

Green Office Interiors in Australia: Lessons Learnt

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Abstract

In 2003, the Green Building Council of Australia (GBCA) launched their Green Star rating tools for various types of buildings in order to promote green building practice in Australia. Of these, the Green Star-Office Interior rating tool is designed for building owners, tenants and interior designers to assess the environmental impact of an interior fitout. It covers a number of categories, including Management, Indoor Environment Quality, Energy, Transport, Water, Materials, Land Use and Ecology, Emissions, and Innovation. This paper reviews the usage of the Green Star system in Australian office tenancy fitouts and the potential challenges associated with Green Star-Office Interior implementation. This involves the analysis of score sheets of 66 office interior projects across Australia that achieved Green Star certification. The percentage of green star points obtained within each category and sub-categories (credits) for each project are investigated to illustrate the achievement of credits. The results show that Emission-related credits and Innovation-related credits are the easiest and most difficult respectively to obtain. It is also found that 6 Green Star office interior projects perform especially better in the categories of Energy and Ecology than 4 and 5 Star projects. The investigation of point frequency in each category provides prospective Green Star applicants with insights into credit achievement for future projects.

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1. Introduction

There has been a widespread acceptance of the need for sustainable development in recent years. As the biggest energy consumer and greenhouse gas emitter, the building sector plays a vital role in achieving environmental, economical and social sustainability goals (WBCSD, 2007; Zuo et al., 2012). Office buildings account for a significant proportion of the building stock. According to the Property Council of Australia (2012), the gross floor area of office buildings in major cities nationwide is more than 23 million m². These office buildings consume a significant amount of water, and electricity and produce more than 60 metric tons of CO₂ equivalent greenhouse gas. Additionally, as most employees spend long hours in offices each day, it is very important to provide a sustainable indoor environment to maintain their health, well-being, and performance.

To promote sustainable practices in office buildings, the Green Building Council of Australia (GBCA) has released three rating tools for office buildings, i.e., Green Star-Office Design, Green Star-Office As Built, and Green Star-Office Interior. Unlike the Green Star-Office Design and Green Star-Office As Built, which assess the sustainability performance of the whole office project, the Green-Star Office Interior assesses the sustainable attributes of interior fitouts in office buildings. While it is primarily applied when the construction of an office tenancy fitout is completed, it can also be used during the interior design stage to ensure green features are incorporated at early stage. Since its release in 2005, more than 60 office fitouts have secured Green Star–Office Interior certification. It is expected the Green Star–Office Interior tool will provide greater opportunity to building occupants to enjoy the social, environmental and economic benefits of a Green Star fitout (GBCA, 2012).

However, obtaining Green Star interior certification for office buildings involves significant challenges. The rating system evaluates the sustainability performance of interior fitouts against as many as nine categories (management, water, indoor environment quality, etc.), each of which pose different requirements and challenges to the applicants. It normally requires the applicants to invest additional resources in order to obtain the Green Star certification. Additionally, considering the large stock of office buildings across Australia, the number of Green Star-Office Interior buildings is relatively small, which to a large extent echoes the difficulty in securing this certification.

Therefore, this paper aims to provide an understanding of the level of difficulty involved in securing GBCA Green Star Office Interiors certification. The frequency of green star points obtained within each category and sub-categories for 66 projects are investigated to illustrate the challenges and achievements involved. Although the number of certified projects is comparatively small from which to obtain general conclusions for the industry, the investigation of points frequency for the rating categories will provide potential applicants “with information on credits awarded in the past, and insight into credit implementation in future projects with similar goals” (Silva and Ruwanpura, 2009).

2. Green Star-Office Interior Rating Tool

Built on existing green building rating tools, such as the BREEAM in Britain and LEED in North America, Green Star is a “national, voluntary environmental rating system that evaluates the environmental design and construction of buildings and communities”, which was launched by the GBCA in 2003 in order to promulgate sustainability features in the Australian property industry. It helps to define and evaluate green buildings by establishing a common language and standard of measurement (GBCA, 2012; Zuo et al., 2012)

The Green Star-Office Interior evaluates the environmental initiatives of a Class 5 office tenancy fitout against the nine categories of Management, Indoor Environment Quality, Energy, Transport, Water, Emission, Materials, Land use & Ecology and Innovation, with 3 to 34 points available. Each of these nine categories includes a different number of sub-level indicators that address different aspects of green features. Within the office interior rating system, a total of 144 (unweighted) points are distributed to eight categories (shown in Table 1). With the application of environmental weightings, the number of total points is then converted into a maximum of 100. In a similar manner to other Green Star rating tools, five extra points are available for the Innovation category if the office interior project adopts innovative strategies and technologies exceeding the Green Star benchmarks and environmental design initiatives.

Table 1 Summary of indicators and points for Green Office Interior V1

Categories	Number of indicators	Points available (un-weighted)
Management	6	15
Indoor Environment Quality	15	34
Energy	4	16
Transport	3	10
Water	1	14
Materials	11	33
Land use & Ecology	6	19
Emissions	2	3

After receiving the application document from project teams, the GBCA commissions a panel of third-party Certified Assessors to assess whether all the claimed indicators meet the requirements outlined in the Technical Manual. Project teams are then notified of their final score based on the recommendation of the Assessment Panel. If the scores are within the range of the Green Star levels, the project team receives the corresponding rating certificate together with an award letter, marketing kit and relevant Green Star logos. There are three different “Star” levels, comprising:

4 Star: 45 – 59 points, indicating “Best Practice”

5 Star: 60 – 74 points, indicating “Australian Excellence”

6 Star: 75-100 points, indicating “World Leader”

3. Method

To investigate the potential challenges in implementing the LEED rating system in the Canadian property sector, Silva and Ruwanpura (2009) conducted a comprehensive review of the percentage of points obtained within each LEED indicator in 42 newly built projects. This helped to understand how the projects utilized the green rating tools and provided insights for improving the application of sustainable features for future sustainability development.

In a similar way to Silva and Ruwanpura (2009) and Xia et al. (2012, 2013), we examine here the point frequency for each evaluation category within the Green Star-Office Interior. The score-sheets of 66 projects provided by GBCA are used for this analysis, with the point frequency being calculated by dividing the points obtained (PO) by the points claimed (PC) for each category, as:

$$\text{Point frequency} = (\text{PO}/\text{PC}) * 100 \text{ percent}$$

It would be reasonable to assume that those categories with lower point frequency pose more challenges to the applicants.

4. Data Analysis

4.1 Project Landscape

According to the geographical distribution of the 66 projects shown in Table 2, New South Wales and Victoria account for the majority of the Green Star-Interior certified projects. Most of these projects were awarded as 4 or 5 Star, with only 4 buildings (6% in total) obtaining a 6-Green Star certification (Table 3).

Table 2 Number of certified projects across Australia

Locations	Number of education projects	Percentage (%)
New South Wales (NSW)	24	36
Victoria (VIC)	22	33
Queensland (QLD)	8	12
South Australia (SA)	8	12
Australia Capital Territory(ACT)	2	3
West Australia (WA)	2	3

Table 3 Number of projects for each Green Star rating

Green Star rating	Number of education projects	Percentage
4 Star	27	41

5 Star	35	53
6 Star	4	6

4.2 Overall Percentage Awarded: Point Frequency in Rating Categories

The point frequency for each rating category is shown in Fig 1. This ranges from 100% in the Emission category to 28% in the Innovation category. These different percentages largely reflect the different levels of challenges faced by project teams.

The Emission category is regarded as the easiest one to achieve as all the applicants were awarded all the points claimed. According to the rating system's Technical Manual, the Emissions category encourages the use of refrigerants that do not contribute to ozone depletion. Additionally, it recognises the use of thermal insulation that is free of ozone-depleting substances. With the wide recognition of the importance of ozone protection and the technology development in HVAC of thermal insulation systems, nearly all the applicants managed to avoid the use of ozone-depleting substances.

The Management category addresses the adoption of sustainable development principles throughout the project development process. With 94 percent of the claimed points being awarded, most of the applicants have adopted sustainable principles and guidelines during the project planning, design, construction, commission, and operation stages. The Management category includes 6 sub-categories with a total of 15 unweighted points. The major reason why the Management category is comparatively easier to achieve appears to be due to most of the indicators being descriptive, operatable and document based, and do not require much additional time and effort. For example, three points are awarded where it is demonstrated that there is a Tenant Guide.

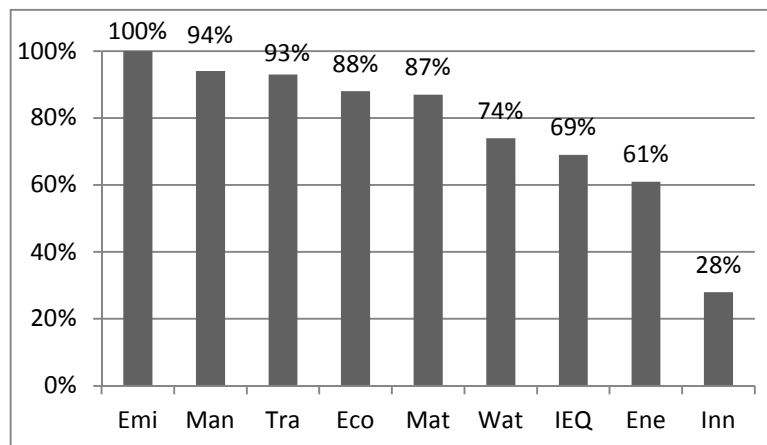


Fig. 1 Point frequency for Green Star-Office Interior rating categories

The category of Transportation encourages and recognizes tenancies with a proximity and good access to public transport networks, utilization of alternative modes of transportation by limiting available parking space, and provision of cyclist facilities. With 93% of the point frequency, most of the projects obtained a sound achievement in this aspect. This is

understandable as most of the official buildings are located within urban areas with easy access to public transportation, and provide cyclist facilities for the tenants.

The categories of Ecology and Material obtained more than 80 percent of the claimed points. These encourage the selection of buildings for tenancy that incorporate environmental impact management, have efficient and flexible layout, reduce material waste, and adopt reuse initiatives and efficient management practices. Considering most of the Green Star office interior buildings already have a 4 Star Office-As Built or higher certification, the point frequencies of Ecology and Material in this rating system is normally higher.

The categories of Water, Indoor Environmental Quality (IEQ), and Energy were awarded a comparatively lower rating of 74 percent, 69 percent and 61 percent respectively. The category of Water aims to encourage and recognise the use of water efficient fittings and appliances that result in reduced potable water consumption. Given the percentage of points awarded in this category (74 percent), it can be concluded that it is not easy to provide water efficient office fitouts. IEQ is important for office occupants as they spend a long time in the building. This category addresses the ventilation rates, carbon dioxide monitoring and control, daylight and electric lighting, external views, personal comfort control, noise level and indoor planting. Most of the measurement is technique oriented and requires significant resource investment. The Energy category, on the other hand, with 61 percent of points awarded, encourages the reduction of greenhouse emissions by addressing energy efficiency, energy improvement, electrical sub-metering, and light switching flexibility.

With only 28 percent of the claimed points awarded, the Innovation category obtained the lowest frequency of points. This category, with a total of 5 points available, includes three subcategories of innovative strategy and technologies, exceeding the Green Star benchmark, and environmental design initiatives. Obviously, the Innovation category is the most challenging to applicants as it requires significant environmental benefits. Additionally, a close look at the three subcategories reveals that they are not clearly defined, which is likely to discourage interested applicants.

4.3 Cross-sector Comparison: Green Star Ratings

The distribution of the point frequency within different categories for 4 Star, 5 Star, and 6 Star office interior projects is shown in Fig 2. This shows that projects with higher certification levels generally have higher points frequency within most of the rating categories. In particular, for the Energy category, the point frequency for 6 Star office interior projects is 32 percentage points higher than for 4 Star and 16 percentage points higher than 5 Star projects. Similarly, the Ecology performance at the higher level of Green Star-office interior projects is much better than at the lower level.

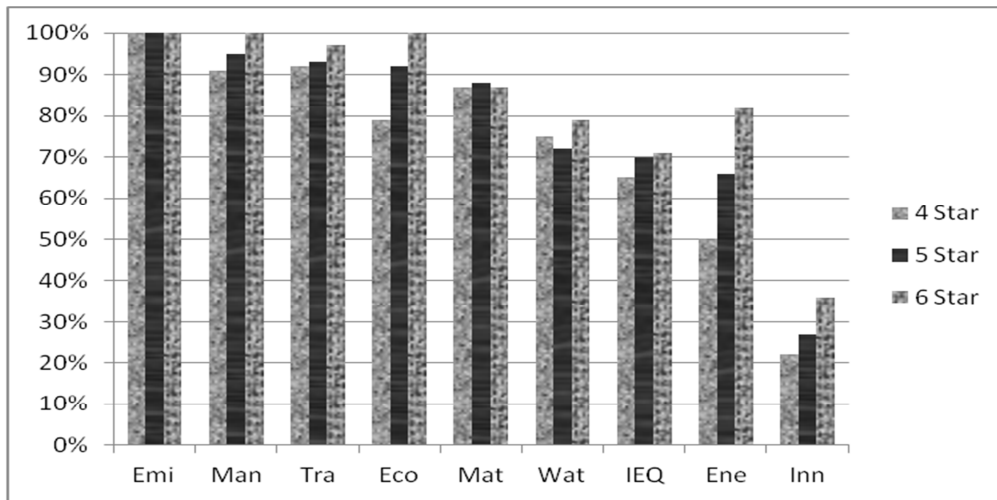


Fig. 2 Percentage of point awarded for different categories

For the Material category however, the 5 Star office interior buildings have a better performance than the 6 Star buildings. The Water category also has a higher point frequency of 4 Star-office interior than the 5 Star equivalent. Also notable is that all the projects achieved the full percentage in the Emission category, while Innovation remains as the most challenging category, with the certified projects obtaining less than 40 percent of the claimed points.

5. Discussion

The Green Star-Office Interior rating system was developed to assess the sustainable features of interior fitout projects. It provides project teams and tenancy occupants with perspectives and guidelines to evaluate the sustainability of the working environment in addition to helping reduce the environmental impact of office buildings.

The comprehensive review of the scoresheets of all office interior projects certified by the GBCA indicates that New South Wales and Victoria account for the majority of the Green office interior projects, which is nearly 70 percent of the total number in Australia. This largely reflects the higher acceptance of sustainability for indoor working environments in this region. Additionally, only 6 percent of these projects achieved a 6 Green Star rating, which is regarded as “World Leader” level in sustainable development. Future studies will be conducted to investigate the specific challenges involved in achieving this level of green office interior buildings in Australia.

The lower point frequency for certain categories largely reflects the challenges facing project teams during green practice implementation. Water, IEQ, Energy and Innovation are the most difficult categories for applicants. There are several possible reasons for this. First, some of indicators within these categories are quite vague and uncertain, and are likely to discourage applicants unless they have clear vision of the possible outcomes. Second, achieving these categories is more expensive than others, and requires larger amount of resources in order to obtain the points. Finally, regional differences may also cause the difference of point frequency. For example, office buildings in drought west Australia

normally obtain fewer points in the Water category, while buildings in cold areas have a lower point frequency in the Energy category. As a result, the overall performance of these two categories is less satisfactory than others.

6. Conclusions

The past decade has witnessed a strong growth of green buildings from both the theoretical and practical perspectives. In Australia, a variety of rating tools for different types of buildings have been developed by the GBCA. This study critically analysed the scoresheets of office interior projects certified by the GBCA. The results showed that Emission, Management, and Transport related credits are the most frequently obtained in GBCA Green Office Interior buildings. This indicates that these categories are comparatively easier to achieve. However, innovation remains the least frequently obtained credit. In other words, it is hard to achieve in practice and poses a challenge to most of the applicants

This study is the first to review the project performance in the implementation of Green Star office interior projects and the analysis of points awarded in each category gives potential applicants a general picture of the challenges involved in making successful applications. It will help developers and project teams in better understanding the rating scheme and providing a better working environment for the occupants of offices. Future studies will be conducted to investigate the underlying causes of the different levels of success in applications in individual rating categories.

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