesn't achieve a minimum of 50 points, (or the minimum required in each category) then it is ineligible for a rating. NABERS, on the other hand, can assess all buildings regardless of how sustainable they operate. Buildings operating poorly are likely to achieve a low star rating, while those operating in a highly sustainable way will receive a high rating.

4. Governance

Both NABERS and Green Mark require information to be collected by an Accredited Assessor and have a robust process for verifying the data collected.

This suggests that NABERS and Green Mark (and Greenship) serve different functions. The systems could function alongside one another in a complementary fashion, as is the case in Australia with NABERS and Green Star. For example, in Australia, most Green Star ratings utilise NABERS to demonstrate the energy component of a Green Star rating (see below). Further discussion is required to understand stakeholder perspectives on the potential value in adapting NABERS to Indonesia given the existing rating tools in use.



2.0 NABERS Indonesia Pilot Ratings

2.1 Assessor findings

The buildings involved in the pilot project range in size from 10,000 sqm to 50,000 sqm in overall gross lettable area. The buildings were built between 2007 and 2013 with the exception of one heritage listed building built in 1979. The most recently constructed building has an energy management plan in place, however it is the exception. There are limited consistencies in the documentation held by buildings and large variations in the type, the quality, and availability of data. Therefore, it is currently very difficult to establish any overall comparison between the buildings in regards to their energy and water efficiency. This is where NABERS can help.

There are two types of NABERS Energy ratings that were used in the pilot: base building ratings and whole building ratings:

- A base building rating includes only the energy used (and greenhouse gas emissions generated) for all central services, including air conditioning, lifts, car parking, back-up generators, all centralised services, and common area lighting etc.;
- A whole building rating includes the energy used (and greenhouse gas emissions generated) for all house services (as listed above) plus the light and power of the commercial office tenants.

A NABERS Water Rating is usually conducted in conjunction with either a base building or a whole building energy rating. The scope of a water rating is the same for both rating types and encompasses all water use for the commercial office component of the building for the provision of all central services including air conditioning, car parks, bathroom facilities, irrigation and office tenant kitchens. The only exclusions possible in a water rating is the water used by non-office entities such as retail tenants, residential spaces etc.

All NABERS energy and water ratings are conducted using 365 days of actual consumption data and assesses the operation of the building throughout the 365-day period which is known as the rating period. The rating period used in the pilot project was 1st March 2016 to 28th of February 2017 and was same for all buildings. For this study, as a like for like comparison for normalisation of the energy consumption, we've used the climate zone associated with post code 0880, located in the Northern Territory. This was based on climate-based data taken from the Bureau of Meteorology Australia, so we could establish an accurate representation of the same climatic conditions in Jakarta as compared to a location in Australia.

The buildings rated performed as follows:

- For Base Building Energy Ratings, the lowest rated building was 0 star, and the highest rated building was 1.5 stars;
- For Base Building Water Ratings, the lowest rated building was 2.5 stars, and the highest rated building was 3.5 stars;
- For Whole Building Energy Ratings, the lowest rated building was 0 star, and the highest rated building was 3.5 stars;
- For Whole Building Water Ratings, the lowest rated building was 2.0 stars, and the highest rated building was 2.5 stars;

2.2 Summary Table

Challenges and potential solutions

This table provides a summary of the challenges identified during the pilot project and which would need to be addressed before a potential NABERS roll-out to Indonesia can be considered. Further detail on each of these is found in the sections below.

Challenges	Description	Potential solution(s)
Market demand for green building tools and NABERS in Indonesia		
Market demand for green building tools and NABERS in Indonesia	Indonesian property owner's perception of green building rating tools in general and NABERS in particular.	Investigate the potential benefits of green building rating tools for Indonesian property owners through consultations, and improve understanding of the potential benefits of NABERS in relation to other available tools such as GreenShip and GreenMark.
Data collection		
Availability and quality of data and documentation	Overall issue of restricted access to data and documentation and concern for quality of data available. The following sub-elements outlined below describe this in more detail.	Internal NABERS consultation to assess what next step can be considered based on the current available documentation. Facilitate discussions between NABERS and the Indonesian property owners about potential solutions to make more data and better quality data available.
i. Confidentiality of documents	High confidentiality concerns restrict access to documentation, which are needed to fulfil NABERS quality assurance processes.	Facilitate discussions between NABERS and Indonesian property owners to understand causes behind high confidentiality concerns and identify solutions to overcome those.
ii. Net lettable area measurements	Currently most tenant survey plans are not undertaken by a licensed surveyor and are often measured as semi gross area. NABERS would need net lettable area measurements.	Require licensed surveyor to survey buildings according to an agreed measurement standard before undertaking a NABERS ratings. All areas in new leases based on plans measured by a licensed surveyor using an agreed measurement standard.
iii. Building sub-metering	No separate metering installed to determine the split of energy use between tenant and base building.	Investigate potential and business case for Indonesian property owners to adopt a comprehensive sub-meter programme and

		installation of sub-metering to all retail and tenancy areas to enable base building ratings to be created. Note that similar issues were experienced in Australia when NABERS was introduced.
iv. Agreed rated hours	The lease document would not be provided meaning the agreed rated hours could not be established in accordance with NABERS Rules. A lease excerpt was provided with an overview of the buildings service hours which were used in the pilot ratings.	NABERS and Indonesian property owners should further investigate what accessible and acceptable documentation can be used to establish rated hours.
Technical applicability		
Air conditioning	Confirmation is required to assess who controls the air conditioning and whether it is base building or tenancies that supply the air conditioning.	For the pilot, base building ratings were conducted if the air conditioning is provided, managed and operated by the building owner, because the base building has full control over the air conditioning. However, a whole building rating is conducted when the tenants themselves control and manage the air conditioning to their tenancy area. Supporting evidence will determine as to whether the building can be rated as a base building or a whole building.
Retail exclusion	The lack of sub metering is an issue as the retail and base building energy usage is metered together. Without adequate sub-metering this has to be included within the base building rating.	Further investigation and discussions with property owners regarding sub-metering specifically designed to capture energy usage for retail tenants located at the site.
Unique area types	Prayer rooms, driver's area's and wash areas are unique to Indonesia. These areas use additional energy and would need to be factored into the overall rating data.	Potential development of NABERS Indonesian-specific benchmarks, although query whether it may be worth retaining international comparability – this depends on intended audience for the ratings.
Tool administration		
Tool administration	Absence of an Indonesian NABERS administrator or supportive government body to roll out the tool to Indonesia.	Facilitate discussion between property owners, industry and government to identify appetite and willingness to import and administer the tool in Indonesia. ClimateWorks has already identified the Green Building Council of Indonesia as a potential future administrator.

2.3 Market demand for green building rating tools in Indonesia

A significant barrier is a lack of recognition of the market for green building rating tools and in particular the perception among some building owners that there is a lack of added value to green building tools in general and NABERS in particular.

For NABERS to be successful in Indonesia a strong and committed Administrator will be required to champion the cause for green buildings and to work with the leading property owners to create the demand for the rating tools and for green buildings.



2.4 Data collection

NABERS requires verifiable documentation for all aspects of data collection. This ensures the integrity of each rating. This also enables buildings to be fairly compared as they are being measured the same way, using the same high standard of data. Ideally, the documentation is independent (utility bills, survey plans) so there is no vested interest in the data or is a legal document (such as a lease).

During the pilot, we encountered numerous documents and information sources that did not comply with the NABERS rules. We discussed each of these issues with the NABERS technical team and agreed on the application of the rules for the pilot ratings as a one off. However, in the longer term the NABERS rules would need to be too adapted to the Indonesian context, and challenges such as the data-related issues would need to be solved. These long-term rule solutions are beyond the scope of the pilot, however we have suggested some possible solutions to act as a catalyst for further discussions beyond the pilot. The final decisions about the rules and related issues will rest with NABERS Administrators (OEH) and a potential future NABERS Indonesian Administrator.

2.4.1 Confidentiality of information: Lease documents and access to tenancy areas

It is a crucial part of NABERS validation protocol that assessors gain an understanding and become familiar with how each building is operated and managed. They also obtain, retain and review the necessary documents required to support the rating. This has been one of the key challenges during the Jakarta pilot, as building owners raised confidentiality concerns, which restricted:

- Access to high level documentation, including lease documents;
- Access to too many tenancy areas.

Lease documentation

The Lease document is a vital part of the data requirements for the NABERS Assessment. A space within a building is classed as ready for occupation when an organisation is entitled to the exclusive use of the space through a lease agreement and would therefore require normal base building services, such as access, air conditioning, lighting and power be provided to the space. The document confirms the period of occupancy for the tenanted areas and can be used to verify any periods of vacancy throughout the building during the rating period. Access to the lease documents in Jakarta during the pilot was not granted due to confidentiality concerns by the building owners. This was a cause for concern as there was no verification of the occupancy dates and it was not possible to identify any vacant tenancy areas during the rating period.

Requirement

According to the NABERS Rules, whilst access to original documents is highly desirable, they understand there are sometimes difficulties or delays in obtaining them. Therefore, it is permissible to utilise a copy of the document. However, it is vital that the assessor is satisfied that the document can be verified to be true and correct.

Solution implemented for the Pilot Ratings

We submitted a request to the NABERS technical team asking if a lease/tenancy schedule was acceptable instead of the lease document. The lease schedule for some properties included each tenant name, Net Lettable Area (or Semi Gross Area), floor level and office/suite, with the commencement and expiry dates of leases, and the management teams signed the document to confirm it is accurate and true. For the pilot ratings, the National NABERS Administrator agreed that the lease schedule document would be an acceptable substitute.

Potential long-term solution

- Moving forward, as a minimum requirement, it will be necessary for the assessor to sight the lease (or an associated excerpt) to verify that the details provided, alongside a current and detailed lease schedule document;
- The excerpt would need to include enough information for the assessor to know which tenant it is relating to. This is in line with the Validation Protocol to ensure that the information used for the rating assessment is accurate and unbiased;
- Establishing confidential secure storage protocols through an Indonesian administrator may also assist to address this issue;
- The alternative is to rely on tenant occupancy surveys where leases will not be disclosed due to

privacy concerns.

Tenancy areas

The tenancy/lease schedules sometimes do not identify the tenant by name only by their floor level and suite number. This format makes it very difficult for the assessor to be familiar with the building occupants and the expected working hours of the tenant.

Additionally, many of the tenants had computer server rooms in their tenancy areas. It is usual practice for the assessor to enter the tenancy area and confirm the square meters of these server rooms as the areas are usually excluded from the Rated Area. This confirmation is important as it impacts the Rated Area calculation and the Star Rating result. For most buildings in the pilot, access was not permitted to the tenant computer server rooms, and for some buildings access to the whole tenancy was denied. Therefore, we could not address these types of areas for verification of the type of air conditioning the server rooms were receiving.

There is also an extremely high level of security surrounding buildings in Jakarta. Whilst at one site, when taking some external photographs of the building as a means to record the building layout and its appearance, the security guards requested we discontinue all photography and delete the photos from our cameras. We understand this is a regular occurrence in Jakarta.

Solution implemented for the Pilot Ratings

Given the building owners and management teams' confidentiality concerns, some of the data was provided in a summary format in consultation with the National NABERS Administrator. List formats for the tenancy areas (floor level and suite number) and for the tenant computer server rooms were accepted for the purpose of the pilot project.

Potential long term solution

The NABERS program has experienced similar confidentiality concerns before. The following could be potential solutions on the longer term:

- Setting up an Indonesian NABERS administrator should help provide building owners more confidence with sharing their data and documents;
- Communicating clearly with buildings owners that the tenancies and their associated areas (sqm) and occupancy are confidential information used only for the NABERS rating assessment. They are not publicly disclosed;
- A code / deed of confidentiality that becomes part of the assessor contract that property owners are comfortable with that covers security checks and tenant space access. This may require a different delivery model (e.g. Government deliver ratings instead of private companies) to ensure the trust is there.

2.4.2 Net Lettable Area

During the pilot we identified variations in the data available from the different buildings. We found the general practice in Jakarta is to use BOMA Method of Measurement, which is similar to the standard used in Australia. However, in Indonesia the measurements are usually not undertaken by an independent qualified licensed surveyor as they are in Australia. This means the BOMA method of measurement rules have not been consistently applied across the commercial building market, resulting

in inconsistencies in the lettable area calculations.

Additionally, we found it is common practice in Jakarta for gross leases to be used, and the area in the lease includes the tenanted area's net lettable area plus a portion of the common area of the tenants floor. The NABERS Rating Tool utilises the Net Lettable tenant area only and not any common areas at all.

Requirement

The NABERS rating tool normalises energy consumption using three major variables: building area, building hours and climate (location). How each of these variables is established is a critical aspect to the rating result. According to the NABERS Rules the office area of the premises to be rated must be verified by the Assessor to have been measured in compliance with the Measurement Standard for Rated Area, by one of the following methods (listed in order of preference):

- Reference to a third-party survey or to lease documentation that is explicitly based on the Measurement Standard for Rated Area or;
- Either the Building Owners and Managers Association (BOMA) 1989 Method of Measurement or the BOMA 1985 Method of Measurement (Net Rentable Area), or;
- If unavailable, direct measurement from current plans or scaled prints, measured to the Measurement Standard for Rated Area, or;
- If unavailable, site measurements verified by the assessor to have been done to the Measurement Standard for Rated Area.

Solution implemented for the Pilot Ratings

NABERS would normally require the Assessor or a surveyor to take site measurements for all buildings according to a recognised measurement standard. However, this would have significantly increased the cost to the point where the pilot would not have been financially viable.

Therefore, following consultation with the NABERS National Administrator it was agreed that sample site measurements reconciled against the available documentation would suffice.

Potential long term solution

It is crucial for NABERS that a reliable standard method of area measurement is used consistently as the area is a fundamental element used in the algorithms that calculate the star rating results.

Potential solutions could be:

- Require a licensed surveyor to survey the building to a standard (BOMA is suggested, however the International Property Measurement Standard is another alternative) prior to conducting ratings. Such a requirement would likely need to be implemented over a period of several years;
- Having the areas in all new leases based on the survey plans measured and drawn by a licensed surveyor;
- Provide a roadmap or plan that sets time frame of when a certain standard of survey plans is required. For example, a self-drawn plan to the BOMA standard is acceptable until 1 July 2020. From 1 July 2020 to 1 July 2022 50% of the area of the building must be surveyed and drawn by an independent and qualified surveyor to the BOMA standard.

2.4.3 Building Sub-metering

It was discovered that some leases in Jakarta provide services including lighting and power to the tenancy areas with the cost incorporated into the lease payments. Whilst this may be financially viable and beneficial to both the lessee and lessor, this type of arrangement makes it impossible to conduct base building NABERS ratings and only allows for whole building NABERS ratings.

In most cases within Australian buildings the energy metering is set up in such a way that there is always sub-metering to distinguish between the tenant's energy usage and the base building's energy usage. In Jakarta, some of the newer buildings have installed sub-metering but this is not consistent across buildings, which is a major difference to Australia.

Requirement

For the completion of NABERS base building ratings, building energy sub-metering is crucial. Since building owners do not have operational control over the tenant's energy use, and limited control over the equipment a tenant uses (i.e. computer server rooms, types of computers, lighting controls), it is important to be able to exclude tenancies' energy use from a NABERS base building rating. NABERS have a requirement that sub-meters and sub-meter reading system are validated as being accurate before they can be used in a NABERS Rating.

Solution implemented for the pilot ratings

In the pilot where the tenant's electricity was not sub-metered or separately metered, we undertook a whole building rating. If the tenant's electricity use was sub-metered, then a base building rating was completed.

Potential long term solution

- Encourage building owners to install sub-metering systems. This will firstly enable them to exclude the tenant energy use and then to identify and manage the energy use of their own plant and equipment (i.e. chillers & AHU's). This sets the building on a path of improved energy management;

2.4.4 Agreed hours of comfort & overtime hours

In a commercial office building the air conditioning system plays a critical role in providing comfort conditions for tenants to work efficiently. As the air conditioning system in a commercial office building uses around 50% of the total energy usage, the hours the system operates is a key input to measuring a building's operational performance. A building providing air conditioning for 8 hours per day will use less electricity than a building providing air conditioning for 12 hours per day. This means the hours of operation of the air conditioning system are an important normalising factor.

Part of the agreed hour calculations includes overtime (after hours air conditioning), where the building owner agrees to provide a tenant with extra hours of air conditioning in addition to the hours agreed in the lease. This is usually supplied at an additional cost.

Some of the buildings in the pilot rely on paper rather than electronic records to record the overtime usage. This means the collection of operational hour's data can be time consuming, complicated and

can lead to variation in the information supplied.

Solution implemented for the Pilot Ratings

Two of the buildings were rated as whole building ratings, which enabled us to use tenant occupancy surveys (TOS) to establish the rated hours for these properties. Completing TOS's in large buildings is very time consuming and difficult from an execution perspective. Additionally, tenants within the building are often hesitant when asked to complete the TOS. The TOS incorporates listing the start and finish times of the majority (80%) of staff, with the addition of listing the overtime hours worked throughout the rating period. For the pilot scheme, we were able to successfully complete all TOS's as we were fortunate to have the Building Manager escort us to all tenancy areas.

Base building ratings require a copy of the lease document that states the hours of comfort conditions, whereby the tenancy area is to be safe, lit and comfortable for office work. The whole lease document was not available due to the confidentiality issues, so a thorough investigation of the Building Management System was undertaken and we took screen shots of the BMS using photographs to act as evidence to verify the start and stop time of the plant in the buildings. We also took site notes.

The building owners are happy to provide a lease excerpt which states the provision of air conditioning. In the pilot buildings, this was either 08:00-18:00 or 07:00-18:00 Monday to Friday and 08:00-13:00 on Saturdays. We believe that these core hours between Monday and Saturday are consistent across the majority of buildings within Jakarta. If the building has the provision of a Building Management System it is acceptable to use the data to confirm the agreed hours of comfort.

Potential long term solution

- This is a complex area and potential solutions will need to be carefully considered;
- Tenant Occupancy Surveys could be used for each individual tenancy to confirm their hours of comfort and overtime.

2.5 Technical application

NABERS provides a fair comparison of the operational efficiency of buildings without penalising the building owner for any additional features or services provided to their tenants. This relies on treating information from buildings in a pre-defined way. While undertaking the ratings in Jakarta we identified issues that made it difficult to apply NABERS rules, such as:

- Significant variances in the configuration of air conditioning to different tenancies;
- Issues relating to the sub-metering and excluding of energy;
- Unique spaces that are absent in Australian office buildings.

2.5.1 Air Conditioning to tenant areas

High rise office buildings in Indonesia do not always use centralised AC systems such as chilled water or condenser water reticulation systems. Some high-rise offices utilise split systems instead and do not sub-meter the tenant electricity consumption for these split systems as the lease arrangement/fee already includes the tenant's electricity consumption.

Although a whole building rating can be completed for buildings with non-centralised air conditioning, it is preferable for the building owner or management team to undertake a base building rating so they can

identify the building's energy efficiency, energy usage and monitor this going forward. A base building rating also provides a benchmark and identifies ways to address energy saving measures.

Solution implemented for the Pilot Ratings

For this pilot project, we undertook a whole building rating for the buildings which have centralised AC but with no tenant consumption sub-meter. For the one building with individual split AC units and sub-meters for tenant AC electricity consumption, a base building rating was completed.

Potential long term solution

- To enable a base building rating to be conducted, sub-meters that measure tenant AC equipment's consumption should be installed;
- Meters must be read on a regular basis (recommended monthly)

2.5.2 Retail exclusions

It was noted that the buildings in Jakarta often have substantial areas for retail tenancies without a clear separation between retail and office common area services (electricity, water, AC). In one of the participating buildings an energy meter for chilled water was installed. Under normal rating procedures in Australia this meter can be used to record data to enable a thermal energy exclusion calculation to be applied.

The meter that was sighted did not provide a clear verification that it was compatible with the NABERS Validation Protocol and therefore could not be used for the rating purposes. The building owner at this property uses the energy meter as a basis to charge the retail tenant for AC usage only, rather than as a means to record energy usage.

Solution implemented for the Pilot Ratings

In this pilot project, we had to include the energy consumption of all retail common areas, which also included the chilled water consumption as we were unable to exclude the energy due to insufficient metering.

Potential long term solution

- The services for retail common areas should have sub-meters installed to exclude this energy usage from the office buildings NABERS rating. All sub-meters used in a NABERS must be validated as accurate before they can be used.

2.5.3 Unique area types

Prayer Rooms

In every building in Jakarta there is a prayer room, with full and free access to tenants at any time during the working day. Currently within the Australian commercial buildings there are only a few of these types of areas and they are always located within a tenanted office area. They are therefore included in rated areas as the services to these areas (lighting, power and air conditioning) are directly provided from tenant electricity consumption.

Drivers Areas

In Australian buildings it is common to have car parking facilities alongside or in the basement areas of commercial office building. It is however, highly unusual that a tenant would engage a driver to chauffeur them to work. The opposite is true in Jakarta and many tenants have a personal driver. Therefore, a dedicated room for drivers to use during office hours in the car park area is provided. Again, all lighting, power and air conditioning for these areas are provided by the base building.

Wash areas associated with the prayer rooms

It is custom that wash rooms are provided adjacent to every prayer room. The tenants have full and free access to use this at any time during the working day. All power, lighting and more importantly, the actual water usage is provided by the base building. This water consumption would increase the overall base building water consumption and would have an impact on the water rating result as no allowance has been made for these areas high water usage.

It is important to note that within Australian buildings there are similar areas, known as end of trip facilities, whereby the building owner provides bike racks and adjacent shower areas for the tenants. The wash room areas in Jakarta are comparable to those in terms of energy and water allocation under the NABERS rules.

Solution implemented for the Pilot Ratings

Within the NABERS tool there is a provision to include a special space used exclusively by a single tenant. These areas are known as office support areas and are always located within the tenant's actual office space.

The Jakarta unique areas are located generally in the basement or lower levels of the building and are used by all tenants in the building. As these are common areas and the nett lettable area is not included in the rated area. However, all lighting, power and AC is provided by the base building and must be included in the overall rating. These areas were treated as base building services in the Jakarta ratings and the energy and water consumed in these particular areas was included.

Potential long term solution

These areas can be large in size and demand a high level of energy and water usage, as they are fully functioning spaces, which are actively used throughout the working day. However, if these spaces are common throughout all buildings in Jakarta, all buildings would be subjected to the same treatment.

- An allowance could be investigated and made for the size and frequency of these areas located in the common areas of the Jakarta commercial office buildings (this would be comparable to a method used by NABERS to rate shopping centres that also have some unique areas);

2.6 Administration

A potential future roll out of the NABERS tool to Indonesia raises the issue of its potential in-country administration. The following questions would need to be addressed:

- **Potential administrators:**
 - Who could be the national NABERS administrator?
 - What resources do they have to administer the program?
 - What is their experience in quality assurance?
 - Do they administer a tool currently?
 - Are there any competitor tools to NABERS in Indonesia?
 - How might the local administrator and the New South Wales Office of Environment and Heritage interact?

- **Supportive government framework:**
 - What is the relevant government body?
 - Would there be any compulsory legislation mandating the use of NABERS similar to Australia (CBD)?

3.0 Next steps

While there are good reasons to consider adapting NABERS to the Indonesian market, there are significant barriers (identified in the previous section) that would need to be overcome first. The following next steps are recommended:

1. A discussion between the Indonesian property sector, building industry and the NABERS team. This discussion should primarily focus on:
 - The value add that green building rating tools in general, and NABERS in particular can bring to the Indonesian property market;
 - Potential solutions to overcome the issues surrounding the availability and quality of data and documentation.
2. Further NABERS internal discussions to review findings from the pilot and assess what potential next steps could be considered based on the project

There are a range of other issues identified above, which are mostly linked to the technical differences between the Indonesian and Australian built environments. However, these aren't major issues and could be relatively easy to resolve once these initial steps are undertaken.



Appendix:

Summary of challenges per piloted building

BUILDING	ISSUE	RESOLUTION
Building 1	The tenancy areas were measured only as Semi Gross Areas (SGA).	If it is to remain similar to the other properties, the NLA must be manually calculated. The floor plan shows the corridor with all the portioned walls and which is used for accurate measurements. The NLA was calculated by measuring the area of the tenancy on the drawing.
Building 1	There is no separate measurement made for the electricity used by tenant AC, power & lighting. The Base Building is therefore not providing the minimum services.	A Whole Building rating was undertaken.
Building 2	There is no separate measurement made for the electricity used by tenant AC, power & lighting. Base Building is therefore not providing minimum services.	A Whole Building rating was undertaken.
Building 3	No thermal energy metering was completed and therefore the retail area, which is of a substantial size, has no data. They have an energy meter to calculate the chilled water energy, which is provided to all the retail tenants. Having compared it to the validation requirements in the thermal exclusions v2.0 document, as it outlines what it needs to cover (flow and temperature uncertainties), the way that the building measures this is different to the VP.	A normal thermal exclusion cannot be completed, which would have a large negative impact on the rating result and therefore the building cannot be rated accurately.
Building 4	A high level of confidentiality of surrounding the documents is required.	The resolution of this issue needs to be developed in collaboration with the Indonesian property owners.
Building 5	Each tenant has a split system for AC. The tenant can send an email request to change the normal hours of operation in the lease. There can be many different hours of operation provided, of which can be changed throughout the year several times. Therefore the hours of operation in the lease is not a true and accurate reflection of what centre management have to provide.	Lease amendments are acceptable so long as they are documented. The hours in the NABERS spreadsheet can be manually amended, so that the total annual hours are correct for the rating.
General	Treatment of the prayer rooms and the associated wash areas. It's not possible to use as NLA as it is not comparable to an office area. This is an addition that is using power and lighting and possibly AC provided by Base Building.	If the prayer rooms and associated wash rooms are located in the common area basement then they would be treated as a base building service. Re-benchmarking could resolve this issue.
General	Treatment of the driver's area / lounges.	Area cannot be included but the energy usage for these spaces are included into the rating.
General	Method of measurement used.	BOMA is used as a guideline. However any internal or external person can provide the plans and it is not compulsory to be drawn by a certified person. If the tenant is not happy with the determined sqm, they can re-measure.
General	Confidentiality of documents, specifically lease documents.	An alternative way to provided data must be sought from the NABERS team.

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