
GREEN STAR—LEED'S AUSTRALIAN COUSIN

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INTRODUCTION

Within the global green building family, if one likens the US and the Australian Green Building Councils to siblings, Green Star and LEED can be viewed as cousins. While sharing much of the same conceptual “genome,” they are appropriately different because they have “grown up” in different “families” and reflect unique sets of aspirations, influences, and constraints.

Established in 2002, the Green Building Council of Australia (GBCA) is a dynamic not-for-profit organisation that is uniquely supported by all sectors of the industry (including Australia's largest and most influential building owners, developers, and contractors), as well as all levels of government, academia, and non-government (NGO) organisations. The GBCA was created with a mission to transition the property industry towards sustainability and drive the uptake of green building practices across Australia. The GBCA achieves this, and grows a strong green platform to support both the local and international green building movement, through its environmental rating system for buildings, Green Star, as well as through its educational and knowledge-transfer activities, advocacy work, and research.

Green Star is a voluntary tool aimed at the top 25% of the market, with the aim of influencing the rest of the market to incorporate green into standard practice. Like LEED, Green Star recognises and rewards leadership and sets a common definition of green for Australia across a level playing field and a comprehensive set of environmental criteria. In doing so, Green Star marries a strong scientific basis with a simplicity that everyone can understand and use. As a result, the property industry receives a robust benchmark against which to reduce the environmental impact of buildings and to achieve real cost savings, as well as to improve occupant health and productivity.

As a national rating tool, Green Star enables buildings to be comparable Australia-wide and provides consistency in green building standards. Also, due to the similarities between Green Star and other international rating systems, international comparisons can be drawn.

Like any mature product of a complex environmental, political and socioeconomic context, the market leverage, technical rigor, integrity, and long-term viability of Green Star are rapidly attracting the attention of the international green building community. This article explores Green Star as a successful context-bred market solution for industry transformation, and draws comparisons with its international counterpart, LEED.

GREEN BUILDING COUNCIL OF AUSTRALIA

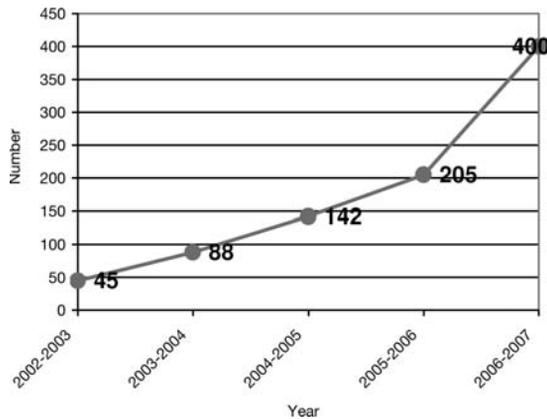
The Green Building Council of Australia (GBCA) has experienced rapid growth over the past twelve months, with the number of members more than doubling from 205 organisations in July 2006, to over 420 organisations today. An internationally distinct strength of the GBCA has been a membership base that reflects all facets of a building's delivery chain, including owners, developers, contractors, professional services, investors, managers, product man-

ufacturers, suppliers, service contractors, universities, utilities, and all levels of government.

Figure 1 illustrates the growth of membership experienced by the GBCA over the past five years, and Figure 2 shows the breakdown of the current member organisations by sector. The largest sector of membership is the professional services, including architects, interior designers, engineers, and project managers. However, an increase in product manufacturers and government departments has occurred as the influence of the green building movement has gathered

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FIGURE 1. GBCA Membership Growth Since Inception.



momentum and Green Star rating tools have been created for new sectors of the industry.

The Green Building Council of Australia's Role Internationally

As a member of the World Green Building Council (now consisting of eleven Green Building Councils around the world), the Green Building Council of Australia (GBCA) provides Australia's property industry with a valuable link to the global network of Green Building Councils and their members. The

GBCA also makes the intellectual property of Green Star freely available to emerging Green Building Councils and has been instrumental in the establishment of organisational, technical, and educational activity of the Green Building Councils in both New Zealand and South Africa.

GREEN BUILDING COUNCIL OF AUSTRALIA ACTIVITIES

The Green Building Council of Australia (GBCA) strongly influences the property industry and drives the uptake of green building practices through a variety of activities.

Technical-Green Star

The Green Star technical team, supported by over 100 volunteers, is engaged in three primary activities essential in ensuring the relevance, veracity, and consistency of the Green Star brand: the development of new Green Star rating tools for each industry sector and life cycle phase, integrity assurance and operation of these tools, and the certification of over 380 commercial office projects currently registered for a Green Star rating.

Advocacy

The GBCA aims to remove the barriers to building green by working with all levels of government across

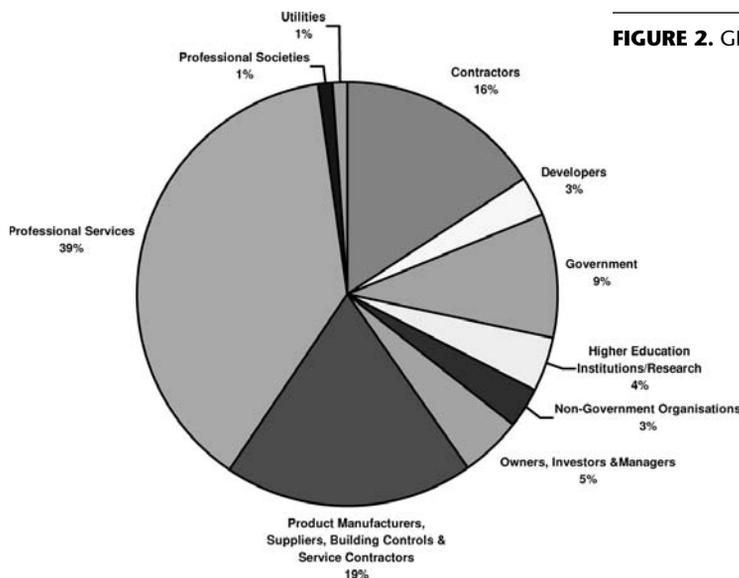


FIGURE 2. GBCA Membership Diversity.

Australia to identify and promote relevant financial and non-financial incentives. The GBCA accomplishes this through direct engagement as well as the publication of research reports and discussion papers on key issues, including the role of the built environment in a National Emissions Trading Schemes, *Valuing Green*, and *Constructing Green—Building the Business Case*.

Through close alliances with other property-focused associations and institutes such as the Property Council of Australia (equivalent to BOMA), the Royal Australian Institute of Architects and the Planning Institute of Australia, the GBCA is also in a unique position to promote initiatives such as Built Environment Meets Parliament, a forum for industry to engage with government. In addition, the GBCA is a member of the Australia Sustainable Built Environment Council (ASBEC), an umbrella organisation that is currently undertaking a substantial research project into the relationship between climate change and the built environment. This project considers abatement opportunities and economic implications of reducing greenhouse gas emissions from the property industry by 60% (from 1990 levels) by 2050.

Education

As the influence of Green Star on the Australian property industry grows, the GBCA is aware of the need to increase awareness and enhance practical knowledge of all property professionals. Through a comprehensive and ever-growing educational program, individuals are becoming skilled in the use of Green Star rating tools and in the creation of Green Star submissions. As many as fourteen Green Star Accredited Professional courses are run throughout Australia every month, with many participants sitting the exam in pursuit of becoming a Green Star Accreditation Professional. As a result, in five years the GBCA has trained more than 3,500 individuals with over 1,500 Green Star Accredited Professionals providing support to the industry.

Membership, Events, and Marketing

In addition to courses, the GBCA continues to expand industry knowledge in green buildings by running case study breakfasts, seminars, forums, site tours, and workshops, as well as by hosting Green Cities, Australia's largest annual green building conference and expo.

The GBCA also assists Green Star certified projects in leveraging the marketing opportunities available to them and maintains an informative web site that solicits an average of 35,000 hits per month. Further information for property professionals is available through a monthly E-Newsletter and regular publications in professional journals and daily media.

WHAT IS GREEN STAR?

Similar to the USGBC, the Green Building Council of Australia (GBCA) developed a national environmental rating system for buildings to assist in achieving its mission. Using the momentum of the "green" Olympic games of 2000, Green Star was launched in 2003 to facilitate greater market transformation and increase the uptake of green building practices. All Green Star tools are free to download from the GBCA web site, and over the past twelve months the average number of downloads of all tools has increased from 700 to over 2,500 per month.

Green Star is comprehensive environmental rating system for buildings developed to meet the following objectives:

1. Establish a common language
2. Set a standard of measurement for green buildings
3. Promote integrated, whole-building design
4. Recognize environmental leadership
5. Identify building life-cycle impacts
6. Raise awareness of green building benefits

Ten Key Characteristics of Green Star

1. Relevant
Green Star responds to the current Australian climatic, ecological, regulatory, and commercial environments while remaining globally informed.
2. Comprehensive
Green Star communicates a single measure of green that reflects consideration of a diverse range of concerns within the broad green building agenda and across all phases of a building's life cycle.

FIGURE 3. Green Star Logo.



3. **Holistic**
Green Star promotes a holistic approach to building design and project management to counteract such impediments to optimal performance as fractured and one-sided thinking.
4. **Voluntary**
Green Star is not mandated within the Australian building codes, but is a voluntary expression of environmental and industry leadership.
5. **For the top 25% of the market**
Green Star encourages and leverages leadership by rewarding the scaling of targets that surpass regulation or address issues void of regulation.
6. **Quantitative**
Green Star quantifies both the benefits of green building and their environmental impact to provide a meaningful, robust, and comparative measure of green.
7. **Attributes-focused**
Green Star assesses inherent building attributes that ensure reduced environmental impact regardless of occupants' operations or behaviour.
8. **Performance-based**
Green Star facilitates context-specific design and innovation by focusing on quantified reduction in environmental impact, as cost and ease of compliance are ever shifting.
9. **Practical to use**
Green Star incorporates substantial scientific information in a user-friendly tool, focusing on key issues within areas of environmental concern and making them cost-effective to document.
10. **Evolving**
Green Star relies on multiple feedback loops and is the subject of continual review to reflect changes in the international market and better accommodate the needs of industry leaders.

How Does Green Star Compare Globally?

Green Star was originally informed by LEED® and the UK's BREEAM (Building Research Establishment Environmental Assessment Methodology), and has become a highly regarded peer amongst international

TABLE 1. Green Stars Categories.

Management	Addresses contracts, policies, and procedures to ensure the adoption of sustainable development principles from project conception through design, construction, commissioning, tuning, and operation.
Indoor Environment Quality	Addresses occupant health, comfort, satisfaction and productivity as products of such elements of the physical environment as indoor air quality, thermal comfort, and lighting.
Energy	Targets the reduction in greenhouse gas emissions from buildings' operation through rewarding holistic design, energy efficient solutions, and renewable, on-site energy generation.
Transport	Targets the reduction of individual automotive commute by both discouraging it and simultaneously rewarding alternative transportation options.
Water	Addresses the reduction of potable water consumption in the major areas of a building's demand: occupant amenity, landscape irrigation, evaporative heat rejection, and fire systems; encourages demand reduction and by encouraging the use of recycled and rain water.
Materials	Includes the "reduce, reuse, and recycle" incentives that minimise the environmental pressure from resource consumption.
Land Use & Ecology	Addresses the project's impact on its immediate ecosystem by encouraging preservation and restoration of flora and fauna.
Emissions	Addresses point source pollution from development to the atmosphere, watercourse, and local ecosystems.
Innovation	Rewards pioneering in industry transformation, exceeding Green Star benchmarks and addressing impacts not currently targeted by Green Star credits to foster the industry's transition to sustainable building.

FIGURE 4. Green Star Rating Tool Worksheet.

Green Star - Office As Built							
Credit Summary for:							
Water							
Ref No.	Title	Aim of Credit	Credit Criteria Summary	No. of Points Available	No. of Points Achieved	Points to be Confirmed	Comments
Wat-1	Occupant Amenity Potable Water Efficiency	To encourage and recognise systems which have the potential to reduce the potable water consumption of building occupants.	Up to five points are awarded where it is demonstrated that the predicted potable water consumption for sanitary use within the building has been reduced. This is determined using the Potable Water Calculator. The points awarded are based on the type and water rating of fixtures/fittings less any reduction in potable water use through greywater, blackwater or rainwater collection systems.	5	0		
Wat-2	Water Meters	To encourage and recognise the design of systems that monitor and manage water consumption.	One point is awarded where it is demonstrated that water meters are installed for all major water uses (refer to 'Additional Guidance') in the project. A further point is awarded if the meters are linked to a building management system to provide a leak-detection system.	2			
Wat-3	Landscape Irrigation Water Efficiency	To encourage and recognise the design of systems that aim to reduce the consumption of potable water for landscape irrigation.	One point is awarded where it is demonstrated that: * 90% of the water requirement for landscape irrigation is sourced from onsite rainwater collection or recycled site water OR * where a water efficient irrigation system comprising subsoil drip systems and automatic timers with rainwater or soil moisture sensor control override is installed. If there are no landscaping or irrigation systems installed then the point is 'not applicable' - type 'na' in the 'No. of Points Achieved' column.	1			
Wat-4	Cooling Tower Water Consumption	To encourage and recognise building design that reduces the potential demand on potable water supplies and infrastructure due to water based building cooling systems.	Up to four points are awarded where it is demonstrated that the building demonstrates that potential water consumption is reduced through efficient use of, or avoidance of, evaporative or water cooling tower systems. Two points are awarded where it is demonstrated that: * The cooling tower water treatment achieves six or better cycles of concentration for water based cooling systems OR * The natural ventilation mode of a mixed mode system reduces the HVAC cooling water consumption by at least 50%. Four points are awarded where it is demonstrated that: * No cooling towers or evaporative cooling are provided OR * Cooling systems use 90% non-potable water	4			
Wat-5	Fire System Water Consumption	To encourage and recognise building design that reduces potable water consumption of the building's fire protection and essential water storage systems.	One point is awarded where it is demonstrated that there is sufficient temporary storage for fire protection system test water and maintenance drain-downs for reuse onsite or where a facility exists for the pump out and recovery of water for use off site.	1			
Total Points =				13	0	0	

rating tools, guidelines, and standards. All these tools now learn from each other in a shared pursuit to reduce the environmental impact of all new and existing buildings.

While Green Star is relevant to the unique Australian environmental and market context, Green Star ratings can be compared internationally. A 6 Star Green Star certified project is an international leader and an example of the world's best.

How Green Star Differs from LEED

As a result of ensuring that they effectively transform their very different industries, Green Star and LEED (which is about five years older), are appropriately different. Some of the key differences are outlined below, and summarised in Table 3, to illustrate how shared principles can take different forms to reflect a unique set of aspirations, influences, and constraints.

- Whereas LEED ratings are communicated solely through figurative descriptors (e.g., Platinum), Green Star ratings are communicated in Stars and the literal descriptors:
 - 4 Star Green Star Certified Rating recognises and rewards “Best Practice”
 - 5 Star Green Star Certified Rating recognises and rewards “Australian Excellence”
 - 6 Star Green Star Certified Rating recognises and rewards “World Leadership”
- Whereas LEED has four ratings, Green Star is limited to three levels of achievement for best-practice projects (i.e., 4 Stars, 5 Stars, and 6 Stars).
- Green Star rating tools are sector-specific: Unlike LEED, Green Star tools are developed independently for specific building sectors, such as commercial office or industrial, to strategically address each sector’s most significant environ-

FIGURE 5. Green Star Certified Ratings.



mental impacts and accommodate its unique development and functional requirements. As a result, credit composition and category weightings vary amongst the tools.

4. Within each building sector, tools for discrete phases of a project's life cycle either currently exist or are in development:
 - Design of new/refurbished building: environmental attributes as evident in construction documents, e.g., Green Star–Office Design.
 - Constructed new/refurbished building: whether design intent was carried through to completion, e.g., Green Star–Office As Built.
 - Fitout: the attributes of the interior, if relevant, e.g., Green Star–Office Interiors.
 - Existing building: the attributes of the building as it is, e.g., Green Star–Office Existing Building.
 - Building in operation: how close to its design potential the building is operated, e.g., Green Star Management Efficiency.
5. Availability of a “Design” rating
A Green Star rating can be achieved and marketed for the documented design prior to completion of construction, allowing for faster market penetration and strengthening the business case for green buildings by enabling developers to secure preferred tenants.
6. Category weightings
Green Star categories are weighted into the final score (out of 100). For example, the Energy Category is worth 25%, so a project's score in that category contributes 25% to its final rating.
7. Geographical adaptation
Within LEED, the level of consideration given to the environmental issues does not vary with the geographical location of the project. In Australia, however, the environmental impact of develop-

ment will vary based on location, and so the weightings for the Water and Land Use & Ecology categories vary in value from state to state.

8. Rating tool structure
While LEED and Green Star address a similar range of environmental issues, they are grouped differently within each tool. Green Star credits are grouped into eight environmental impact categories with an additional Innovation category. Also, unlike LEED credits, Green Star credits may be non-applicable under certain circumstances or progressively offer multiple points.

FIGURE 6. Green Star Framework.

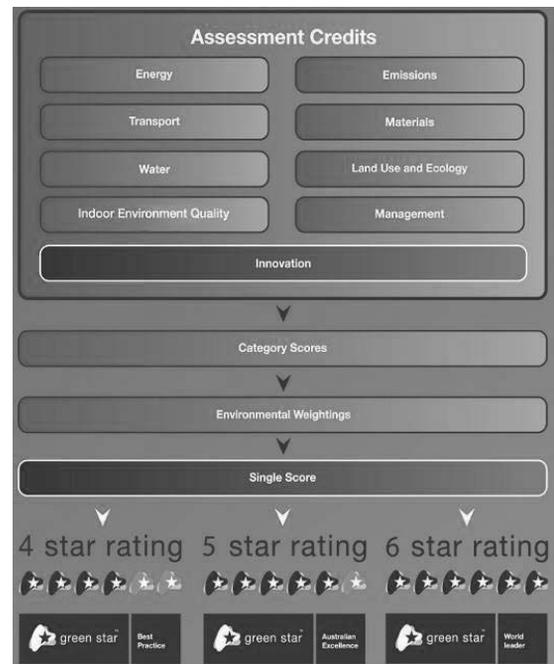


TABLE 2. Key Points of Difference Between Green Star and LEED

	Green Star®	LEED®
1. Language of ratings	Stars and Literal descriptors	Figurative descriptors
2. Number of ratings	3	4
3. Focus	Sector-specific	Cross-sectoral
4. Scope	Tools for specific to life cycle phase	Tools for as-built attributes
5. Rating for Design	Available	Not available
6. Rating tool structure	8 Impact categories	5 Impact categories
7. Category weightings	Yes	No
8. Geographical adaptation	State-specific weightings	No geographical differentiation within tools
9. Credits	Unique credits such as "Design for Disassembly"	Unique credits such as "Locally-produced Materials"
10. Calculators	Yes	No

9. Credit content

While most Green Star credits address issues recognised by LEED, other credits focus on additional issues that are of climatic relevance for Australia or of functional relevance for the specific building type. For example, Green Star rewards building reuse in all rating tools, but rewards the development of tenant fitout guides only in Green Star–Shopping Centre and solutions for mediating trade waste pollution only in Green Star–Healthcare.

10. Calculators

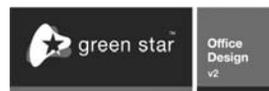
Green Star has developed proprietary calculators to more accurately address issues that depend on multiple factors. For example, the amenity of public transport depends not only on its type (train, bus, tram, or ferry), but also on its frequency and proximity to the site.

GREEN STAR SUITE OF TOOLS

Initially, Green Star tools were developed for the four distinct phases of commercial office buildings: design, construction, fitout, and existing buildings. Development of a similar suite of rating tools for other building sectors, including shopping centres, healthcare facilities, schools and universities, industrial buildings, multi-unit residential apartments, and public buildings (such as libraries and exhibition centres), is currently underway.

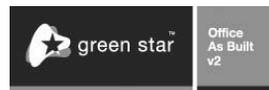
Currently available Green Star rating tools include:

Green Star–Office Design was developed to facilitate a new approach to building design, where environmental impacts of development and the



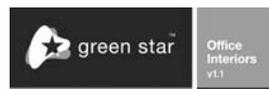
benefits of holistic design for ongoing building operation

are considered from project inception. Projects are assessed based on tender documentation, and if successful they can market their Green Star Certified Rating prior to construction.



Green Star–Office As Built assesses the delivery of the design

intent through to construction completion. Its criteria are identical to Green Star–Office Design, but the assessment takes place after practical completion and is based largely on the work of the builders because it solicits as-built/as-installed documentation.



Green Star–Office Interiors was developed for building

owners, tenants, and interior designers to assess the environmental impact and attributes of an interior fitout. The attributes of the project are assessed after practical completion of the fitout works.

Green Star rating tools undergo regular public reviews, with feedback solicited from a range of stakeholders. Revisions to Green Star tools are considered as a result of any of the following:

- Industry progress: best practice has become standard practice
- New best-practice standards emerge
- International innovation

- Changing national goals, e.g., political resolution to address drought
- Formal Stakeholder Feedback on current tools
- Learning from the assessment process and other rating tools
- Need to ensure credit wording supports for overall Green Star aims
- Need to provide more clarity to projects undergoing assessment

The next generation of Green Star rating tools for commercial office will be released into the market within the next few months. These tools will effectively redefine green building, streamline documentation, and provide alternative methodologies for compliance.

Green Star tools currently in PILOT:

- Design and completed construction of shopping centres
- Design and completed construction of healthcare facilities (including aged care)
- Design and completed construction of education facilities (including schools and universities)
- Attributes and operational efficiency of existing office buildings

Green Star tools currently being developed for design and completed construction:

- Multi-unit residential developments
- Industrial properties
- Public buildings (including convention centres and libraries)
- Mixed-use projects

UPTAKE OF GREEN STAR

The Green Building Council of Australia (GBCA) appreciates that industry involvement during development is essential to adoption of the tools after they are released. By engaging with industry and actively seeking its involvement in tool development, the GBCA ensures that the rating tools are relevant to their respective sectors and increases the rate of their uptake.

Green Star has been embraced as the national standard for best building practice and has extensively influenced the Australian property industry, ensuring that sustainable initiatives are included in the design, construction, and management of new and existing buildings.

TABLE 3. Green Star Statistics

Certified Projects Total:	31
Registered Office Projects Total:	384
Green Star–Office Design:	252
Green Star–Office As Built:	59
Green Star–Office Interiors:	73
Green Star Projects Total:	415
Green Star Office NLA:	Nearly 6 million m²

Green Star is now referenced in the accommodation guidelines of the South Australian and Victorian State Governments; the Property Council of Australia's Guide to Office Building Quality includes a requirement for Premium Grade and A-Grade buildings to achieve a 4 Star Green Star Certified Rating; and it is common for Green Star to be included in tender specifications.

As evident from Figure 7, the number of projects registering for Green Star certification has surged 225% over the past 12 months. In July 2006, there were 55 registered projects with 16 buildings certified. Today the total number of projects registered for certification is approaching 400, with 32 projects having already achieved a Certified Rating. This accounts for nearly six million square meters of net lettable office space.

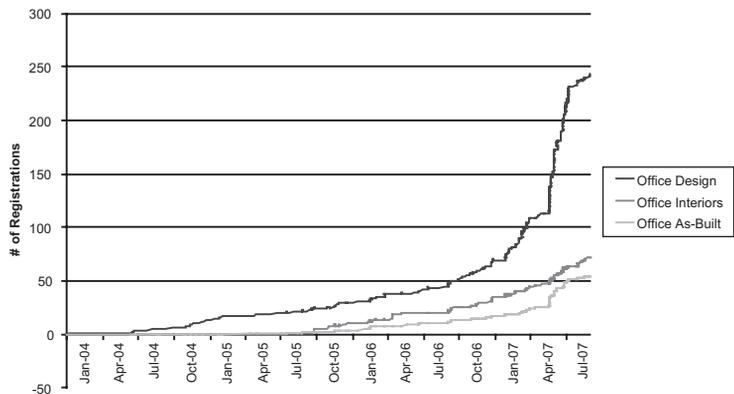
The impact of Green Star has been substantial, with certified projects estimating an average reduction in energy use of up to 85% against equivalent conventional buildings, a cut in CO₂ emissions equivalent to removing nearly 4000 cars permanently off the road, a reduction in potable water consumption of over 60%, and an average diversion of 69% of construction waste going from landfill.

GREEN STAR ASSESSMENT

The use of Green Star rating tools is not restricted to market leaders or tied to a formal certification. Projects that do not qualify for certification can still use the rating tools as a guide to track and improve their environmental performance. However, these projects cannot publicly claim a Green Star rating.

New or refurbished projects that aspire to achieve at least a 4 Star rating are eligible to apply for formal Green Star certification, available to existing buildings regardless of the level of rating. To validate the project's self-assessed rating, the Green Building

FIGURE 7. Green Star Registrations Growth.



Council of Australia (GBCA) commissions one or more third-party Certified Assessors. The assessment process is conducted in a transparent, consistent, and robust manner and involves an Independent Chair.

THE FUTURE OF GREEN STAR

The Dollars and Sense of Green Buildings—Building the Business Case for Green Commercial Buildings in Australia (GBCA 2006), *Sustainable Building Pathway* (2006), the *Green Building Market Report* (GBCA) and the *Building Construction Interchange 2006* all concur that Australia is moving towards a sustainable future, although a number of barriers still need to be overcome. A range of actions have been identified to provide a pathway forward and facilitate the greening of buildings within Australia. These actions will also provide a framework for the future activities of the Green Building Council of Australia (GBCA) and continue to assist in building relationships between industry and government.

Building products and materials within Green Star will be a major issue over the next few years. When they address products and materials, Green Star credits affect numerous stakeholders, and this generates a growing debate about the meaning of sustainability for that industry sector.

As the uptake of Green Star rating tools for existing buildings in all building sectors grows, a greater proportion of the market, including building managers, owners and leasing agents, will become en-

gaged. The GBCA will need to meet this demand with a broad and multifaceted education program to increase awareness of how sustainability affects these professionals and to equip them to harness and promote its benefits.

CONCLUSION

As the Green Building Council of Australia (GBCA) approaches its fifth birthday in November, it will celebrate measurable achievement in some areas while preparing to tackle new challenges.

The GBCA has already achieved recognition within the industry and Green Star is acknowledged for its technical rigor. Now the GBCA must sustain constructive engagement with an ever-growing range of stakeholders as new tools address additional market sectors, and provide relevant education at the right timeframe and scale. At the same time, without compromising its integrity, Green Star must now scale the learning curve of the industry and clearly demonstrate that Certified Ratings are cost-effective to achieve.

The GBCA will continue to pursue the benefit of the global green building community by exchanging knowledge and experience with both established and emerging Green Building Councils within the World Green Building Council. In doing so, the GBCA aims to facilitate broad, swift, and effective transformation of the world's property industry towards more sustainable development.