

Rating Tool Evolution

Concurrent Session 3D

Pixel – The World's First
Green Star, LEED and
BREEAM Rated Building

6 star rating



*green building council australia

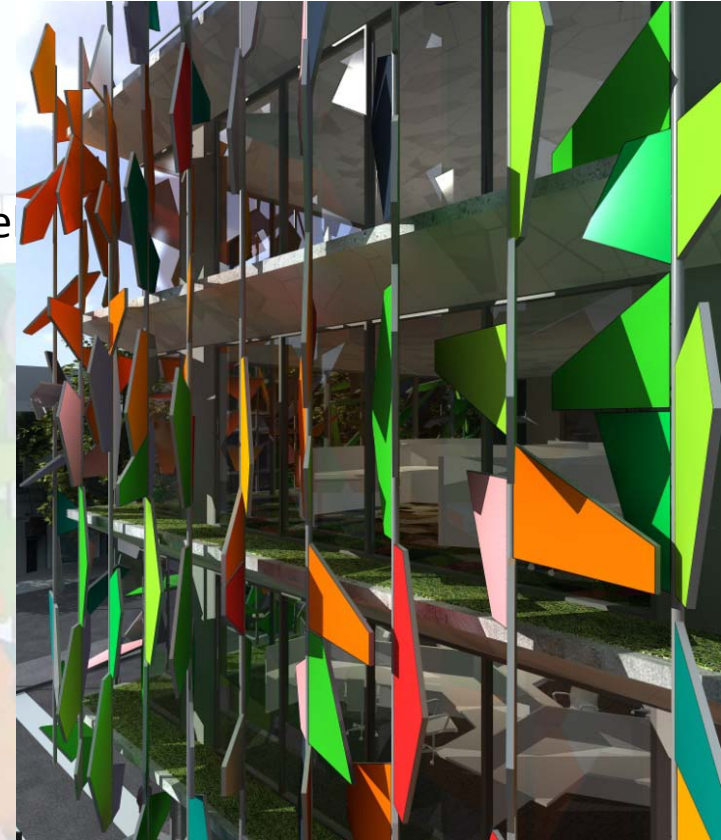


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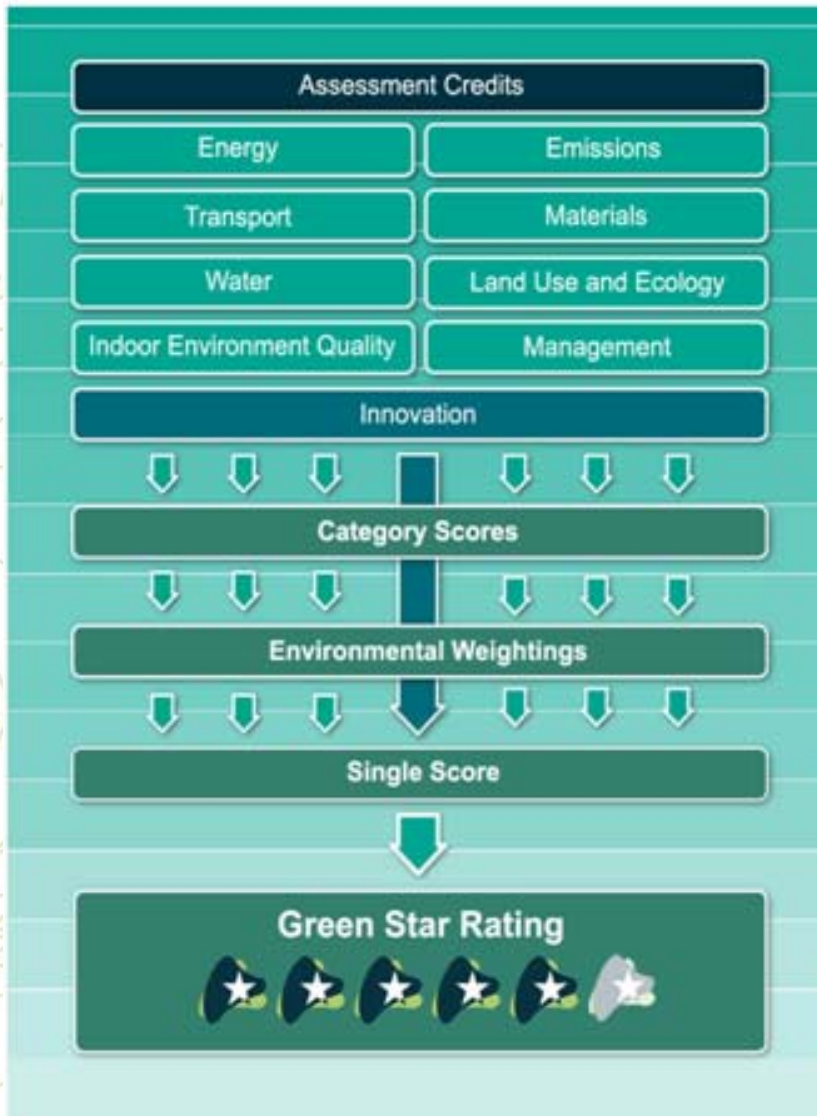


SMALL BUILDING, BIG PICTURE

- Pixel is a four-storey “Office of the Future” located in Carlton, just outside the CBD of Melbourne, Australia
- Grocon as both developer and constructor, has used Pixel to push the boundaries of Green Building
 - Carbon Neutrality
 - Water Balanced
 - Innovative Technologies
 - Exceeding LEED, BREEAM and Green Star
- Pixel is the first building in the world to undergo certification in Green Star, LEED and BREEAM.
- Pixel has already achieved a Perfect 105 point Green Star score and is targeting the highest rating scores to date in LEED and BREEAM



Green Star Process



- Project Design to meet Green Star
- Design Rating Round 1 Submission
- Revise Submission & Submit Round 2
- Discretionary Credits and Appeals?
- **Design Rating Awarded**
- Project Construction to meet Green Star
- Prepare As-Built Submission (Post PC)
- Round 1 and 2 As Built Submissions
- Discretionary Credits and Appeals?
- **As Built Rating Awarded**



PIXEL GREEN STAR - DESIGN SUBMISSION PROCESS

CIR's and TC's

Numerous CIR's and TC's had to be submitted as many credits had not been tested, and the zero points buffer required certainty.

CIR'S: IEQ-9 Thermal Comfort; IEQ-15 Mould Prevention; IEQ-16 Tenant Exhaust Riser; Mat-1 Recycle Store; Mat-5 Concrete; Eco-4 Change in Ecological Value

TC's Wat-1 Amenity Potable Water; Mat-3 Reused Materials; Mat-9 Disassembly

Round 1 Design Submission and Assessment

Submitted on 25/11/09 and returned 21/12/09. 34 pts awarded with many of the major credits having various queries.

Round 2 Design Submission and Assessment

Submitted 28/5/10 including the innovation report (300 pages) and returned 10/09/10 with 100 points awarded following some clarifications. Innovation still to be awarded by GBCA.

GBCA Innovation and Final Award

Aspects of Ene-1 calculations queried by GBCA post assessment for innovation. Issues resolved after re-modeling as requested (no change to score) with final score of 105 points awarded on 12/7/2010.



GREEN STAR CERTIFICATION PROCESS

- RESULTS

Green Star Rating



4 Star

5 Star

6 Star



BREEAM - ("*British Research Establishment Environmental Assessment Method*")

- Established 1990 (the original green building rating tool)
- Owned and operated by BRE, now used by UKGBC
- Over 110,000 buildings certified and 700,000 registered to date
- Primarily in the UK but now Netherlands, Europe, Gulf (Emirates) and Globally
- BREEAM Schemes:
 - Offices
 - Courts
 - Education
 - Healthcare
 - Industrial
 - In-Use
 - Eco Homes
 - Retail
 - Multi-Residential
 - Communities
 - Bespoke
 - Gulf
 - Europe Commercial
 - International Bespoke

breeam



BREEAM Categories

Minimum Standards

- Energy
- Management
- Health & Well-being
- Water
- Waste
- Land Use & Ecology

Tradable Credits

- Energy
- Water
- Materials
- Transport
- Waste
- Pollution
- Health & Well-being
- Management
- Land Use & Ecology

Innovation Credits

- Exemplary Performance Requirements
- Approved Innovation Credits

Category Scores

Environmental Weighting

Final Score

Pass	≥ 30
Good	≥ 45
Very Good	≥ 55
Excellent	≥ 70
Outstanding	≥ 85



BREEAM – Preliminary Pixel Rating

Building Performance by Section			
	Environmental weighting	% Achieved	Weighted Score
Management	8.00%	66.67%	5.33%
Health & Wellbeing	15.00%	92.76%	13.91%
Energy	20.00%	100.00%	20.00%
Transport	5.00%	100.00%	5.00%
Water	20.00%	100.00%	20.00%
Materials	9.00%	30.77%	2.77%
Waste	8.00%	100.00%	8.00%
Land Use & Ecology	7.00%	100.00%	7.00%
Pollution	8.00%	92.31%	7.38%
Total			89.40%
Exemplary Level credits achieved			8.00%
Approved Innovation credits			2.00%
Total BREEAM Score			10.00%
Total BREEAM Score			99.40%



BREEAM Bespoke International Process

- Project contacts BRE to begin the registration process
- Registration forms are completed and fees paid (£5,000)
- BRE Issues weightings questionnaire, sample credit criteria, International Bespoke manual and International Reference Standards schedule
- Project team negotiates with BRE on final credit list and provides documentation for relevant local reference standards
- BRE provides final rating tool and reference standards schedule
- Project BREEAM Assessor undertakes and submits Design Stage Assessment then Post Construction Stage Assessment for QA review by BRE
- BREEAM Certification awarded by BRE

(Process similar to the current Green Star Custom Pilot Rating)



BREEAM Report Structure

- Report is a simple word template for each credit with common references
- References are typically documentation extracts or correspondence from team members confirming how compliance is achieved.
- Buck stops with the BREEAM Assessor to check compliance (BRE does QA and occasional audits)
- Process is more closely related to a NABERS assessment



BREEAM Report Structure

Management	Minimum BREEAM Standards					
	Rating Level	P	G	VG	E	O
Man 1 - Commissioning	Min. credits to achieve rating	1	1	1	1	2

Number of credits achieved:	1 of 2
-----------------------------	--------

Aim

To recognise and encourage an appropriate level of building services commissioning that is carried out in a co-ordinated and comprehensive manner, thus ensuring optimum performance under actual occupancy conditions.

Criteria

Two credits available as follows:



Credits	
1	Where evidence provided demonstrates that an appropriate project team member has been appointed to monitor commissioning on behalf of the client to ensure commissioning will be carried out in line with current best practice.
2	Where, in addition to the above, evidence provided demonstrates that seasonal commissioning will be carried out during the first year of occupation, post construction (or post fit out).



BREEAM Report Structure

Schedule of Evidence

First Credit achieved? (For full explanation, please refer to Validation Statement)	Yes
Second Credit achieved? (For full explanation, please refer to Validation Statement)	No
<ol style="list-style-type: none">1. Specification 1.5.3 Commissioning and Appendix 3.1.19, Commissioning Schedule and Responsibilities2. Specification 1.5.3 Commissioning and Appendix 3.1.20, Design and Pre-Installation Duties3. Project Plan 'Example Building' rev05, 19th November 20084. Letter from Mr Client to Regina Commissioning Ltd, terms of appointment of specialist commissioning agent (ref: 12345/4 date: 23/8/09).	



BREEAM Report Structure

Validation Statement

First credit

The specification confirms that the senior mechanical design engineer (Mr. B Brown) will be responsible for monitoring and programming pre-commissioning, commissioning and re-commissioning on behalf of the client. The specification also confirms that commissioning will be carried out in accordance with the Building Regulation and CIBSE and BSRIA guidance (the assessor has witnessed that the specification details each relevant guide).

The main contractor's project plan confirms an allowance of a 4 week period for commissioning of all relevant services. The letter provided by the client details the terms of appointment of a specialist commissioning management organisation (Regina Commissioning Ltd), which includes responsibility for commissioning the HVAC systems (the building will not have a computerised Building Management System). The terms of Regina Commissioning Ltd's appointment include, reviewing the design for commissionability at the detail design stage, defining the length of commissioning period (in collaboration with the main contractor) and over-seeing all commissioning and performance testing as detailed in the specification.

Second credit

Regina Commissioning Ltd confirmed to the assessor (at the assessment meeting) that there is no requirement, within their terms of appointment, to carry out seasonal commissioning. As a result the second credit has not been awarded.

The second credit could be achieved if the client confirms the appointment of a specialist commissioning manager to oversee the following responsibilities over a minimum 12 month period, once the building is occupied:

1. Testing of all building services under full load conditions. Testing must be carried out during periods of extreme (high or low) occupancy.
2. Conduct interviews with building occupants to identify problems or concerns regarding the effectiveness of the installed systems.
3. Re-commissioning of systems (following any work needed to serve revised loads), and incorporating any revisions in operating procedures into the O&M manuals.



BREEAM – Preliminary Pixel Rating




BREEAM Scheme: Bespoke BREEAM 2010

Building/Development Name: Pixel Building 9, Carlton Brewery, Melbourne

Assessment Registration No.: Registered Online

Qualified BREEAM Assessor: SE

Criteria Type: Final

Date: 26/08/2010

		Minimum BREEAM Standards				
		Pass	Good	Very Good	Excellent	Outstanding
Achieved?	YES	YES	YES	YES	YES	YES

Ref	Title	Number of BREEAM credits available	Whole building/site credits achieved	Minimum required credits by BREEAM issue and rating				
				Reception / Foyer (Manned)	Offices	Meeting Rooms	Kitchenette	Changing Rooms
	Area (m ²)	842.00		25	764	40	8	5

Management

Man	Title	Number of BREEAM credits available	Whole building/site credits achieved	Reception / Foyer (Manned)	Offices	Meeting Rooms	Kitchenette	Changing Rooms	Pass	Good	Very Good	Excellent	Outstanding
Man 1	Commissioning	2	2	2	2	2	2	2	-	-	-	1	2
Man 2	Constructors' Environmental & Social Code of Conduct	2	1	1	1	1	1	1	-	-	-	-	-
Man 3	Construction Site Impacts	4	4	4	4	4	4	4	-	-	-	1	2
Man 4	Building user guide	1	1	1	1	1	1	1	-	1	1	1	1
Man 6	Consultation	2	0	0	0	0	0	0	-	-	-	-	-
Man 9	Publication of Building Information	1	1	1	1	1	1	1	-	-	-	-	-
Man 10	Development as a Learning Resource	1	1	1	1	1	1	1	-	-	-	-	-
Man 12	Life Cycle Costing	2	0	0	0	0	0	0	-	-	-	-	-

Credits Available	15	15	15	15	15
Credits Achieved	10	10	10	10	10
% Function Score	66.67%	66.67%	66.67%	66.67%	66.67%
% Total Score	1.98%	60.49%	3.17%	0.63%	0.40%



BREEAM – Preliminary Pixel Rating, Management

Management			
Man 1	Commissioning	2	2
Man 2	Constructors' Environmental & Social Code of Conduct	2	1
Man 3	Construction Site Impacts	4	4
Man 4	Building user guide	1	1
Man 6	Consultation	2	0
Man 9	Publication of Building Information	1	1
Man 10	Development as a Learning Resource	1	1
Man 12	Life Cycle Costing	2	0

- Similar to Green Star Management but more intensive
- Several Technical checklists required to be completed
- Many credits required early in the design or construction process



BREEAM – Preliminary Pixel Rating, Health & Wellbeing

Health & Wellbeing						
Hea 1	Daylighting	1	N/A	1	1	1
Hea 2	View Out	1	N/A	N/A	1	N/A
Hea 3	Glare Control	1	N/A	1	1	1
Hea 4	High frequency lighting	1	1	1	1	1
Hea 5	Internal and external lighting levels	1	1	1	1	1
Hea 6	Lighting zones & controls	1	N/A	1	1	1
Hea 7	Potential for natural ventilation	1	N/A	0	0	1
Hea 8	Indoor air quality	1	0	0	0	0
Hea 9	Volatile Organic Compounds	1	1	1	1	1
Hea 10	Thermal comfort	1	1	1	1	1
Hea 11	Thermal zoning	1	1	1	1	1
Hea 12	Microbial contamination	1	1	1	1	1
Hea 13	Acoustic Performance – Internal noise levels and sound insulation	1	N/A	N/A	1	1
Hea 15	Outdoor Space	1	1	1	1	1
Hea 20	Ventilation Rates	1	1	1	1	1

- Very Similar to Green Star IEQ in both credits and criteria
- Only some credits harder (eg Hea 8) and some easier (eg Hea 20)



BREEAM – Preliminary Pixel Rating, Energy

Energy

Ene 1	Energy Efficiency	15	15
Ene 2	Sub-metering of Substantial Energy Uses (Non healthcare)	1	1
Ene 3	Sub-metering of high energy load Areas and Tenancy	1	1
Ene 4	External Lighting	1	1
Ene 5	Low zero carbon technologies	3	3
Ene 8	Lifts	2	2

- Zero carbon for maximum Ene-1 points, similar to Green Star
- Energy modeling % CO2 reduction against baseline building (BCA DTS or ASHRAE 90.1)
- Very Wide selection of Renewables applicable for Ene-5



BREEAM – Preliminary Pixel Rating, Transport

Transport

Tra 1	Provision of public transport – Location type 3	4	4
Tra 2	Proximity to amenities - - Location Type 3	1	1
Tra 3	Alternative modes of Transport	2	2
Tra 4	Pedestrian and cycle safety – Location types 3	1	1
Tra 5	Travel plan	1	1
Tra 6	Maximum car parking capacity	2	2
Tra 7	Travel information point	1	1

- Similar to Green Star Transport but with additional credit areas



BREEAM – Preliminary Pixel Rating, Water

Water

Wat 1	Water Consumption (Non-Domestic)	3	3
Wat 2	Water meter	1	1
Wat 3	Major leak detection	1	1
Wat 4	Sanitary supply shut off	1	1
Wat5	Water recycling (Outside Europe ONLY)	1	1
Wat 6	Irrigation systems	1	1

- Similar to Green Star Water but with lower credit requirements and importance
- Focus on leak prevention as much as efficiency



BREEAM – Preliminary Pixel Rating, Materials

Materials

Mat 1	Materials Specification	4	2
Mat 2	Hard Landscaping and Boundary Protection	1	1
Mat 3	Re-use of Facade	1	0
Mat 4	Re-use of Structure	1	0
Mat 5	Responsible sourcing of materials	3	0
Mat 6	Insulation	2	0
Mat 7	Designing For Robustness	1	1

- Very different to Green Star and much harder
- Reuse credits become zero for new projects (Green Star is n/a)
- Greater emphasis on Life Cycle Assessment and Sustainable Sourcing (Very Detailed)
- Several Detailed Technical checklists required to be completed



BREEAM – Preliminary Pixel Rating, Waste

Waste

Wst 1	Construction Site Waste Management	3	3
Wst 2	Recycled Aggregates	1	1
Wst 3	Recyclable waste storage	1	1

- Similar to parts of Green Star Materials with similar criteria



BREEAM – Preliminary Pixel Rating, Land Use & Ecology

Land Use & Ecology

LE1	Re-use of land	1	1
LE2	Contaminated land	1	1
LE3	Ecological value of site AND Protection of ecological features	1	1
LE4	Mitigating Ecological impact	5	5
LE6	Long term impact on biodiversity	2	2

- Similar credits to Green Star and but some are much harder (eg LE3 and 4)
- Several Detailed Technical checklists required to be completed



BREEAM – Preliminary Pixel Rating, Waste

Pollution

Pol 1	Refrigerant GWP – Building services	1	1
Pol 2	Preventing refrigerant leaks	2	2
Pol 4	NOx emissions from heating source	3	3
Pol5	Climate Zones 5	3	3
Pol 6	Minimising watercourse pollution	1	1
Pol 7	Reduction of Night Time Light Pollution	1	1
Pol 8	Noise Attenuation	1	0
Pol 9	Refrigerant ODP – Building Services	1	1

- Similar to Green Star Emissions but with some additional credits



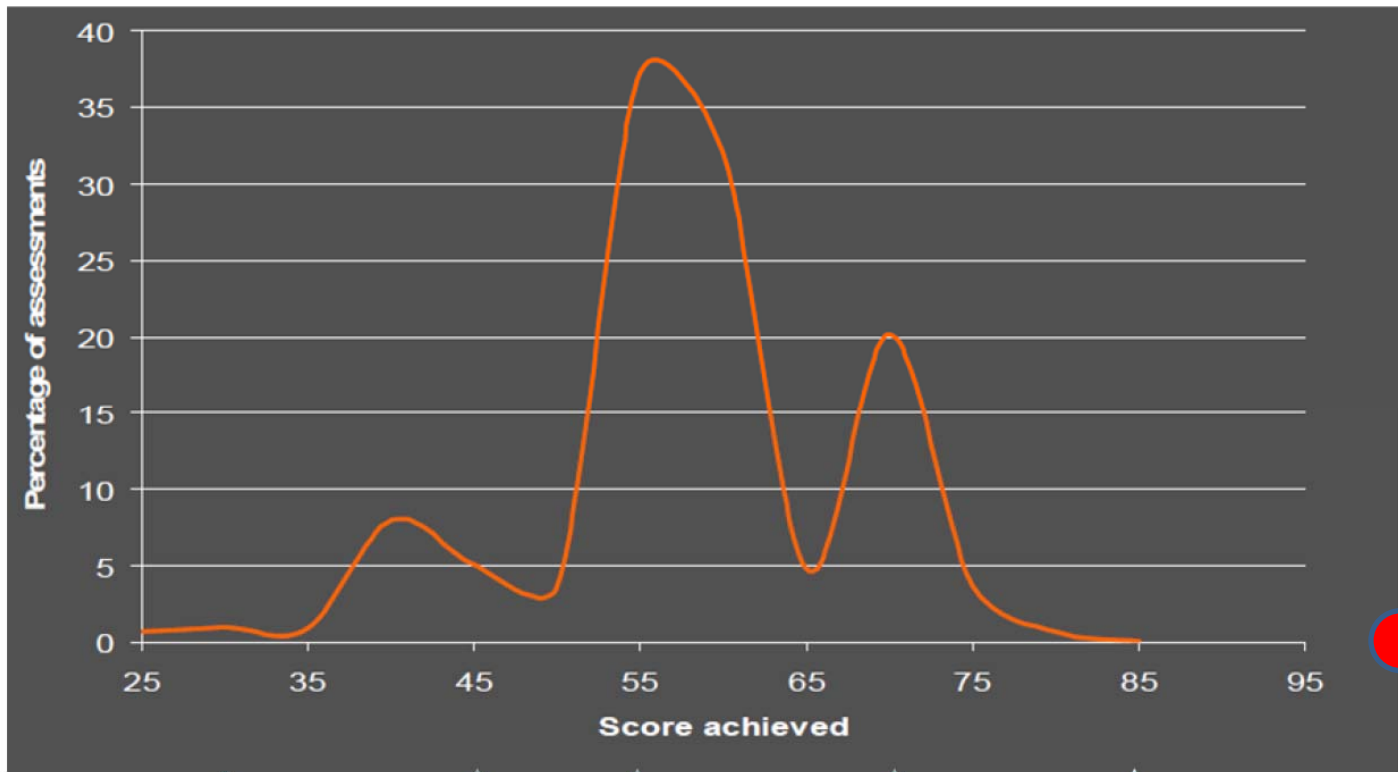
BREEAM – Preliminary Pixel Rating, Innovation

Innovation

Man 2	Considerate Constructors	1	1
Hea 1	Daylighting	1	0
Ene 1	Reduction of CO ₂ Emissions	2	2
Ene 5	Low or Zero Carbon Technologies	1	1
Wat 2	Water Meter	1	1
Mat 1	Materials Specification	1	1
Mat 5	Responsible Sourcing of Materials	1	1
Wst 1	Construction Site Waste Management	1	1
Number of Approved Innovation Credits Available / Achieved		2	2



BREEAM > Rating distribution

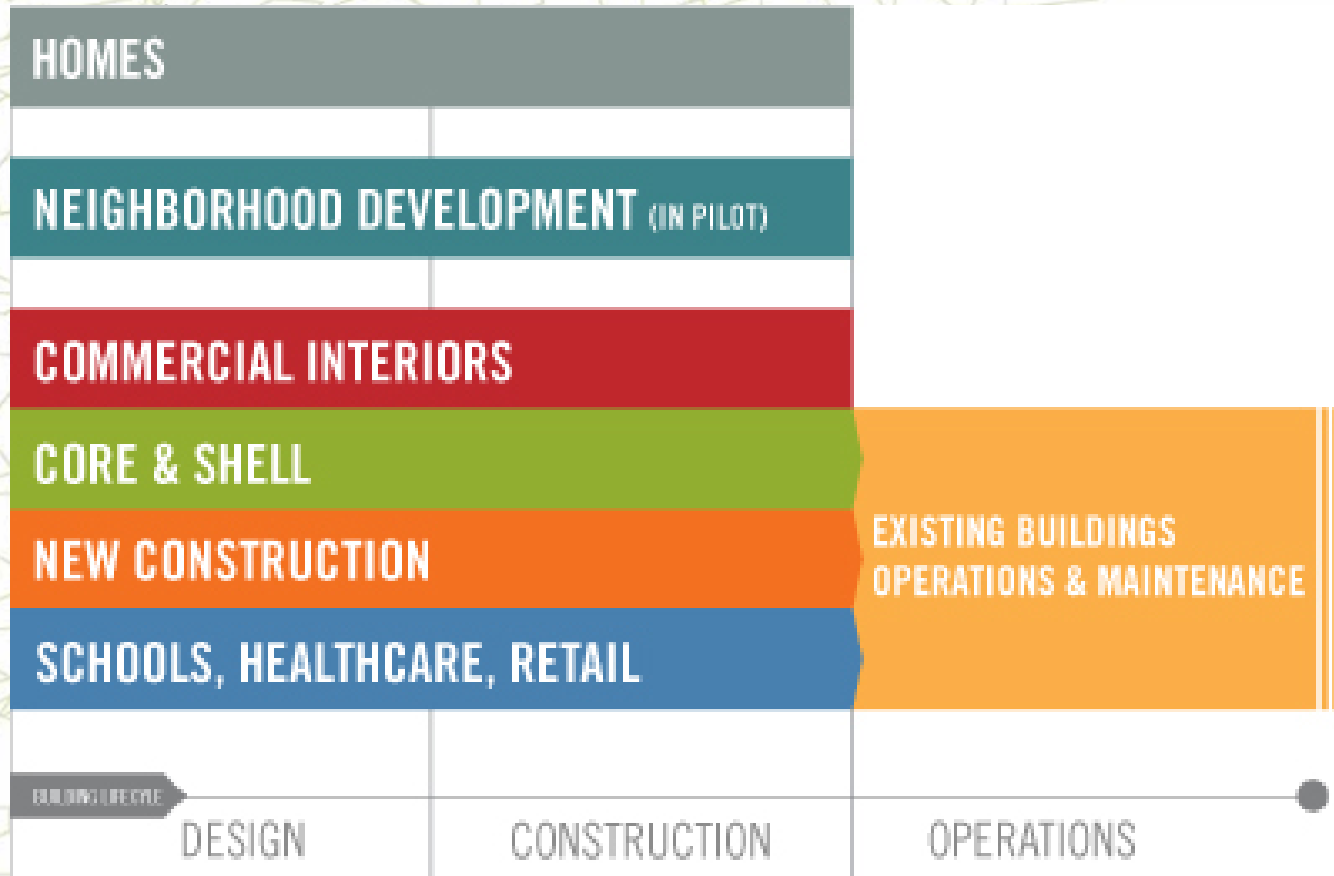


Pixel

Score	Rating
30	Pass
45	Good
55	V.Good
70	Excellent
85	Outstanding

LEED – “Leadership in Energy and Environmental Design”

- Established 1998 by the USGBC
- USGBC has over 16,000 members and 157,000 LEED AP’s
- Used globally in over 90 countries as a default Green Building certification

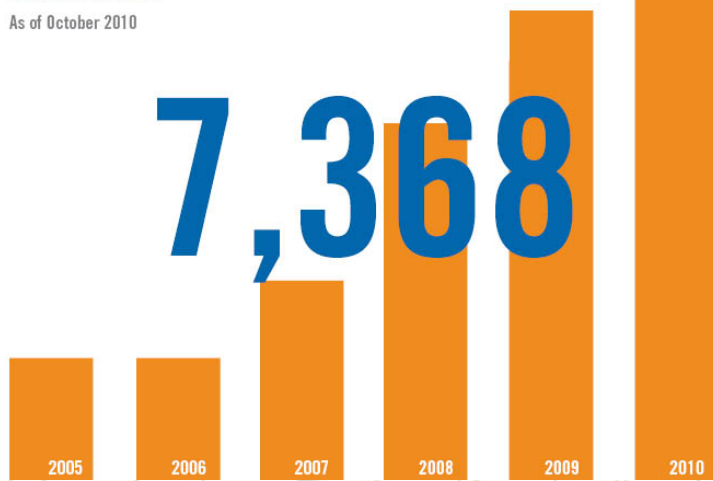


LEED – Growth and Development

Commercial LEED Certified Projects (cumulative)

As of October 2010

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LEED 2009

ADVANCEMENTS TO THE RATING SYSTEM

LEED ONLINE

FASTER, SMARTER & A BETTER USER EXPERIENCE

CERTIFICATION

SPEED, CAPACITY, PERFORMANCE

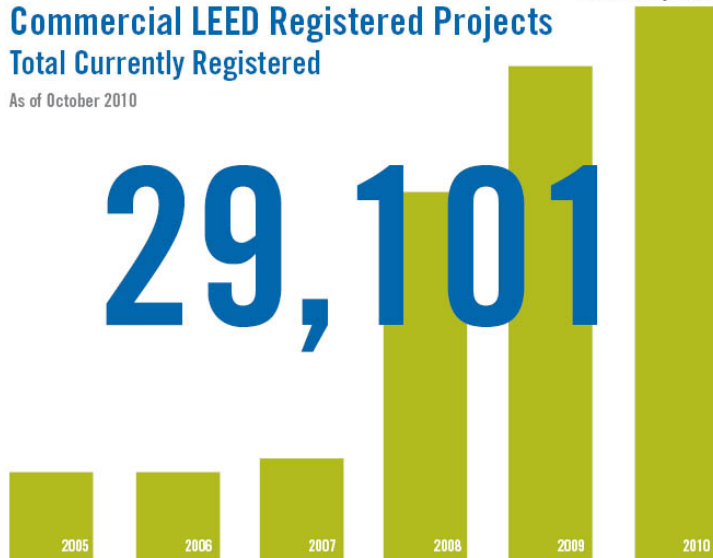


LEED V3

Commercial LEED Registered Projects Total Currently Registered

As of October 2010

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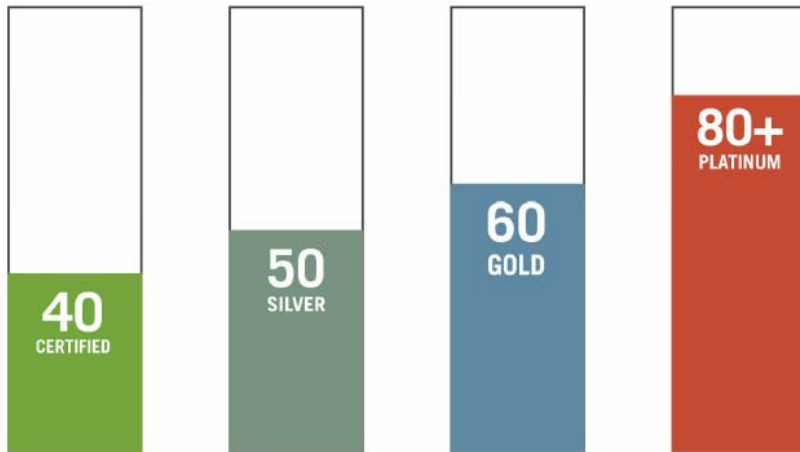
GBCI™



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LEED – Ratings and Categories

100-POINT SCALE



100 Point LEED LEED 2009 for New Construction

Category	Points 2009	Certification Threshold	
SS	26	Certified	40-49
WE	10	Silver	50-59
EA	35	Gold	60-79
MR	14	Platinum	80 +
EQ	15		
PD	--		
Base Points	100		
Regional	4		
ID	6		
Total	110		



LEED Certification Process

- Project registers details and makes registration payment online
- LEED Online is set up for the project
- Project team collectively fills in required PDF forms in LEED Online
- Any CIR's are submitted online (additional cost)
- Design stage is submitted (with payment) through LEED online when ready
- Independent reviewer comments are received and responded to if needed with some credits approved or likely to be awarded
- Final As-Built stage PDF forms and documentation submitted in LEED online
- LEED rating and certificate is awarded



LEED Online

Project Home Page [ID: 1000002829] - LEED Online - Windows Internet Explorer

https://www.leedonline.com/ij/portal/anonymous

Shane Esmore | SITE USER | Log Off

Your Account | Help | Feedback | Release Notes | Legal | Sample Forms Download | GBCI | USGBC

Copyright © 2009–2010 USGBC

LEED ONLINE™

My Projects My Archives Register New Project Project Transfer

Projects Blocks Volume Pending Invitations Search

Pixel

Carlton VIC 3053 AU | Registered 3/12/2009

Design Final Review

Refresh

Project ID 1000002829 | Access ID 4179832282213013

Project Administrator: Clare Parry

Overview **Scorecard** Timeline Team Administration Registration Details Clarifications Messages Formal Inquiries

Add/Remove Credits Print Scorecard Project Comments

Total :- Credits Attempted : 62 Points Possible : 102 Points Attempted : 84 Points Anticipated : 33 Points Denied : 0 Points Pending : 1 [Legend](#)

Category	#	d/c	RP	Credit Name	Attempted	Anticipated	Pending	Denied	Status	Changed	Assignee
PI	f1			Minimum Program Requirements	Y	-	-	-	Under Review	N	Shane Esmore
PI	f2			Project Summary Details	Y	-	-	-	Under Review	N	Clare Parry
PI	f3			Occupant and Usage Data	Y	-	-	-	Under Review	N	Shane Esmore
PI	f4			Schedule and Overview Documents	Y	-	-	-	Under Review	N	Shane Esmore
<<	n1	←		Construction Activity Pollution Pra	Y	-	-	-		N	Buran

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LEED for New Construction: Construction

IEQ CREDIT 4.2: LOW-EMITTING MATERIALS PAINTS AND COATINGS

Project # 1000002829 Pixel

All fields and uploads are required unless otherwise noted.

Select one of the following:

- None of the paint/coating products used on the interior of the building exceed the allowable VOC limit.
- VOC Budget: One or more of the paint/coating products used on the interior of the building exceeded the allowable VOC limit.

NO PAINT PRODUCTS EXCEED THE ALLOWABLE VOC LIMIT

Table. Indoor Paint and Coating Products VOC Budget

Product Type	Product Manufacturer	Product Name / Model	Product VOC Content (g/L)	Green Seal GS-11/ Green Seal GC-03, or SCAQMD Rule 1113 Allowable VOC Content (g/L)	Source of VOC Data (letter, cutsheet, MSDS sheet, etc.)	Product meets allowable VOC content:	Cutsheet provided:
						N	<input type="radio"/> Y <input type="radio"/> N
Percent of cutsheets provided: (Must be at least 20% of total items)						0	

showing the VOC content in g/L for 20% of the materials listed in each table, by item (not by cost).

ADDITIONAL DETAILS

- Special circumstances preclude documentation of credit compliance with the submittal requirements outlined in this form.

BETA

Save Form



LEED CERTIFICATION – Sustainable Sites



LEED for New Construction and Major Renovation v3.0 (2009) Project Scorecard

Project Name: CUB Building 9

Project Address: Corner of Bouverie and Queensbury Streets, Carlton

Yes ? No

24

Sustainable Sites

26 Points Comments

Y						
	Prereq 1	Construction Activity Pollution Prevention		Required	EMP able to be written to meet requirements	
1	Credit 1	Site Selection		1	Site meets requirements.	
5	Credit 2	Development Density & Community Connectivity		5	Sufficient density and nearby community facilities.	
1	Credit 3	Brownfield Redevelopment		1	Sufficient existing contamination needs to be established. OK if council defines site as brownfield.	
6	Credit 4.1	Alternative Transportation, Public Transportation Access		6	Sufficient public transport to meet requirements.	
1	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms		1	5% staff requirement is met.	
1	Credit 4.3	Alternative Transportation, Low-Emitting & Fuel-Efficient Vehicles		1	Electric charge point to be provided with fitout.	
2	Credit 4.4	Alternative Transportation, Parking Capacity		1	No car parking meets requirements.	
1	Credit 5.1	Site Development, Protect or Restore Habitat		1	Green roof meets habitat restoration target.	
1	Credit 5.2	Site Development, Maximize Open Space		1	Green roof can meet vegetated space requirement.	
1	Credit 6.1	Stormwater Design, Quantity Control		1	Green roof sufficiently reduces stormwater.	
1	Credit 6.2	Stormwater Design, Quality Control		1	Green roof and rainwater achieves quality.	
1	Credit 7.1	Heat Island Effect, Non-Roof		1	Shaded external hardscape (rear ramp) complies.	
1	Credit 7.2	Heat Island Effect, Roof		1	Green roof meets minimum requirements (50%).	
1	Credit 8	Light Pollution Reduction		1	External lighting and internal lighting control complies.	

- Includes a variety of Green Star equivalent Management, Transport, Water, Materials and Ecology credits.
- Transport benchmarks are lower than Green Star, eg 5% of staff for cyclist facilities.
- Numerous credits that don't relate to anything in Green Star.



LEED CERTIFICATION – Water Efficiency

Yes			?			No					
10											
Water Efficiency						10 Points			Comments		
Y			Prereq 1	Water Use Reduction, 20% Reduction	Required	Hydraulic design exceeds all requirements.					
2			Credit 1.1	Water Efficient Landscaping, Reduce by 50%	2	Provided by greywater and rainwater design.					
2			Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	2	Provided by greywater and rainwater design.					
2			Credit 2	Innovative Wastewater Technologies	2	Vacuum toilets and greywater comply					
4			Credit 3	Water Use Reduction	2 to 4	Hydraulic design exceeds all requirements.					
				30% Reduction	2						
				35% Reduction	3						
				40% Reduction	4						

- Pre-requisite credit for 20% water use reduction
- Water use reductions are calculated based on difference to a reference design with fixture flow rates provided.
- Water benchmarks are lower much than Green Star, eg 50% landscape water reduction vs 90%.
- Pixel achieved:
 - 100% reduction for WE1
 - 92% reduction for WE2
 - 69% reduction for WE3.



LEED CERTIFICATION – Energy and Atmosphere

35

Energy & Atmosphere

35 Points Comments

Y	Prereq 1	Fundamental Commissioning of the Building Energy Systems	Required	Model against ASHRAE.
Y	Prereq 2	Minimum Energy Performance	Required	Targets are based on energy cost instead of carbon
Y	Prereq 3	Fundamental Refrigerant Management	Required	but are not particularly high. The proposed design
19	Credit 1	Optimize Energy Performance	1 to 19	Based on energy cost!
		12% New Buildings or 8% Existing Building Renovations	1	
		14% New Buildings or 10% Existing Building Renovations	2	
		16% New Buildings or 12% Existing Building Renovations	3	
		18% New Buildings or 14% Existing Building Renovations	4	
		20% New Buildings or 16% Existing Building Renovations	5	
		22% New Buildings or 18% Existing Building Renovations	6	
		24% New Buildings or 20% Existing Building Renovations	7	
		26% New Buildings or 22% Existing Building Renovations	8	
		28% New Buildings or 24% Existing Building Renovations	9	
		30% New Buildings or 26% Existing Building Renovations	10	
		32% New Buildings or 28% Existing Building Renovations	11	
		34% New Buildings or 30% Existing Building Renovations	12	
		36% New Buildings or 32% Existing Building Renovations	13	
		38% New Buildings or 34% Existing Building Renovations	14	
		40% New Buildings or 36% Existing Building Renovations	15	
		42% New Buildings or 36% Existing Building Renovations	16	
		44% New Buildings or 40% Existing Building Renovations	17	
		46% New Buildings or 42% Existing Building Renovations	18	
		48% New Buildings or 44% Existing Building Renovations	19	
7	Credit 2	On-Site Renewable Energy	1 to 7	Design of renewable systems currently exceeds 100% of carbon and will easily exceed this criteria.
		1% Renewable Energy	1	
		3% Renewable Energy	2	
		5% Renewable Energy	3	
		7% Renewable Energy	4	
		9% Renewable Energy	5	
		11% Renewable Energy	6	
		13% Renewable Energy	7	
2	Credit 3	Enhanced Commissioning	2	Current ICA appointment meets requirements.
2	Credit 4	Enhanced Refrigerant Management	2	Ammonia exceeds ODP and GWP requirements.
3	Credit 5	Measurement & Verification	3	Measurement and verification can be provided.
2	Credit 6	Green Power	2	Greenpower not included but could be arranged.

- Energy Cost not Carbon measured against a baseline building (ASHRAE 90.1)
- Total building energy use such as HVAC, Lighting, Plug Loads etc all included
- Renewable Energy Separately Awarded



LEED CERTIFICATION – Materials and Resources

Yes	?	No	Materials & Resources		14 Points	Comments
9	1	4				
Y			Prereq 1	Storage & Collection of Recyclables	Required	Recycling waste storage room meets requirements.
		3	Credit 1	Building Reuse	1 to 3	No existing building so unable to achieve credit.
			Credit 1.1	Maintain 55% of Existing Walls, Floors & Roof	1	
			Credit 1.2	Maintain 75% of Existing Walls, Floors & Roof	2	
			Credit 1.3	Maintain 95% of Existing Walls, Floors & Roof	3	
		1	Credit 1.4	Building Reuse , Maintain 50% of Interior Non-Structural Elements	1	No existing building so unable to achieve credit.
1			Credit 2.1	Construction Waste Management , Divert 50% from Disposal	1	Requirement of 50% or 75% recycling is met by
1			Credit 2.2	Construction Waste Management , Divert 75% from Disposal	1	the project (min target is 80%)
1			Credit 3.1	Materials Reuse , 5%	1	5% reused material is achievable
1			Credit 3.2	Materials Reuse , 10%	1	10% reused material possible with furniture value
1			Credit 4.1	Recycled Content , 10% (post-consumer + 1/2 pre-consumer)	1	Recycled content includes structure and so should be achievable.
1			Credit 4.2	Recycled Content , 20% (post-consumer + 1/2 pre-consumer)	1	Recycled content includes structure and so should be achievable.
1			Credit 5.1	Regional Materials , 10% Extracted, Processed & Manufactured Regionally	1	10% within 500 Miles achievable (eg concrete).
1			Credit 5.2	Regional Materials , 20% Extracted, Processed & Manufactured Regionally	1	20% within 500 Miles achievable (eg concrete).
		1	Credit 6	Rapidly Renewable Materials	1	2.5% rapid renewable materials will be included in the fitout.
1			Credit 7	Certified Wood	1	50% FSC timber can be sourced.

- Most credits similar to Green Star with some lower and some higher, eg Sustainable Timber is lower but Formaldehyde is higher
- Material credits calculated based on cost % of project total material cost less services
- Materials can include fitout furniture if applied consistently
- Building Reuse is not awarded for new buildings (GS is n/a)



LEED CERTIFICATION – Indoor Environment Quality

Yes	?	No	Indoor Environmental Quality		15 Points	Comments
15						
Y			Prereq 1	Minimum IAQ Performance	Required	Minimum requirements exceeded.
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required	Requirements can be met.
1			Credit 1	Outdoor Air Delivery Monitoring	1	Monitoring can be provided with alarms as required.
1			Credit 2	Increased Ventilation	1	30% required Increase is easily exceeded.
1			Credit 3.1	Construction IAQ Management Plan, During Construction	1	A complying Construction IAQ plan could be developed but would require additional monitoring.
1			Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1	A complying Construction IAQ plan could be developed but would require additional monitoring.
1			Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1	Proposed materials will meet requirements.
1			Credit 4.2	Low-Emitting Materials, Paints & Coatings	1	Proposed materials will meet requirements.
1			Credit 4.3	Low-Emitting Materials, Carpet Systems	1	Proposed materials will meet requirements.
1			Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	1	Particle board can be upgraded to no added Urea-Formaldehyde or eliminated.
1			Credit 5	Indoor Chemical & Pollutant Source Control	1	May require redesign of filtration and photocopy areas to meet contamination control requirements.
1			Credit 6.1	Controllability of Systems, Lighting	1	Proposed base and task lighting approach complies.
1			Credit 6.2	Controllability of Systems, Thermal Comfort	1	Floor diffusers meet requirements.
1			Credit 7.1	Thermal Comfort, Design	1	Systems will meet thermal comfort requirements.
1			Credit 7.2	Thermal Comfort, Verification	1	Occupant surveys can be carried out to comply.
1			Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1	Criteria is achieved with proposed design.
1			Credit 8.2	Daylight & Views, Views for 90% of Spaces	1	Criteria is achieved with proposed design.

- Most credits similar to Green Star but with lower requirements
- Several credits require monitoring and evidence during construction (IE IE3.1)
- Daylight area is less than GS but daylight level is higher
- There is no maximum distance for views



LEED CERTIFICATION - MANAGEMENT

Yes	?	No				
6			Innovation & Design Process		6 Points	Comments
1			Credit 1.1	Innovation in Design: EAc1 Optimized Energy Performance	1	Automatically awarded for credit performance
1			Credit 1.2	Innovation in Design: SSc4.1 PubTrans Access	1	Automatically awarded for credit performance
1			Credit 1.3	Innovation in Design: WEc3 Water Use Reduction	1	Automatically awarded for credit performance
1			Credit 1.4	Innovation in Design: Carbon Neutral, Wind Turbines, etc	1	Detailed submission
1			Credit 1.5	Innovation in Design: Water Disconnect, Anaerobic Digestion, etc	1	Detailed submission
1			Credit 2	LEED® Accredited Professional	1	Automatically awarded for SRE
4			Regional Priority Credits		4 Points	Comments
1			Credit 1.1	Regional Priority Credit: SSc2 Development Density and Community	1	Automatically awarded for credit performance
1			Credit 1.2	Regional Priority Credit: SSc6.2 Stormwater Design Quality Control	1	Automatically awarded for credit performance
1			Credit 1.3	Regional Priority Credit: WEc2 Innovative Water Technologies	1	Automatically awarded for credit performance
1			Credit 1.4	Regional Priority Credit: EAc2 On Site Renewable Energy	1	Automatically awarded for credit performance
103	1	4	Project Totals (Certification Estimates)		110 Points	
Platinum Certified: 40-49 points Silver: 50-59 points Gold: 60-79 points Platinum: 80+ points						

- 3/6 Innovation points awarded for exceeding benchmarks
 - benchmarks required are published and points automatically awarded if reached
- 2/6 Innovation reports require a report similar to Green Star Inn-1 & 3
- Final Innovation point is similar to Green Star Man-1 (LEED AP/GSAP)
- 6 Regional priority credits are set based on project location
 - points are automatically awarded if 4 of these 6 credits are achieved!



Comparative Assessment - Strengths



- Very Robust certification tool with well balanced credit weightings
- Closely matched to target markets, not “one size fits all”
- Independent certification
- Clear evolution of tools and credit criteria evident
- Rapid growth and market acceptance



Comparative Assessment - Weaknesses



- Extremely detailed credit documentation required making the process long and very costly to undertake (Pixel submission was 2500 pages long)
- Inconsistencies in nature and standard of independent certifier rulings
- Innovation credit requirements only loosely defined
- Comparative small size of GBCA makes technical development and assessment processes challenging to evolve
- Eligibility criteria is very tight often making ineligible for certification



breeam

- Very Robust certification tool with well balanced credit weightings
- Many different tools with the ability to customise to local markets”
- Certification is carried out by the Assessor with BRE providing QA reviews
- Less reliant on extensive documentation
- BRE have strong technical development and review teams due to scale
- Rapid tool development with regular online pdf updates of tools and manuals
- Able to assess part buildings within limits



breeam

- Some credits are extremely detailed in calculation response required (eg Materials LCA), while others minimal
- Process relies heavily on professionalism of BREEAM Assessors
- Local customisation has potential for inconsistency between tools
- BRE control all tools and certification with no local ownership of the process



Comparative Assessment - Strengths



- Well respected certification tool with widespread international acceptance
- Tools can be applied to a wide variety of buildings
- LEED online provides a very effective and efficient documentation process
- Less reliant on extensive documentation
- USGBC have strong technical committees and membership base
- Able to assess part buildings within limits
- More clearly defined innovation criteria



Comparative Assessment - Weaknesses



- Slow to respond and update tool
- Lacking some overall robustness and aspiration in credits
- Reliant on energy cost for significant part of ratings, highly variable
- Independent certification bodies have had inconsistencies
- One size fits all approach for any project anywhere without local body engagement (doesn't always travel well)



Concluding Comments

- No rating tool is perfect!
- However, as a robust rating tool Green Star stands up well to international comparisons
- Green Star's approach of working with local bodies to match local requirements is commendable
- Green Star can learn from other tools how to simplify and streamline the certification process
- Major international rating tools need to move towards each other to create common benchmarks and greater consistency in what is 'green'

