

Indoor environment quality and NABERS IE ratings: A case study of a commercial office building portfolio of twenty eight Australian buildings (HP1198)

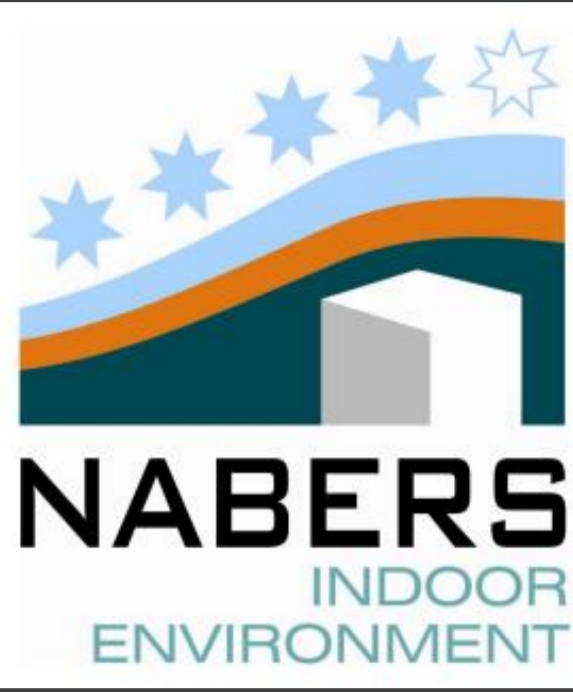


CETEC, 2/27 Normanby Road, Notting Hill, Victoria, Australia

Jack J Noonan, Dr. Vyt P Garnys

Introduction

Accreditation and rating schemes are one way of assessing and benchmarking the performance of buildings. The National Australian Built Environment Rating Scheme (NABERS) Indoor Environment (IE) tool is a unique rating tool that is governed by federal and state governments in Australia. It has been the subject of much discussion in recent times, with significant focus being placed on a lack of take up by building owners and facilities managers since introduction to the market in 2009 (in comparison to NABERS Energy, which is mandated, and NABERS Water). Furthermore, the tool is currently undertaking a review. In 2013, a large property owner engaged the project team to review the Indoor Environment Quality of their 28 commercial office buildings using the NABERS IE tool as a guide, as well as providing NABERS IE certification for 18 of these buildings. This was the first time a building owner of this size had decided to certify their portfolio for NABERS IE ratings.



Methods

Office Properties	State	NLA (m2)*
Building 1	ACT	15,000
Building 2	ACT	20,000
Building 3	ACT	5,000
Building 4	ACT	30,000
Building 5	ACT	20,000
Building 6	ACT	25,000
Building 7	ACT	20,000
Building 8	NSW	20,000
Building 9	NSW	30,000
Building 10	NSW	50,000
Building 11	NSW	15,000
Building 12	NSW	25,000
Building 13	NSW	25,000
Building 14	NSW	15,000
Building 15	NSW	15,000
Building 16	NSW	10,000
Building 17	QLD	40,000
Building 18	QLD	20,000
Building 19	QLD	25,000
Building 20	QLD	5,000
Building 21	VIC	60,000
Building 22	VIC	70,000
Building 23	VIC	30,000
Building 24	VIC	15,000
Building 25	VIC	50,000
Building 26	VIC	5,000
Building 27	VIC	5,000
Building 28	WA	30,000

NABERS offers four rating tools for a range of building types (Figure 2). The project team undertook indoor environment quality assessments in accordance with the NABERS Indoor Environment Validation Protocol. Assessments took place in Melbourne, Sydney, Brisbane, Perth, and Canberra across a total of 28 commercial office buildings ranging from 4,000 to 70,000 square meters of net lettable area (NLA) (Figure 1, Net lettable areas measured are listed as approximates in order to retain the confidentiality of the buildings reported). Three of the buildings in the portfolio were not able to be assessed due to security and access issues (government agencies) or major refurbishments. While ratings are possible for tenancies and whole buildings, this study focused on base building assessments (including delivery of base building services to the tenancies).

A summary of the parameters assessed through the NABERS IE process can be seen in Figure 3. The weightings of each of these parameters for base buildings ratings can be seen in Table 1.



Figure 1 (above) – Basic Building Information

Figure 2 (right) – Summary of NABERS Rating Tools for Buildings

Results

A summary of the scores for each building for IAQ, thermal comfort, and acoustic comfort can be seen in Figure 4 below. Maximum scores for IAQ and thermal comfort were 30 points and 15 points for acoustic comfort. In the case of thermal comfort, 15/30 points were only possible when there was no Building Management System (BMS) data.

- Common areas where buildings failed to demonstrate a high performing indoor environment quality (and where the buildings subsequently lost points/stars) included:
- Ambient temperature – typically above 24 degrees Celsius
 - Relative humidity – Canberra properties had RHs of under 30%
 - Indoor microbials – many buildings showed indoor microbials amplified over outdoors
 - Acoustic comfort – base building noise measured above 40 or 45 dBA

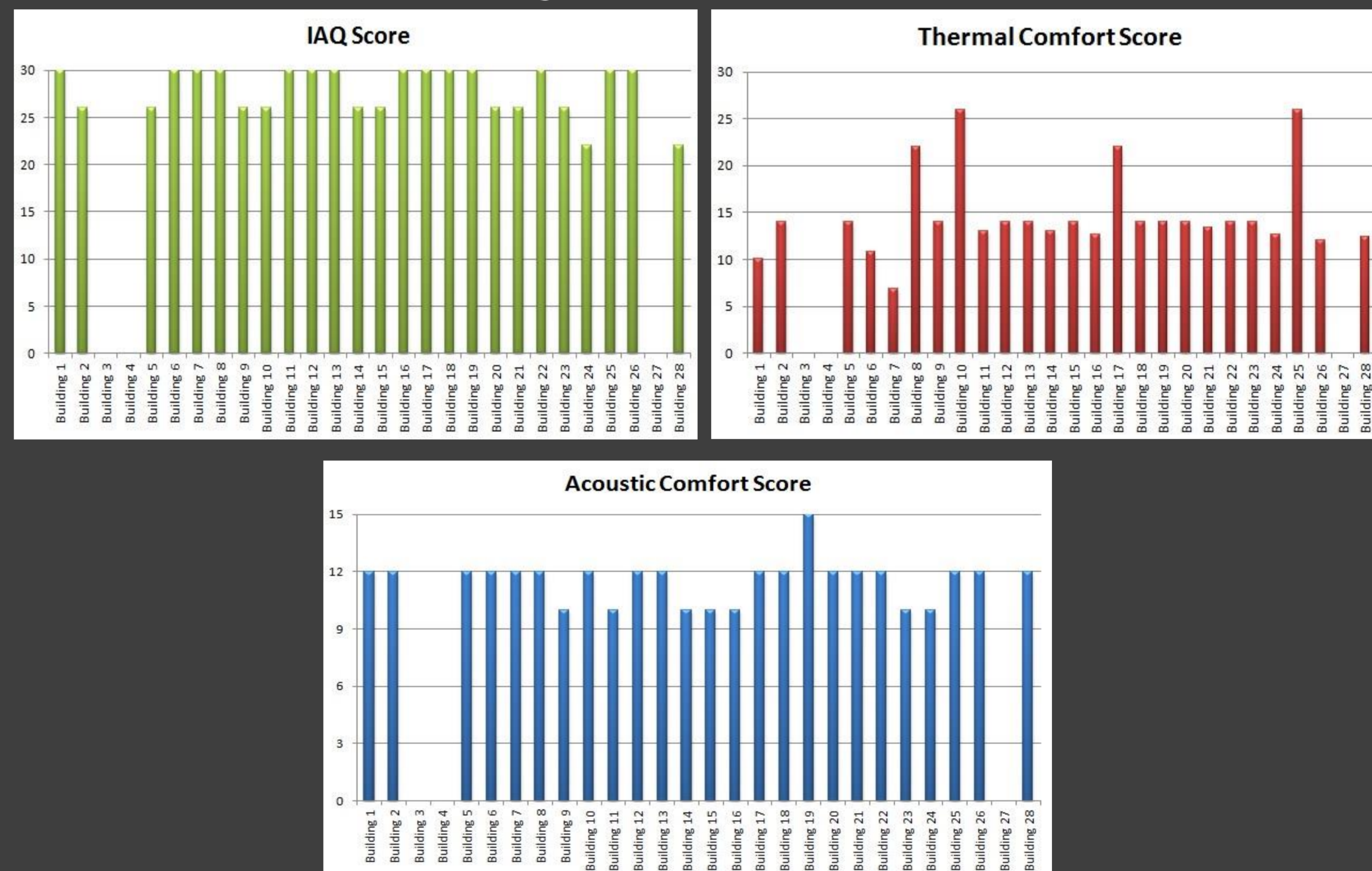


Figure 4 – (from clockwise) IAQ, Thermal Comfort and Acoustic Comfort scores for each building

The maximum score possible for each building was 75 points. Based on set bands set by NABERS IE, scores correspond to a star rating (ranging from 1 to 5). Each building's rating can be seen in Figure 5. Across the entire building portfolio of 28 commercial office buildings, the average rating was 4.04 stars. Four buildings were awarded the maximum five star rating. The building owner decided to only proceed with formal accreditation (disclosure to the property industry) on buildings that achieved a minimum of four stars (18 of 28 buildings).

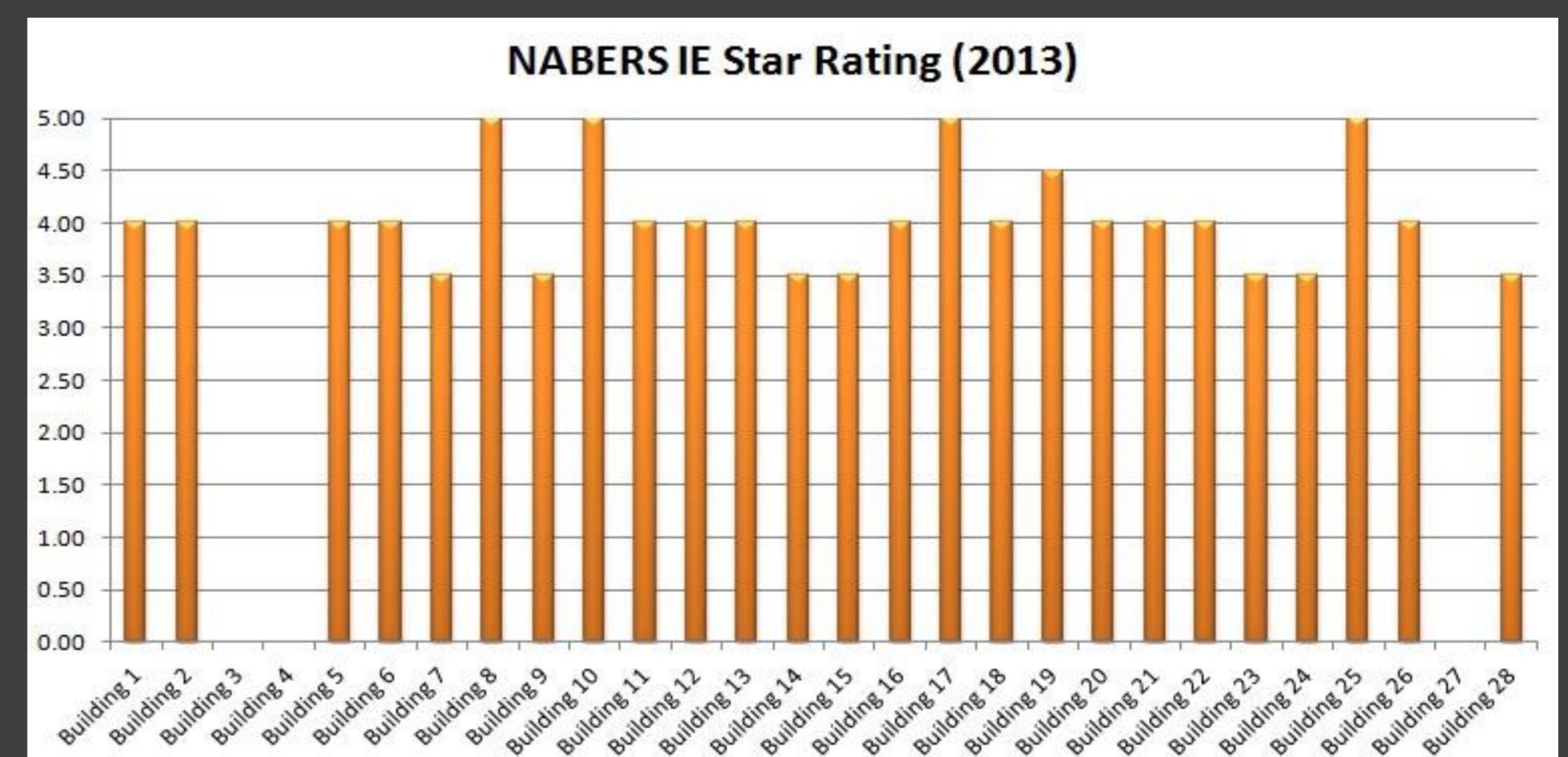


Figure 5 – Final NABERS IE Base Building Star Ratings based on IEQ inputs

Indoor Air Quality	<ul style="list-style-type: none"> • Particulate Matter • Airborne Microbials • Carbon Monoxide • Carbon Dioxide (Ventilation Effectiveness)
Thermal Comfort	<ul style="list-style-type: none"> • Ambient Temperature • Relative Humidity • Air Movement
Acoustic Comfort	<ul style="list-style-type: none"> • dBA (tenant noise isolated)
Plant inspection	<ul style="list-style-type: none"> • Visual inspection and measurements as required

Figure 3 - IEQ parameters measured as part of the assessment. Detailed methods for each parameters can be found in the NABERS Indoor Environment Validation Protocol.

Table 1 - Weighting of each parameter for a Base Building rating

Thermal Comfort	Air Quality	Acoustic Comfort	Lighting Quality	Office Layout
40%	40%	20%	Tenancy only	Tenancy only

Limitations

1. Weighting of BMS data in the process. It was observed that the use of weekly BMS temperature data as inputs for thermal comfort could result in an additional one and a half star rating. This meant that a building which was assessed as a three and a half star building could be classified as a five star building simply for having additional BMS data.
2. Difficulty measuring base building noise as an input for acoustic comfort. This is a major challenge due to the typical hours of occupancy within the occupied commercial office buildings and the difficulty in isolating tenancy noise. This issue will be raised in the review of the tool, which is currently taking place.

Conclusions

- The large building owner is using the high NABERS IE ratings as a means of demonstrating their ability to manage and maintain high indoor environment quality within their buildings and is also using the results to attract further tenants. Furthermore, they are using the results to manage the obligations of their contracted facilities managers. This case study is the first of its kind in Australia and it is anticipated that it will create a change in the market and put indoor environment quality firmly on building owners' agendas.
- Limitations to the tool exist and a national technical working group has been set up to review and revise the tool. These results will be critical to the review. A new version of the tool is expected to be available in late 2014. It is intended that the changes will facilitate greater uptake of the tool and a greater focus on indoor environment quality by the commercial property and construction sector in Australia.
- As the emergence of interest in productivity and IEQ continues to grow alongside significant advancement in the NABERS IE process and BMS data availability, the facility manager is able to obtain more knowledge of how their building is performing than ever before. As such, they will become well placed to further exert his/her influence on the building and maximize its performance. With significant cost savings based on health and productivity benefits, facility managers will have indispensable roles in corporate performance.