

Back to basics: Green HVAC design

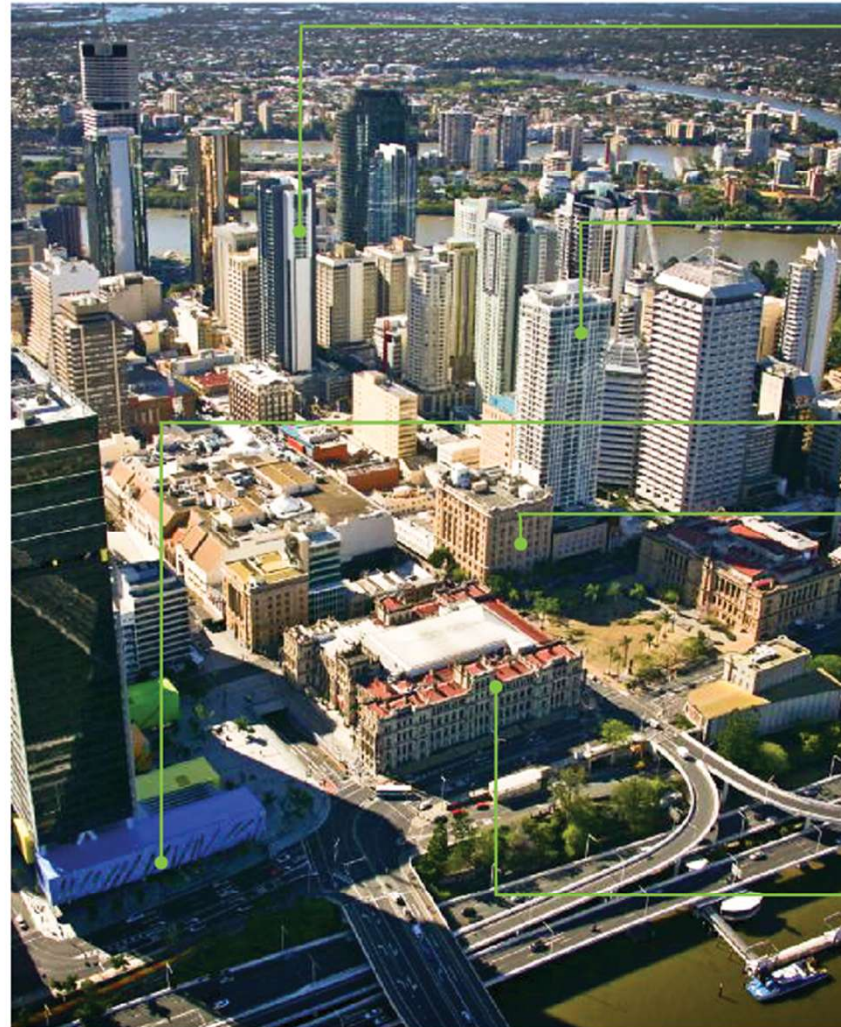
Green Star Design and As-built What you need to know

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Green Star – Design & As Built assesses the design and construction of any building or major refurbishment.



- **Offices**
- **Retail centres**
- **Industrial facilities**
- **Apartments**
- **Hospitals**
- **Schools and universities**
- **Assembly buildings**
- **Hotels**
- **Mixed use buildings**
- **Police and fire stations**
- **Sporting venues**
- **Laboratories**
- **Public buildings**
- **and many other building types.**



DESIGN REVIEW RATING



- Optional review
- Simple documentation
- Provides early feedback to projects
- Embeds sustainability from the outset
- Supports promotional opportunities
- Projects are awarded a Green Star -
Design & As Built: Design Review rating
- This rating expires

AS BUILT RATING



- Mandatory requirement
- More detailed documentation relating to the project
- Confirms building attributes and outcomes meet Green Star benchmarks
- Projects are awarded a Green Star - Design & As Built certified rating
- Rating does not expire

The rating tool at a glance



Management

- Green Star Accredited Professional
- Commissioning and tuning
- **Adaptation and resilience***
- Building information
- **Commitment to performance**
- Metering and monitoring
- Construction environmental management
- Operational waste



Indoor Environment Quality

- Indoor air quality
- Acoustic comfort
- Lighting comfort
- Visual comfort
- Indoor pollutants
- Thermal comfort



Energy

- Greenhouse gas emissions
- Peak electricity demand reduction



Transport

- **Sustainable transport***



Water

- Potable water



Materials

- **Life cycle impacts***
- **Responsible building materials***
- Sustainable products
- **Construction and demolition waste***



Land Use and Ecology

- Ecological value
- **Sustainable sites***
- **Heat island effect***



Emissions

- Stormwater
- Light pollution
- Microbial control
- Refrigerant impacts



Innovation

Innovation points are awarded for:

- Innovative technology or process
- Market Transformation
- Improving on Green Star benchmarks
- Global sustainability benchmarks
- Innovation challenges

* **New Credit**

Useful Links

- GBCA webinar series – Design and As-Built
 - <http://bit.ly/1HdDHgM>
- GBCA Design and As-built calculators, guides, etc
 - <http://bit.ly/1BL8PnK>



Management

Commissioning & Tuning	2.0	Environmental Modelled Targets
	2.1	Services and Maintainability Review
	2.2	Building Commissioning
	2.3	Building Systems Tuning
	2.4	Independent Commissioning Agent
Adaptation and Resilience	3.1	Implementation of a Climate Adaptation Plan
Building Information	4.1	Building Operations and Maintenance Information
	4.2	Building User Information
Metering and Monitoring	6.1	Metering Strategy
	6.2	Monitoring Strategy

Climate Adaptation Plan

- Identify the risks associated with climate change impacts of temperature and sea-level rise. Also drought/flood, cyclones and bushfire
- Address all high/extreme risk items and two items overall



Indoor Environment Quality

Quality of Internal Air	9.10	Ventilation System Attributes
	9.20	Provision of Outside Air
	9.30	Exhaust or Elimination of Pollutants
Acoustic Comfort	10.10	Internal Noise Levels
	10.20	Reverberation
	10.30	Enclosed Spaces
Reduced Exposure to Pollutants	13.10	Paints, adhesives, sealants and carpets
	13.20	Engineered wood products
Thermal Comfort	14.10	Thermal Comfort
	14.20	Advanced Thermal Comfort

Ventilation System Attributes

- Design separation between pollution sources and outdoor air intakes to comply with ASHRAE Standard 62.1:2013, Table 5.5.1
 - <https://www.ashrae.org/resources--publications/bookstore/indoor-air-quality-guide>
- Provide access for maintenance to both sides of “moisture and debris catching components”
- New and existing ductwork to be cleaned prior to occupation

Thermal Comfort – prescriptive option

- **HVAC system requirements:**
 - Dry Bulb Temperature between 20°C and 24°C.
 - Relative humidity controlled between 40% and 60%.
 - Air velocity no more than 0.2m/s with no supply air directed at occupants
 - Systems must have modulation/turn down capability
 - Distinct internal zones (no more than 120 m²) and external perimeter zones (no more than 75m²) with independent temperature controls.
- **Building facade requirements:**
 - Solar Heat Gain Coefficient of facade glazing must be 0.3 or lower; OR, maximum solar heat gain through the glass must be calculated as no greater than 250W/m² peak.
 - Total glazing U-Value (inclusive of glass and frame) is 3.0W/m².K or lower.



Energy

Greenhouse Gas Emissions	15-A.0	Conditional Requirement: Performance Pathway
	15-A.1	Performance Pathway: Comparison to a Reference Building
	15-B.0	Conditional Requirement: NABERS Commitment Agreement
	15-B.1	NABERS Commitment Agreement Pathway
	15-C.0	Conditional Requirement: NatHERS Pathway
	15-C.1	NatHERS Pathway
	15-D.0	Conditional Requirement: Prescriptive Pathway
	15-D.1	Prescriptive: Building Envelope
	15-D.2	Prescriptive: Glazing
	15-D.3	Prescriptive: Lighting
	15-D.4	Prescriptive: HVAC
	15-D.5	Prescriptive: Building Sealing



Energy

Peak electricity demand reduction	16.1-A	Deemed to Satisfy Pathway
	16.1-B	Reference Building Pathway

Only minor changes

Prescriptive: HVAC

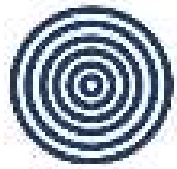
- The HVAC systems comply with the following conditions:
 - The installed fan motor power and pump power, is at least 15% less than the maximum fan motor powers and pump powers defined in Tables J5.2 and J5.4a.
 - The thermal efficiency of the installed water heater is 15% more than the required minimum as defined in Table J5.4b.
 - The required minimum energy efficiency ratio for packaged air conditioning equipment and refrigerant chillers, as defined in Tables J5.4d and J5.4e, or
 - MEPS, where Section J does not apply to the equipment capacity, is increased by at least 15%.



Water

Potable Water	18-A.1	Potable Water - Modelled Pathway
	18-B.1	Sanitary Fixture Efficiency
	18-B.2	Rainwater Reuse
	18-B.3	Heat Rejection
	18-B.4	Landscape Irrigation
	18-B.5	Fire System Test Water

Only minor changes



Materials

Responsible Building Materials	20.1	Responsible Steel Maker and Fabricator
	20.2	Timber
	20.3	Cables, pipes, floors and blinds

Only minor changes



Emissions

Microbial Control	28.1	Microbial Control
Refrigerant Impacts	29.1	Refrigerant Impacts

Refrigerant Impacts

- The combined Total System Direct Environmental Impact of the refrigerant systems in the building is less than 15; (<http://bit.ly/1TMzsyc>)
- The combined *Total System Direct Environment Impact* (TSDEI) of the refrigerant systems is between 15 and 35, **AND** a leak detection system is in place;
- All refrigerants in the project have an ozone depletion potential of zero, and a global warming potential of 10 or less;
- Where there are no refrigerants employed by nominated building systems.



Innovation

Innovative Technology or Process	30.A	Innovative Technology or Process
Market Transformation	30.B	Market Transformation
Improving on Green Star Benchmarks	30.C	Improving on Green Star Benchmarks
Innovation Challenge	30.D	Innovation Challenge
Global Sustainability	30.E	Global Sustainability
Innovative Technology or Process	30.A	Innovative Technology or Process

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