



NET ZERO / NET POSITIVE CERTIFICATION SCHEME

TECHNICAL MANUAL v1.0 (Released: 2019-03)





Pictures on the cover page:

- 78 Corlett Drive (top)
- Vodafone Site Innovation Centre (bottom left)
- House Linden Vleihuis (bottom middle)
- Two Dam Sustainable Trout Farm (bottom right)

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Green Building Council South Africa
Net Zero / Net Positive
Technical Manual

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Authorisation & Disclaimer

The Green Star SA Rating System and the rating tools have been developed with the assistance and participation of representatives from many organisations. The rating tools are subject to further development in the future. The views and opinions expressed in this Technical Manual have been determined by the GBCSA and its Committees.

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You are only authorised to proceed to use this Technical Manual on this basis.

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Acknowledgements

GBCSA NET ZERO / NET POSITIVE CERTIFICATION RATING TOOL

The Net Zero / Net Positive Certification rating tool provides for Net Zero / Net Positive Certification for projects in the Design, As Built and Operational (Existing Building Performance) phase of the typical GBCSA rating tool options/types.

The tool has established individual environmental measurement criteria with particular reference to the South African marketplace and environmental context, whilst also aligning with international best practice to some extent.

The Green Building Council South Africa (GBCSA) would like to acknowledge all the parties who have worked on and supported the development of the Net Zero / Net Positive Certification rating tool.

SPONSORSHIP

The first three years of the Net Zero / Net Positive Certification program has been sponsored thus far by:



Their significant financial contribution has contributed to the GBCSA's ability to bring this rating tool to industry – the GBCSA is grateful for their generous contribution. More sponsors are welcome to contribute to the ongoing improvement and roll out of this rating tool.

The GBCSA notes that sponsors are in no way allowed to influence the benchmarks and standards developed within rating tools by the GBCSA, to ensure that these rating tools are aligned with best practice for green buildings and are unbiased.

SUPPORT

The Green Building Council South Africa acknowledges the tremendous collaboration and support from the World Green Building Council (WGBC) and the Green Building Councils that form part of WGBC's Advancing Net Zero (ANZ) program. This global program was and still is instrumental to creating a coordinated effort towards developing global standards for Net Zero certification and promoting this globally.

Acknowledgements

The Green Building Council South Africa also acknowledges the support from various green buildings consultants who have applied the Net Zero pilot rating tool on projects and targeted certification. These projects have provided incredibly valuable feedback to allow version 1 of the Technical Manual to be created, and all case studies for these projects can be found on the GBCSA website. These projects (12 Net Zero certifications) are:

Carbon:

- Greenfield Industrial Park (Growthpoint) – Net Zero Carbon (modelled) pilot certification (Net Zero AP: Sow & Reap, Misplon Green Building Consulting)
- Vodafone Site Solution Innovation Centre (Vodacom) – Net Zero Carbon (modelled) pilot certification (Net Zero AP: WSP)
- Two Dam Sustainable (Harms owned trout farm) – Net Zero Carbon (measured) pilot certification (Net Zero AP: Ecolution)
- 78 Corlett Drive (Legaro Developments) – Net Zero Carbon (modelled) pilot certification (Net Zero AP: Solid Green)
- House Linden Vleihuis (Marc Sherratt Sustainability Architects) – Net Zero Carbon (modelled) pilot certification (Net Zero AP: Solid Green)

Water:

- The Estuaries Plaza (Developer: Asset Matrix) – Net Zero Water (modelled) pilot certification (Net Zero AP: Terramanzi Group)
- House Linden Vleihuis (Marc Sherratt Sustainability Architects) – Net Zero Water (modelled) pilot certification (Net Zero AP: Solid Green)
- The District (Growthpoint owned) – Net Zero Water (modelled) pilot certification (Net Zero AP: Ecolution)

Waste:

- Wild Coast Sun (Sun International) – Net Zero Waste (measured) pilot certification (Net Zero AP: GCX Africa)
- Virgin Active Constantia – Net Zero Waste (modelled) pilot certification (Net Zero AP: Ecolution)

Ecology:

- Vodafone Site Solution Innovation Centre (Vodacom) – Net Positive Ecology (modelled) pilot certification (Net Zero AP: WSP)
- House Linden Vleihuis (Marc Sherratt Sustainability Architects) – Net Positive Ecology (modelled) pilot certification (Net Zero AP: Solid Green)

Acknowledgements

2017/2018 GBCSA BOARD TECHNICAL STEERING COMMITTEE

The Green Building Council South Africa acknowledges the GBCSA's board 2017/2018 Technical Steering Committee that provided their input and support for the GBCSA Net Zero / Net Positive rating tool.

Green Building Council South Africa

GREEN BUILDING COUNCIL SOUTH AFRICA

The property industry is well-placed to deliver significant long-term environmental improvements using a broad range of measures. More importantly, it is unique in that it can directly influence and create behavioural changes at all stages of the supply chain. However, there are inherent barriers within the industry that often act to ensure that efficiency measures are not adopted, despite the fact that a strong business case can be made for their implementation. Most significantly, these barriers relate to the developer/contractor/owner divisions or split incentives that often result in the benefits of efficiency or improved performance measures not accruing to the party that initiated them.

The Green Building Council South Africa (GBCSA) was created in order to address some of these barriers. The GBCSA's objective is to promote sustainable development and the transition of the property industry towards sustainability by promoting green building programs, technologies and design practices. A key priority for the GBCSA has been the development of comprehensive environmental rating system for buildings, such as Green Star, Energy Water Performance and Net Zero / Net Positive.

The GBCSA's purpose is to establish a built environment in which people and planet thrive. As a key instrument to assist in the pursuit of its purpose, the GBCSA uses rating tools that aim to transform the market place towards the cutting edge of sustainability. Net Zero / Net Positive is a methodology that can accelerate the end goal of complete market transformation. Net Zero / Net Positive is not about slowly pushing the built environment industry towards betterment, but rather about inspiring the end goal now.

Green building rating tools typically:

- Establish a common language and standard of measurement for green buildings;
- Promote integrated, whole-building design;
- Identify building lifecycle impacts;
- Raise awareness of green building benefits;
- Recognise environmental leadership; and
- Transform the built environment to reduce the environmental impact of development.

The GBCSA has developed and operates various green building rating tools to provide industry with an objective measurement for green buildings. In assessing those elements that should be rated and to drive change in the market, the GBCSA has been diligent in focusing on areas of environmental impact that are a direct consequence of a building's briefing, design, construction and operations/maintenance – that is, those outcomes that can be directly influenced by stakeholders within the property industry.

Green Building Council South Africa

NET ZERO ACCREDITED PROFESSIONALS (AP)

To encourage the adoption of environmental initiatives from the earliest project stages throughout design, construction and operation of a building, all rating tools operated by the GBCSA recognise the need for training and accredited professionals that understand the relevant green building rating tool, and have been accredited by the GBCSA as such – these are called Accredited Professionals. Each rating tool has a unique accreditation according to that particular rating tool system.

Net Zero Accredited Professionals are building industry practitioners who have demonstrated their understanding of the GBCSA's Net Zero / Net Positive certification system. **It is mandatory for Net Zero projects targeting certification through the GBCSA to be done by a Net Zero Accredited Professionals that is registered with the GBCSA.**

The GBCSA has developed an on-line directory of Accredited Professionals (see <http://www.gbcsa.org.za>) to enable easy identification and provide the contact details of these service providers. When clients are looking for Net Zero Accredited Professionals to lead their project through the certification process, it is important to note that clients should consider what experience the APs have on similar projects and rating tools, and are to take all necessary precautions to ensure that they obtain competitively priced, market related consulting services from such an AP.

To become a Net Zero Accredited Professional, candidates must attend a GBCSA Net Zero Accredited Professional face-to-face course and pass the associated online multiple choice open book exam. Refer to the GBCSA website (<http://www.gbcsa.org.za>) for updates regarding how to book for such a course or exam and how to maintain Net Zero Accredited Professional status, or any updates to the accreditation requirements.

Introduction to Net Zero

DEFINITIONS

A Net Zero/Net Positive - Carbon building according to the GBCSA is defined as:

“A building that is highly energy-efficient, and the remaining energy use is from renewable energy, preferably on-site but also off-site where absolutely necessary, so that there are zero net carbon emissions on an annual basis (Net Zero), or if the energy from renewable energy results in more energy being produced than what is used on site (Net Positive)”.

A Net Zero/Net Positive - Water building according to the GBCSA is defined as:

“A building that is designed, constructed and operated to greatly reduce total water consumption, and then use harvested, recycled and reused water such that the amount of water consumed is the same as the amount of water that is produced (Net Zero), or if the water recycled/ produced is greater than the water consumed (Net Positive).”

A Net Zero/Net Positive - Waste building according to the GBCSA is defined as:

“A building that reduces, reuses, and recovers its waste streams to convert them to valuable resources with zero solid waste sent to landfills over the course of the year (Net Zero), or where the building can take waste from other sites and divert it for reuse, and not to landfill (Net Positive). (Applicable to both construction and buildings in operation)”

A Net Zero/Net Positive - Ecology building according to the GBCSA is defined as:

“A building that does not reduce the ecological value of the site during development for Greenfield sites (Net Zero), and increases the ecological value of the site for brownfield sites, greenfield sites and/or existing developments (Net Positive).”

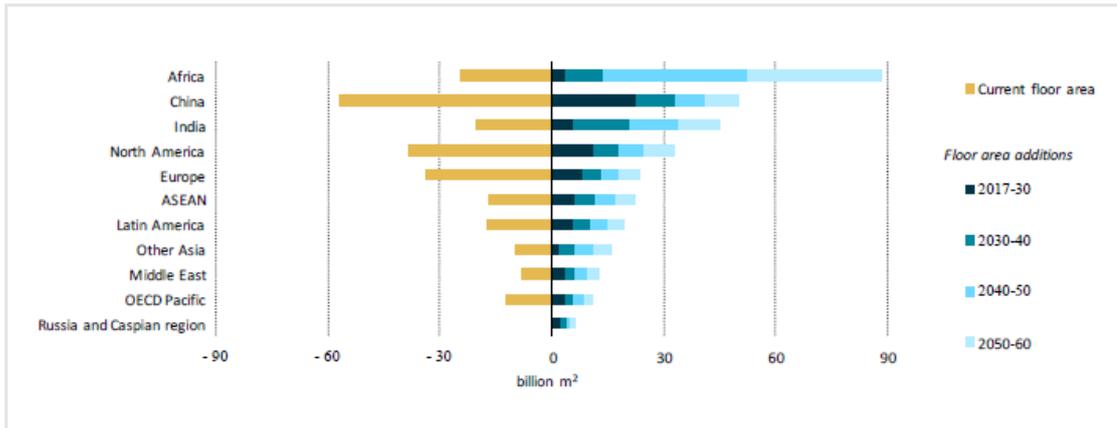
These definitions are based on GBCSA’s interpretation and application of international practices, through engagements with the World GBC ANZ program.

BACKGROUND TO THE NET ZERO / NET POSITIVE CONTEXT

Net Zero and Net Positive buildings have in the past seemed a somewhat distant reality and possibly left to the ‘experimental’ or research’ type projects. There have been some wonderful inventions such as the Living Building Challenge and Passiv Haus, which have inspired and drawn some attention to the Net Zero and Net Positive buildings in the commercial and residential sector respectively, but not to the point where this has seen large scale global uptake. At the same time, the sad reality is that green building rating tools across the world are not widely enough used, and not enough buildings are reducing energy consumption and carbon emissions enough to avoid a likely global average temperature rise reduction.

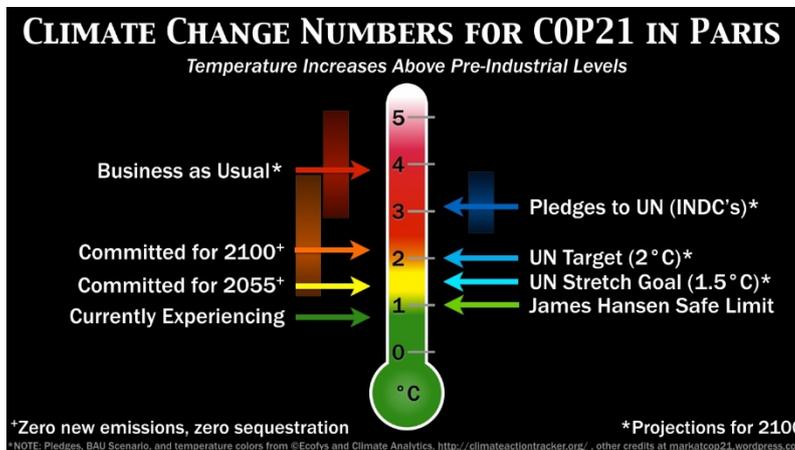
There is urgent need to address rapid growth in inefficient and carbon-intensive buildings investments, especially in developing countries – as demonstrated by the below diagram, detailing the floor area additions to 2060 by key regions:

Introduction to Net Zero



Notes: OECD Pacific includes Australia, New Zealand, Japan and Korea; ASEAN = Association of Southeast Asian Nations.
 Source: IEA (2017), Energy Technology Perspectives 2017, IEA/OECD, Paris, www.iea.org/etp

The agreement reached at COP21 brought new focus and attention to this aspect, where a commitment was made by 170 countries that they would work towards limiting global temperature rise to not more than 2 degrees, and strive towards 1.5 degrees. (UNFCCC, 2016).



The South African Government is a signatory to this. South Africa’s National Development Plan Vision 2030 details that the plan is to “Progressively strengthen the energy efficiency criteria set out in the South African National Standard 204 to achieve a zero carbon building standard by 2030.”

http://www.poa.gov.za/...NPC_National_Development_Plan_Vision_2030.pdf

Introduction to Net Zero

The trajectories for these targets are illustrated in the below figures taken from the WorldGBC report “From Thousands to Billions - Coordinated Action towards 100% Net Zero Carbon Buildings By 2050”:

<http://www.worldgbc.org/news-media/thousands-billions-coordinated-action-towards-100-net-zero-carbon-buildings-2050>

Figure 2: Trajectory for New Buildings to Achieve Net Zero Carbon

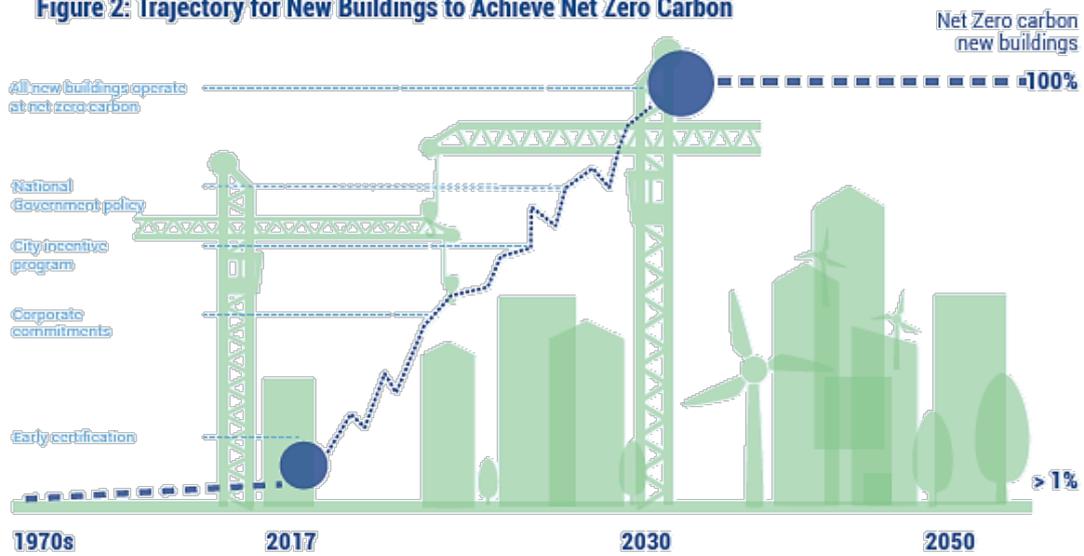
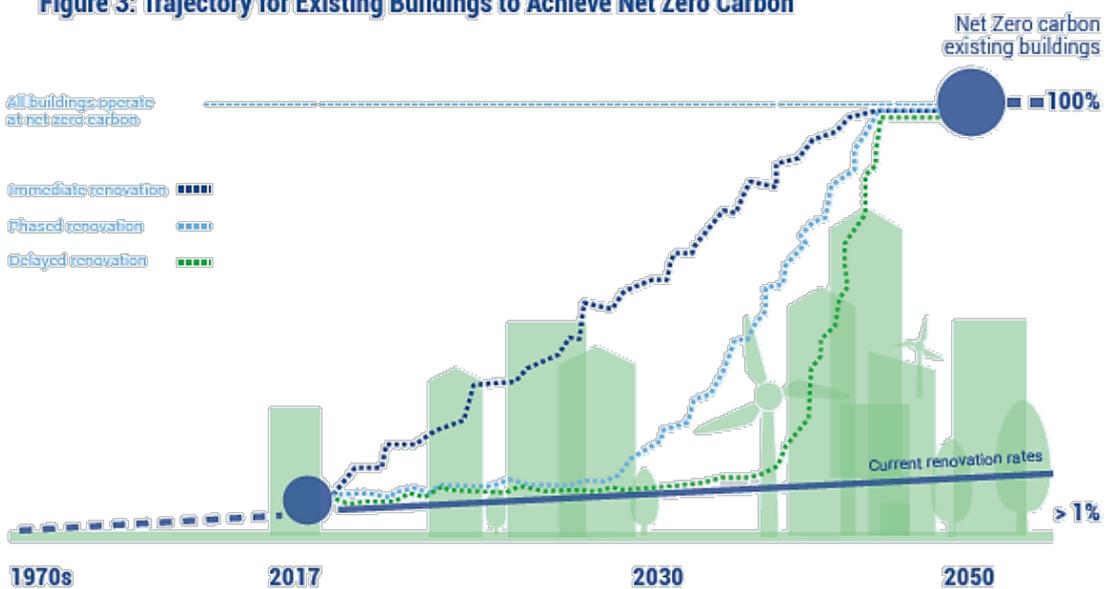


Figure 3: Trajectory for Existing Buildings to Achieve Net Zero Carbon



Net Zero / Net Positive Certification Scheme

The GBCSA has since 2007 been developing and operating various certification schemes such as Green Star, EDGE and Energy Water Performance (EWP) and is in the fortunate position to be able to launch a national Net Zero / Net Positive certification programme as an addition to its existing rating tools (Green Star, EDGE, EWP).

The GBCSA tools do already recognise and reward projects that reduce their environmental impacts, and this certification systems details how these tools can be used and adapted to calculate and recognise Net Zero / Net Positive projects. The WGBC's project only looks at carbon, but the GBCSA Net Zero / Net Positive Certification scheme in South Africa is taken further and addresses each of the below categories for reasons explained later in this Technical Manual:

CARBON

WATER

WASTE

ECOLOGY

The GBCSA Net Zero / Net Positive Certification scheme awards projects which go beyond the partial reductions (recognised in the earlier GBCSA tools), and have taken the initiative to reach the endpoint of completely neutralising (or positively redressing) their carbon emissions; water consumption; solid waste to landfill and their negative ecological impacts.

This Technical Manual sets out the definitions and methodologies for projects to achieve Net Zero or Net Positive certification in South Africa.

The GBCSA have launched the Net Zero / Net Positive Certification scheme beyond carbon for South Africa, to also include Water, Waste & Ecology, as these are critical stress points in our country, for which some additional detail and definitions have been added in this technical manual.

There are 5 Levels for which the Net Zero / Net Positive standard has been created by the GBCSA, which are largely related to the property cycle of design, build, operate and deconstruct - the Levels have been created to acknowledge and account for the typical timing of project decisions and relationships that exist between developer/landlord and tenant/occupant, to ensure that individual parties can take action and be rewarded for this as early on as possible, even at design and construction stage while the building is not yet occupied and in use. The Technical Manual spells out the details for Level 1 and 2, but not for 3-5 for which the GBCSA believe the industry is not ready for yet or in some case where the GBCSA is not able to yet develop criteria for these levels. As and when GBCSA receives substantiated applications for Level 3-5 GBCSA will develop criteria and documentation requirements for these levels. The levels are indicated in a very simplified manner as follows, using carbon as an example:

Net Zero / Net Positive Certification Scheme

Net Zero / Net Positive Standard Levels:

- Level 1: Base Building
- Level 2: + Occupant Operations
- Level 3: + Embodied Carbon
- Level 4: + Renovation Carbon
- Level 5: + Deconstruction



There are some slight modifications to the above principal per category (carbon, water, waste, ecology) because this could not be applied in exactly the same way across these categories – these differences are explained in the individual category sections.

Further to the above, in some instances, the GBCSA will allow for projects to be certified as ‘modelled’ (before use) and as ‘measured’ (in use). This is quite unique to the South African Net Zero certification context where if these things are not caught at design/construction stage, it is likely to be dealt with in operation, and makes the operational Net Zero / Net Positive objectives so much harder if not tackled during design and construction. This will likely change this in future versions of this standard, as and when the industry progresses, shifting more to only measured (in use) certification, which is where the biggest impacts are had.

The GBCSA believes that it is very important to distinguish between Net Zero versus Net Positive ratings, where Net Positive ratings are restorative versus Net Zero not yet restorative – the ratings and the certificate awarded are thus titled ‘Net Zero’ or ‘Net Positive’ depending on the project’s achievements. The GBCSA has set the threshold for a Net Positive rating as a 5% improvement on the Net Zero, but this may be reviewed and increased by the GBCSA over the years to encourage and reward greater adoption of Net Positive, restorative projects.

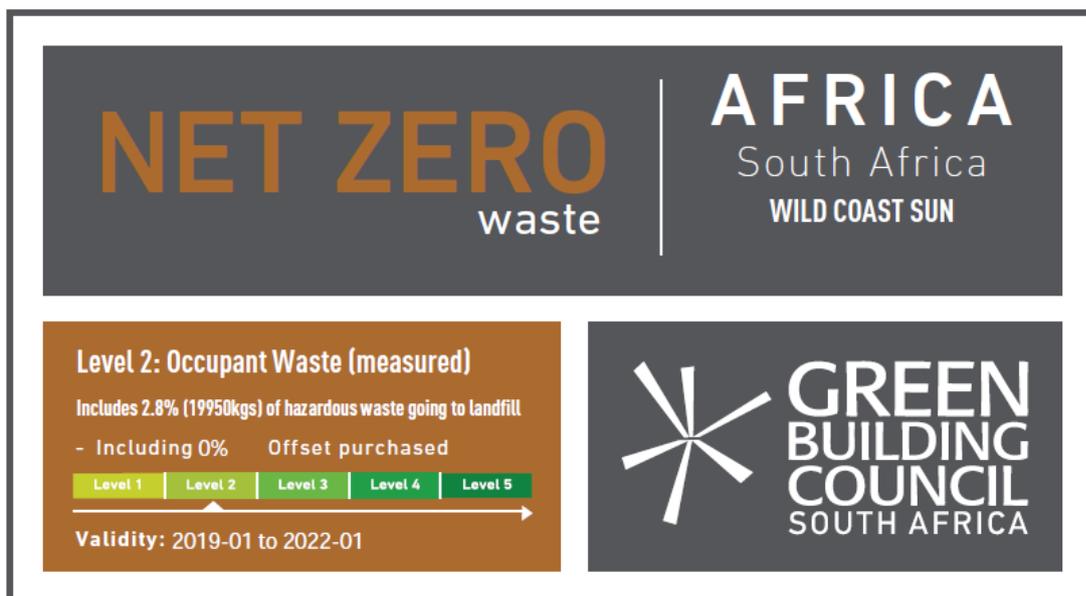
Offset or Offsite measures are also allowed as part of the GBCSA’s Net Zero standard, because it will be impossible for every project to achieve Net Zero status on every site because of very specific site constraints, which could include issues such as lease constraints or space limitations, for example. The GBCSA will however not reward Net Positive certification through offset or offsite solutions, and thus projects that use offsets and offsite solutions will only be able to achieve a maximum Net Zero certification. Projects are also to take note that on site initiatives must be addressed first before the GBCSA will allow offset or offsite solutions, which is described in more details in the ‘pathways of achievement’ section under each category.

Refer to the certified project logo example below that indicates key components of the certification that are very important for project owners and their marketing teams to take note of – the logo indicates:

1. whether the project was certified as Net Zero or Net Positive

Net Zero / Net Positive Certification Scheme

2. whether the certification it is for Carbon, Water, Waste or Ecology
3. who the certifying body is (Green Building Council South Africa)
4. the name of the project to which the certification was awarded
5. the version of the tool under which the project was certified (pilot, v1, v2, v1.1 etc)
6. whether the certification was awarded for using modelled or measured evidence
7. the Level for which the certification has been awarded (Level 1, 2, 3 or 4)
8. the validity period of the certification for this project
9. the % offset or offsite contribution to the certification
10. For certain categories, indicates additional information on any exclusions, such as for waste where there might be some hazardous waste that must by law be dealt with in a certain way
11. the continent and country in which the project is located



The project case study will contain this logo, and will also contain a high level overview of the project achievements, and the project team that was involved in achieving the certification.

The various Net Zero / Net Positive certifications available under this version of the standard from the GBCSA are indicated in the table below:

Net Zero / Net Positive Certification Scheme

	NET ZERO		NET POSITIVE	
	NEW BUILD	EXISTING	NEW BUILD	EXISTING
Carbon LEVEL 1	Modelled (before use) (excl. tenant items)	Not Available	Not Available	Not Available
Carbon LEVEL 2	Modelled (before use) (incl. tenant items)	Measured (in use)	Modelled (before use) (incl. tenant items)	Measured (in use)
Water LEVEL 1	Not Available	Not Available	Not Available	Not Available
Water LEVEL 2	Modelled (before use) (incl. tenant items)	Measured (in use)	Modelled (before use) (incl. tenant items)	Measured (in use)
Waste LEVEL 1	Measured (in construction) (construction waste only)	Not Available	Measured (in construction) (construction waste only)	Not Available
Waste LEVEL 2	Not Available	Measured (in use)	Not Available	Measured (in use)
Ecology LEVEL 1	Measured (greenfield site)	Not Available	Measured (in situ) (greenfield and brownfield)	Not Available
Ecology LEVEL 2	Not Available	Not Available	Not Available	Measured (in situ) (brownfield site)

Net Zero & Net Positive certifications awarded by the GBCSA are valid for 3 years from the date of certification. The GBCSA reserves the right to withdraw a certification, if there is clear evidence the GBCSA is given that shows the project not to be complying with the commitments made for the 3 year duration of the certification validity period.

The GBCSA reserves the right to within the same version of the tool remove certain certification options or shorten the validity period, for certification options that in the GBCSA opinion are not being effective in transforming the market. For example, the GBCSA may choose to remove modelled options for all or some certification types, or shorten the validity period of certain options. In such cases the GBCSA will give industry 3-6 months warning of such a change via the GBCSA website. The options that will apply to any project will be those

Net Zero / Net Positive Certification Scheme

that are published via the GBCSA's online TC/CIR platform at the time of full registration of the particular project.

It is important to note that Net Zero or Net Positive does not mean off-grid in terms of energy and water – the grid is a very important component of allowing transfer of excess energy or water from one site to another site where a shortage is experienced. The grid will become more and more important for South Africa to work towards a regenerative society that is able to shift resources from places of excess to places of need – this cannot be achieved by requiring every site to go off grid. However, off grid projects can achieve Net Zero / Net Zero certification, such as for example the Two Dam Sustainable project, which was one of the pilot projects certified by the GBCSA – this project was off grid in terms of energy.

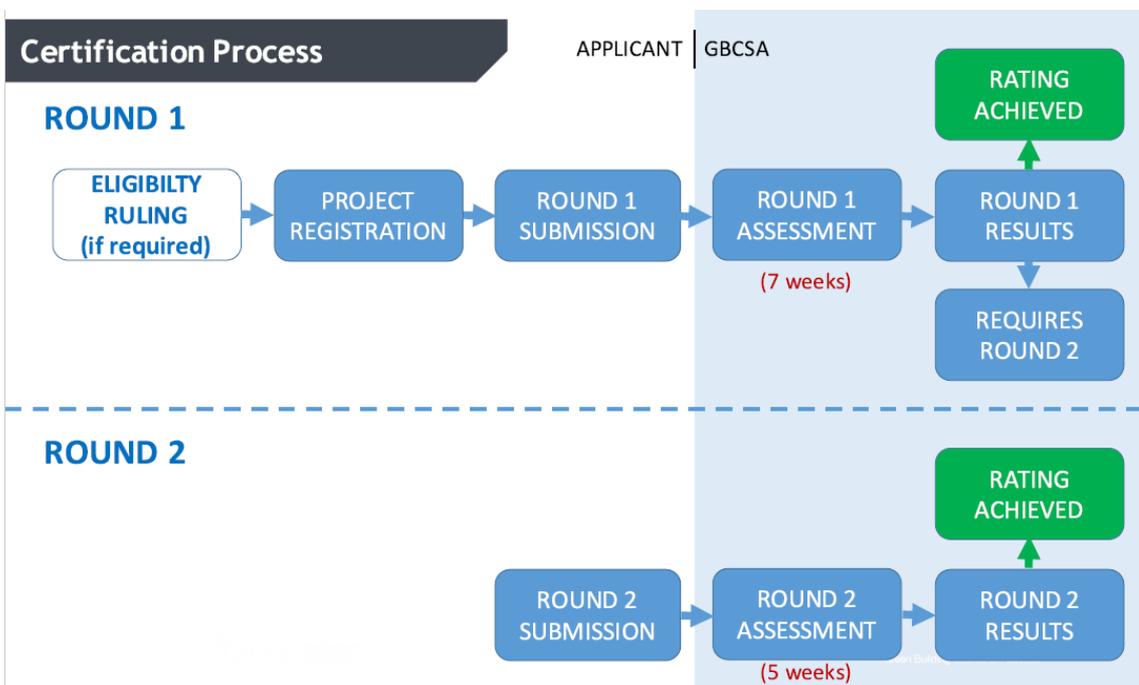
Certification

CERTIFICATION PROCESS

The process is:

- Projects are to submit the Net Zero / Net Positive submission to the GBCSA for assessment and certification.
- Projects can submit Net Zero / Net Positive as a stand-alone submission; OR
- Projects can submit the Net Zero / Net Positive submission as a part of a Green Star, EDGE or EWP project.
- If submitted as a part of a Green Star / EDGE / EWP submission, the Net Zero / Net Positive results will be assessed and certified at the same time as the Green Star / EDGE / EWP project, but will attract additional GBCSA registration fees.
- The GBCSA will manage and own the assessment of these Net Zero/Net Positive submissions.
- The GBCSA will issue the Net Zero/Net Positive certificate once the assessment is complete and the GBCSA is satisfied that the project has met the requirements.

The Net Zero/Net Positive Certification scheme will use the same processes for certification as per the relevant rating tool type it is submitted with. For stand-alone Net Zero / Net Positive ratings these will have a 7 week round 1 and 5 week round 2 assessment turn-around times as outlined below. This might be reviewed by the GBCSA in future.



Certification

Figure 2: Overview of certification process

SUBMISSION REQUIREMENTS

Submission to be co-ordinated and submitted by a NET Zero AP*: (a person that has attended the GBCSA Net Zero AP course & passed the GBCSA's Net Zero AP exam)

DOCUMENTATION REQUIREMENTS

The Documentation Requirements are detailed in this Technical Manual for projects targeting Net Zero/ Net Positive certification – these must be submitted in exact accordance with the requirements set out in this document, and any subsequent Technical Clarifications published by the GBCSA.

Registration

Registering a building project with the Green Building Council South Africa declares the intent to pursue certification under a specific rating tool and is the first step in the certification process. Registration establishes a connection with the GBCSA and gives the project access to essential information and assistance with the submission process. Projects should register as soon as possible during the project, though there is no deadline during the design or construction process.

Registration takes place by the project completing the Net Zero registration form on the GBCSA website www.gbcsa.org.za, making payment to the GBCSA of the GBCSA Net Zero registration fee, and signing the Net Zero certification agreement.

Please Note: Registering a project simply declares the intent to pursue certification and should not be confused with actual project certification which is awarded by the GBCSA once a project has demonstrated its achievement of a certain rating level.

Preparing the Submission(s)

Once your project is registered, the project team should prepare documentation, drawings and calculations to satisfy the Net Zero / Net Positive requirements. The Net Zero Accredited Professional must take responsibility for the quality of submission, and must submit a signed AP declaration with the round 1 and round 2 submission to the GBCSA.

It is important to ensure that documentation for all claimed achievements adheres to the Documentation Requirements outlined in the Net Zero / Net Positive Technical Manual as there are only two rounds of assessment) available.

Assessors will not award the certification unless it is demonstrated that all the requirements have been met exactly as detailed in the Technical Manual.

Please note that if a Credit Interpretation Request (CIR) has been submitted, an assessment cannot take place until it has been resolved.

The GBCSA reserves the right to conduct a pre-assessment review of a project submission prior to the commissioning of a review by the assessors. A project may be required to resubmit if the pre-assessment review suggests that the quality of the submission would result in an excessive number of items being denied. There is no fee associated with this additional pre-assessment quality inspection. As part of the certification process in the round 1 and round 2 submission, the Net Zero AP must submit a completed pre-submission check list to highlight

Certification

that all items have been done in accordance with the submission quality requirements to make for a submission that is ready to be assessed.

Round 1 Assessment

The Assessment Panel, containing one or more independent assessors will review the submission. Recommendations will then be made to the GBCSA case manager. The GBCSA reserves the right to moderate the findings of the Assessment Panel.

The GBCSA will forward the results of the Round 1 assessment to the project Net Zero AP. The project may accept the results as the final rating or request to resubmit documentation where additional feedback is required by the project in a Round 2 assessment.

Projects must provide with the Round 1 submission the Round 1 pre-submission checklist as well as the signed Net Zero AP declaration.

Round 2 Submission

Upon receipt of the results of the Round 1 Assessment, the project may request to resubmit documentation to be confirmed. Each project has only one opportunity for resubmission, which may include:

- Additional/revised documentation to demonstrate fulfilment of documentation requirements;
- Alteration to project design that results in meeting the certification standard; and
- Credit Interpretation Requests (CIRs) to clarify alternative compliance.

Projects must also provide the Round 2 pre-submission checklist as well as the signed Net Zero AP declaration with their round 2 submission.

Round 2 Assessment

Assessment of the Round 2 submission will follow the procedures outlined above for Round 1 assessment.

Certified Rating Awarded

If the assessment validated the project's achievement, the GBCSA will award a Certified Rating and notify the Applicant via the results email.

Certified Rating not Awarded

If a desired Certified Rating is not achieved, the project may be eligible to Appeal selected aspects for a fee to re-asses. Please contact the GBCSA Technical Manager on this tool for further details.

Technical Clarifications and Credit Interpretation Requests

The Technical Clarifications (TC) and Credit Interpretation Request (CIR) rulings provide an essential source of information to all projects undertaking assessment. They are available on the GBCSA website <http://www.gbcsa.org.za>.

Certification

Technical Clarifications often represent the GBCSA answers to technical queries and complement Technical Manuals (e.g. the Assessment Team will use the Technical Clarifications as public precedent). They do not amend but clarify the compliance criteria. They are an extension of the Technical Manual; it is the responsibility of the project teams to stay up-to-date with this section of the GBCSA website.

The CIR rulings offer alternative compliance options whenever those have been deemed equivalent in meeting the aim of criteria. A registered project may submit a CIR if the project team feels that the Aim of Credit/Criteria has clearly been satisfied via an alternative solution that does not adhere to the stated Credit Criteria/Additional Guidance of the relevant Technical Manual.

FEEDBACK ON NET ZERO / NET POSITIVE CERTIFICATION

Ongoing Feedback

The GBCSA encourages feedback on all rating tools, including Net Zero / Net Positive Certification. Feedback is to be sent to the Technical Manager for this rating tool for consideration by the GBCSA.

Glossary

Accredited Professional

A building professional who has attended the relevant Accredited Professional training course for that rating tool, has passed the associated examination and is registered with the Green Building Council South Africa as an Accredited Professional for that rating tool.

Active Solar Strategies

Mechanisms, such as photovoltaics, which are designed to actively collect the energy of sunlight and use it.*

AFFL

Above Finished Floor Level.

Air Handling Unit (AHU)

Equipment that includes a fan or blower, heating and/or cooling coils, regulator controls, condensate drain pans, and air filters.*

Alternative Energy

Energy from a source other than the conventional fossil-fuel sources of oil, natural gas and coal.*

Alternative Energy Sources

Energy sources that can be substituted for the conventional sources such as fossil fuels (coal, oil, natural gas), nuclear power, and large-scale hydroelectric power, e.g. solar, wind, geothermal, biomass.*

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)

See <http://www.ashrae.org>.

Asbestos

A naturally occurring soft fibrous mineral commonly used in fireproofing materials and considered to be highly carcinogenic in particulate form.

Assessor

A person or persons, independent of the GBCSA, independent of the project client, design team and contractor, nominated by the GBCSA, knowledgeable and with experience in the green building industry, or who has such other appropriate assessment qualifications as the GBCSA may from time to time determine.

Basement Seepage Water

The slow movement of water into a structure that penetrates the groundwater table (also known as subsoil drainage). (This is adapted from "The Groundwater Foundation" glossary, definition 1 of seepage: The slow movement of water into or out of a body of surface or subsurface water.

Biodiversity

The totality of living animals, plants, fungi and micro-organisms in a region; the variety of life in all forms, levels and combinations.*

Biomass

Plant matter such as trees, grasses, agricultural crops or other biological material; all materials of recent plant or animal origin.*

Blackwater

Glossary

Water which has been mixed with waste from toilets. Blackwater requires biological or chemical treatment and disinfection before reuse.

BMS

See Building Management System.

Borehole water supply

Defined by the GBCSA as a constructed hole in the ground from which groundwater can be abstracted. It includes a well, excavation, or any other artificially constructed or improved underground cavity which can be used for the purpose of intercepting, collecting or storing water in or storing water in or removing water from an aquifer; observing and collecting data and information on water in an aquifer; recharging an aquifer. [Source: *National Water Act - Act No. 36 of 1998*].

Building

The base building development seeking Green Star SA certification.

Building Envelope

The exterior surface of a building's construction: the walls, windows, roof and floor; also referred to as 'building shell'.*

Building Maintenance Guide (BMG)

A detailed guide for the building owner or manager on assessing and maintaining the building's services and external building fabric.

Building Management Control System (BMCS)

As per BMS.

Building Management System (BMS)

The BMS automatically controls the building services systems to maintain temperature, humidity, ventilation rates and lighting levels to pre-determined load requirements and to provide safe, efficient operation of equipment.

Building Research Establishment Environmental Assessment Method (BREEAM)

The UK-based BREEAM green building rating system assesses the environmental performance of both new and existing buildings. See <http://www.breeam.org>.

Building Users' Guide (BUG)

A simple and easy to use guide for the non-technical building user which, through practical recommendations, encourages the use of the green building features of the design.

Carbon Dioxide (CO₂)

Odourless gas commonly sourced by respiration, and is the result of the oxidation (including active combustion and respiration) of carbon based substances; it has been widely used as a measure of the ventilation adequacy of a space; a principal greenhouse gas.*

Car Parking Area

Car parking areas include drive aisles and access areas situated therein.

Computational Fluid Dynamics (CFD)

Numerical analysis of problems involving fluid flows. A computer is used to perform the millions of calculations required to simulate the interaction of fluids, for example looking at air movement within buildings.

Conventional Delivery

Glossary

This is assumed if projects are not pursuing Shell & Core or Integrated Fitout. Conventional delivery means that finishes and services are applied to common areas, and tenancies are delivered with ceilings, floor coverings, lighting systems, but no paint, while ducts from air supply and return risers, electrical and hydraulic services are installed above the ceiling from the riser throughout the tenancy areas.

Chartered Institute of Building Services Engineers (CIBSE)

See <http://www.cibse.org>.

Chlorofluorocarbons (CFCs)

CFCs are refrigerants or blowing agents which cause ozone depletion when released in the atmosphere.

CIR

See Credit Interpretation Request.

Client

The building/project owner or developer responsible for the development/refurbishment of the building and for the engagement (directly or indirectly) of the design team and the contractor.

Climate Change

The change expected to occur to the world's climate due to human activities that emit greenhouse gases, such as burning fuel (cars and electricity generation) and deforestation.

CLO Constant

The CLO Constant refers to the clothing variable used to assess the Predicted Mean Vote (PMV). It recognises that people are warmer if they are wearing more clothes.

Chain of Custody (CoC)

The path taken by raw materials, processed materials, and products from the forest to the consumer, including all successive stages of processing, transformation, manufacturing and distribution. All parties in the chain of custody must be CoC certified by FSC.

Cogeneration

The simultaneous production of electrical or mechanical energy (power) and useful thermal energy from the same fuel/energy source.*

Commissioning

The advancement of an installation from the state of static completion to full working order to the specified requirements. It includes the setting to work of an installation, the regulation of the system and the fine tuning of the system.

Constructed Wetland

A human-made habitat for waterfowl and other forms of wildlife, often using greywater or rainwater catchments' overflow.*

Contaminant

A substance that is not naturally present in the environment or that is present in unnatural concentrations or amounts, and which can (in sufficient concentration) adversely alter an environment.

Contract Value

The Contract Value is defined as the rand value that will be required to complete the works for the entire project, including site works (landscaping, external paving, etc). The contract value must include contractor fee, contingencies and any other items included as part of the contract amount, but exclude demolition works, consultants fees, design fees, project management

Glossary

fees, VAT, works outside the site area, and buildings or areas within the site that are not being assessed for purposes of Green Star. In the Net Zero / Net Positive Certification tool the contract value excludes tenant allowances, even if these form part of the contract value. Where a number of amenities or services are shared between buildings, the cost apportioned to the rated building must be equivalent to the use that the building will have of these facilities (Where this is required to achieve credit requirements, a breakdown of the excluded costs and the total cost for the project should be provided by the Quantity Surveyor or cost planner). Other exclusions are provided, where relevant, in the specific credit documentation.

Contractor

The main contractor or builder engaged to construct or refurbish the building.

CSIR

Council for Scientific & Industrial Research – See <http://www.csir.co.za>.

CSIRO

Australian Commonwealth Scientific and Research Organization – See <http://www.csiro.au>.

Credit Interpretation Request (CIR)

CIRs are submitted prior to assessment by a project that clearly meets the Aim of Credit but does not adhere to the stated Credit Criteria of the relevant Technical Manual. CIRs are considered by the GBCSA with the consultation from the Technical Working Group and other independent consultants, and the resulting rulings may set precedent and be used to update Green Star SA rating tools.

Daylight Factor (DF)

The proportion of internal illuminance (light level) compared to the external illuminance, expressed as a percentage. Daylight Factor represents the proportion of external light which illuminates a given internal surface.

DEAT

South Africa Department of Water and Environmental Affairs – See <http://www.deat.gov.za>.

Deconstruction

A process to carefully dismantle or remove useable materials from structures, as an alternative to demolition; it maximises the recovery of valuable building materials for reuse and recycling and minimises the amount of waste landfilled.*

Design Team

The design team comprises all the professionals normally engaged in the design and contract administration of a building project. These typically include architects, engineers (structural, civil, mechanical, electrical, hydraulics, fire), project manager, cost consultant and building surveyor plus other specialists including green building consultant, landscape architect, acoustics consultant, façade engineer, lighting consultant, etc.

Displacement Ventilation

Supply air is introduced to the space at or near the floor level, at a low velocity, at a temperature only slightly below the desired room temperature. The cooler supply air 'displaces' the warmer room air, creating a zone of fresh cool air at the occupied level. Heat and contaminants produced by activities in the space rise to the ceiling level where they are exhausted from the space. This results in an efficient and low power ventilation system.

DOH

South Africa Department of Health – See <http://www.doh.gov.za>.

Glossary

DOT

South Africa Department of Transport – See <http://www.dot.gov.za>.

DWAF

South Africa Department of Water Affairs – See <http://www.dwaf.gov.za>.

Ecology

A branch of science concerned with the interrelationship of organisms and their environment.*

Ecosystem

An interconnected and symbiotic grouping of animals, plants, fungi and micro-organisms that sustains life through biological, geological and chemical activity.*

Education Buildings

Education Buildings are defined as buildings classified as “A3 Place of Instruction” under SANS 10400-A:200.

Eligible Project

A project that complies with the requirements contained in the Green Star SA Eligibility section of this Technical Manual.

Embodied Energy

Energy that is used during the entire life cycle of the commodity for manufacturing, transporting and disposing of the commodity as well as the inherent energy captured within the product itself; this term does not always correlate to the life cycle environmental impact.*

Emission Controls

Any measure that reduces emissions into air, water or soil. The most effective emission controls involve the redesign of the process so less waste is produced at the source.*

Emissions

The release of gases, liquids and/or solids from any process or industry; liquid emissions are commonly referred to as effluents.*

Environmental Impact

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from human activity, industry or natural disaster.*

EPA

Environment Protection Agency – See <http://www.epa.gov>.

EMP

Environmental Management Plan.

EMS

Environmental Management System.

Environmental Tobacco Smoke (ETS)

Also known as second-hand smoke, consists of airborne particles emitted from the burning of cigarettes, pipes and cigars, and exhaled by smokers. The particles contain compounds some of which are known to cause cancer.

ESKOM

South Africa Electricity Supply Commission – See <http://www.eskom.co.za>

FFL

Finished Floor Level.

Glossary

Functionally Autonomous Building

A building that does not rely on any other building for primary access or identification.

FSC

Forest Stewardship Council – See <http://www.fsc.org>.

FSC Certification

A certification system for timber products which confirms that timber has been harvested in a sustainable manner.

GFA

See Gross Floor Area.

Global Warming Potential (GWP)

GWP provides a measure of the potential for damage that a chemical has relative to one unit of carbon dioxide, the primary greenhouse gas.

Greenbelt Zones

Zones or areas in or around a city where the removal of native vegetation is prohibited and/or parks and other open, undeveloped, and vegetated space is protected.*

Green Building

A Green Building incorporates design, construction and operational practices that significantly reduce or eliminate its negative impact on the environment and its occupants; an opportunity to use resources efficiently while creating healthier environments for people to live and work in.

Green Building Council South Africa (GBCSA)

The GBCSA is a national, not-for-profit organisation that is committed to developing an environmentally sustainable property industry for South Africa by encouraging the adoption of green building practices. See <http://www.gbcsa.org.za>.

Greenfield Site

Land on which no development has previously taken place; usually understood to be on the periphery of an existing built-up area.*

Greenhouse Effect

(1) The warming of the earth's surface and lower atmosphere as a result of carbon dioxide and water vapour, which absorb and reradiate infrared radiation, in the atmosphere; (2) An intensification of this warming effect from human-induced increase in carbon dioxide and other greenhouse gases in the atmosphere from the burning of fossil fuels.*

Greenhouse Gases (GHGs)

Trace gases such as carbon dioxide, water vapour, methane, and CFCs that are relatively transparent to the higher-energy sunlight, but trap the lower-energy infrared radiation.*

Greenwash

Disinformation disseminated by an organisation so as to present an environmentally responsible public image.*

Greywater

Waste water recovered from sinks, showers, washing machines and other water sources that do not contain food or human waste.

Grid

A term used to describe the network of wires and cables which transport electricity from a power plant.*

Glossary

Ground Water

A general term for the water beneath the Earth's surface.

Gross Floor Area (GFA)

The total floor area of all parts of a building that are permanently covered and can be protected from the elements but excluding car parking areas. For the purposes of the Green Star SA submission, Gross Floor Area should be calculated as the building Construction Area (using SAPOA definition 1st Aug 2005) less the area of car parking.

GWP

See Global Warming Potential.

Habitat

(1) The natural home of an animal or plant; (2) The sum of the environmental conditions that determine the existence of a community in a specific place.*

Habitat Fragmentation

Habitat disruption where natural habitat is broken into small, relatively isolated sections.*

Hardscaping

Pavers, sidewalks, raised planters, retaining walls, site furnishings and other non-living design elements used to enhance landscaped areas.

Hazardous Waste

Waste that is particularly dangerous or destructive; specifically characterised by one or more of the following properties: ignitable, corrosive, reactive or toxic.*

Heating, Ventilation and Air Conditioning (HVAC)

Mechanical systems that provide heating, ventilation and air conditioning in buildings.

Heat Recovery Ventilation

A system that reclaims the heat from warm exhaust air exiting a building and uses it to pre-heat entering fresh air.*

High Density Poly Ethylene Plastic (HDPE)

HDPE is a type of plastic that can be used to make pipes and other plastic products as an alternative to PVC.

HVAC

See Heating, Ventilation and Air Conditioning.

Hydrochlorofluorocarbons (HCFCs)

HCFCs are found in refrigerants and blowing agents that cause ozone depletion when released in the atmosphere.

Hydrofluorocarbons (HFCs)

HFCs are commonly used to replace HCFC refrigerants and blowing agents to reduce the ozone depletion potential (ODP); however, HFC products have a high Global Warming Potential (GWP).

Illuminance

The luminous flux incident on a unit area of a surface. The unit is the lux which is one lumen per square meter.

Glossary

Independent Chair

A person independent of the GBCSA, nominated by the GBCSA, knowledgeable and with experience in the green building industry, who has such appropriate assessment qualifications as the GBCSA may from time to time determine who is responsible for reviewing the report of the Assessors prior to the Assessors making a recommendation to the GBCSA in respect of the development.

Independent Commissioning Agent

An experienced and qualified commissioning agent who carries out commissioning on behalf of the building owner or tenant.

Indicators

(1) A measurement or reporting tool used to gauge how well a society is achieving its economic environmental and societal goals; (2) A species of plant or animal, or a community, whose occurrence serves as evidence that certain environmental conditions exist.*

Indoor Environment Quality (IEQ)

Covers issues such as indoor air quality, thermal comfort, illumination, daylight, views, acoustics and occupant control of building systems.

Integrated Fitout

A fitout where the tenancy design and construction is fully coordinated with the base building design and construction.

Intergovernmental Panel on Climate Change (IPCC)

UN agency set up to provide the decision-makers and others interested in climate change with an objective source of information about climate change. Its role is to assess on a comprehensive, objective, open and transparent basis the latest scientific, technical and socio-economic literature produced worldwide relevant to the understanding of the risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation. Findings of the IPCC played a role in the establishment of the Kyoto Protocol under the UN Framework Convention on Climate Change. See <http://www.ipcc.ch>.

Interdependent Projects

Projects that share services and amenities.

IPCC

See Intergovernmental Panel on Climate Change.

ISO 14001:2004

An international standard which specifies requirements for an Environmental Management System (EMS).

Kyoto Protocol

The Kyoto Protocol is an international agreement reached in 1997 in Kyoto, Japan to address the problems of climate change. (See also IPCC).

Landfill

An area where solid waste is deposited. In a suitable area, a hole in the ground is lined so that materials will not escape, and is filled with layers of rubble/waste as the waste is progressively deposited. When completely filled, it is typically capped and sealed.

Leadership in Energy and Environmental Design (LEED)

Glossary

The US-based LEED Green Building Rating System® is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. See <http://www.usgbc.org/leed>.

Life Cycle of a Product

All phases associated with the life of a product (i.e. creation, distribution, sale, installation, use, care and disposal/reuse/recycle).*

Life Cycle Assessment (LCA)

An evaluation of the environmental effects of a product or activity holistically, by analysing the entire life cycle of a particular material, process, product, technology, service or activity. The LCA consists of three complimentary components: inventory analysis, impact analysis, and improvement analysis, together with an integrative procedure known as scoping.*

Light Pollution

Waste light from buildings that is directed upward to the sky or is directed away from the site.

Maintained illuminance

The average illuminance over the reference surface at the time maintenance has to be carried out by replacing lamps and/or cleaning the equipment and room surfaces (if applicable).

Mall area

The common space between tenancies that acts as the walking space between tenants. Malls can be covered or open air.

Material Cost

The cost of a material may include transport/shipping costs to the project site, but may not include installation costs, equipment for installation, contractor fee, contingencies, VAT or any other amounts.

Mechanical Ventilation

Ventilation systems which use fans or other electrically operated air movement devices to provide ventilation to a building. Wind driven turbine ventilators and mechanically operated windows are not classified as 'mechanical ventilation'.

MET Values

MET refers to human metabolic rate and corresponds to the amount of heat (sensible and latent) released from the human body. It is used to size air conditioning equipment and to assess the Predicted Mean Vote (PMV) when calculating thermal comfort.

Mixed-Mode Ventilation

A ventilation strategy that combines natural ventilation and mechanical ventilation, allowing the building to be ventilated either naturally or mechanically according to the season or ambient temperatures.

Mixed-Use Development

The use of a single building for different purposes simultaneously.

Mould

Mould is a fungus that typically grows in a filamentous cobweb-like mass under damp conditions and is capable of producing staggering numbers of reproductive spores in as little as a few days. Moulds are non-chlorophyll containing entities, which require organic matter, living or dead, for survival. Moulds are extraordinarily diverse in character and their relationship with humans span the positive (e.g. food, antibiotics) to the negative (e.g. pathogens, antigens, toxins).*

Glossary

Natural Ventilation

The process of supplying and removing air in building spaces by natural means, by using openings in the façade (e.g. windows), non-powered ventilators, solar chimneys and infiltration processes. A building can still be termed 'naturally ventilated' if it contains propeller type ceiling fans provided they only recirculate air and their energy use is included in the energy modelling.

Nominated Area

A credit specific dynamic area definition used to delineate the area that is relevant to individual credits. Refer to each credit and the Energy Calculator & Modelling Protocol Guide for the definition of the nominated area.

Nominated Area (HVAC, Lighting)

In addition to Nominated Area, the Energy Calculator requires the Nominated Area for Lighting and HVAC to be delineated. Refer to the 'Energy Calculator Guide' for the definitions of these nominated areas.

Nominated Space

See Nominated Area.

Non-Potable Water

Water collected on-site or recycled/recovered from a previous use such as blackwater or greywater recovery. It does not include water from rivers, lakes or groundwater (borehole water) unless the water has previously been used.

Non-Renewable Resources

Resources that cannot be replaced in the environment (e.g. fossil fuels) because they form at a rate far slower than their consumption.*

O&M Manual

Operations and Maintenance Manual.

Occupied Space

Areas that are predominantly:

- Work spaces (e.g. cellular offices, open plan offices, meeting rooms, food preparation areas, laboratories, consulting rooms, workshops - small scale and high density work spaces);
- Large event spaces (e.g. dry sports halls, swimming pool areas, halls, arts theatres, libraries, assembly areas, sales areas – general, sales areas – chilled, performance areas (stage), check in areas, baggage reclaim areas, security check areas, fitness suites, gyms, fitness studios and ice rinks);
- Common areas (e.g. receptions, waiting rooms, eating/drinking areas, laundries, common rooms/staff rooms/lounges, public circulation areas, foyers and lobbies); and
- Learning spaces (e.g. classrooms and lecture rooms) are all expected to form part of the Occupied Space.

Most corridors are to be excluded from the calculation of Occupied Space. Where corridors are exclusively used for transit between spaces (i.e. do not act as a foyer, lounge, waiting space, or reception), and where these corridors are bound in both sides by a wall these are to be excluded. Where a corridor is part of a shared space, this corridor, or section of a corridor, cannot be excluded and is considered part of the adjacent space. Occupied Space also

Glossary

excludes enclosed fire stairs, storage areas, toilets, tea kitchens, changing facilities, bathrooms, display areas, IT equipment rooms and plant-rooms.

ODP

See Ozone Depleting Potential.

OHS

Occupational Health and Safety.

Organically Certified Products

Products certified by a specialist organic certification body.

Organisation for Economic Co-operation and Development (OECD)

See www.oecd.org.

Ozone (O₃)

A naturally occurring, highly reactive, irritating trace gas comprising of tri-atomic oxygen formed by recombination of oxygen in the presence of ultraviolet radiation.*

Ozone Depletion

Destruction of the Earth's ozone layer, which can be caused by the photolytic breakdown of certain chlorine and/or bromine-containing compounds (e.g. chlorofluorocarbons), which catalytically decompose ozone molecules.*

Ozone Depleting Potential (ODP)

ODP provides a measure of the potential damage that a chemical has relative to that of refrigerant type CFC11. CFC11 has an ODP of one and is the most damaging of CFCs.

Ozone Hole

A thinning break in the ozone layer. Designation of the amount of such depletion as an 'ozone hole' is made when the detected amount of depletion exceeds 50%. Seasonal ozone holes have been observed over the Antarctic and Arctic regions, part of Canada, and the extreme northeast United States.*

Ozone Layer

The protective layer in the stratosphere layer of the atmosphere, about 24 kilometres above the ground, that absorbs some of the sun's ultraviolet rays, thereby reducing the amount of potentially harmful radiation that reaches the earth's surface.*

Passive Design

Design that reduces the energy consumption of a building by taking advantage of natural heating, cooling and lighting.*

Passive Solar Design

Design that uses the inherent characteristics of a building rather than mechanical systems to capture heat and light from the sun.*

Photovoltaics

The use of semiconductor technology to generate electricity directly from the sunlight.*

Pollution

Generally, the presence in the environment of a substance that, because of its chemical composition or quantity, prevents the functioning of natural processes and produces undesirable environmental and health effects; can be seen as the human-induced alteration of the physical, biological, chemical and radiological integrity of water and other media.*

Glossary

PPB

Parts per Billion.

PPM

Parts per Million.

Post-Consumer Recycled Content

A product composition that contains some percentage of material diverted from the product user's waste stream.

Post-Industrial Recycled Content

A product composition that contains some percentage of manufacturing waste material that has been reclaimed from a process generating the same or a similar product. This includes returns of material from the distribution chain, but excludes re-utilisation of materials such as re-work, re-grind or scrap generated in a process and capable of being reclaimed within the same process that generated it.*

Potable Water

Water that is drinkable i.e. safe to be consumed.

Precautionary Principle

The decision-making principle that advises that, in face of uncertainty, the best course of action is to assume that a potential problem is real and should be addressed.*

Predicted Mean Vote (PMV)

PMV is an index that predicts the mean value of the votes of a large group of persons on the 7-point thermal sensation scale, from +3 (hot) to -3 (cold), based on the heat balance of the human body. Thermal balance is obtained when the internal heat production in the body is equal to the loss of heat to the environment. In a moderate environment, the human thermoregulatory system will automatically attempt to modify skin temperature and sweat secretion to maintain heat balance. A PMV of -1 to +1 corresponds to a Predicted Percent Dissatisfied (PPD) of no more than 25% (i.e. 25% of people are dissatisfied or uncomfortable). A PMV of -0.5 to +0.5 corresponds to a PPD of 10%. A PMV of zero would still mean 5% of occupants are dissatisfied or uncomfortable.

Predicted Percent Dissatisfied (PPD)

PPD is an index that establishes a quantitative prediction of the percentage of thermally dissatisfied people who feel too cool or too warm. For the purposes of the international standard (ISO 7730) quoted in the Technical Manual, thermally dissatisfied people are those who will vote hot, warm, cool or cold on the 7-point thermal sensation scale (PMV).

Primary function

The function accounting for over 50% of the GFA.

Project/Contract Value

see 'Contract Value'.

Psychrometric Chart

A chart showing the air's dry and wet bulb temperatures, humidity, moisture content and enthalpy. It is used by mechanical engineers to illustrate the condition (temperature, humidity and enthalpy) of air at each point of the air conditioning process. This information assists with sizing air conditioning equipment to maintain comfortable internal air temperatures and relative humidity.

Glossary

PVC

Polyvinyl chloride. A form of plastic that is used typically in buildings for electrical tubing, electrical insulation around wires and piping for plumbing installations. It is also sometimes used in carpets and other building materials.

Reclamation

Restoration of materials found in the waste stream to a beneficial use that may be other than the original use.*

Recyclable

Commonly referred to as the ability of a product or material to be recovered from, or otherwise diverted from, the solid waste stream for the purposes of recycling.*

Recycled Content

Materials that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer) or after consumer use (post-consumer). Pre-consumer material does not include materials normally reused by industry within the original manufacturing process, and is also termed 'post-industrial'.*

Recycling

A process by which materials that would otherwise become waste are collected, separated or processed and returned to the economic mainstream to be reused in the form of raw materials or finished goods. Horizontal Recycling – A recycling system that turns a majority of the original product back into a similar product as the original. Downcycling – a term coined to disparagingly describe creation of a product of lesser intrinsic value manufactured from a material at the end of its service life that had higher initial end use value. Upcycling – a subjective term used to describe the creation of a product with higher intrinsic value, manufactured from a material at the end of its useful life, which had a lower initial end use value.*

Refurbishment

The upgrading of either (or both) a building's fabric and services with the aim of enhancing its ability to attract tenants, improve rental growth and maximise market value. Refurbishment (Full) – Where a building, or portion of a building, is vacated and withdrawn from stock for refurbishment, including replacement of plant and services. Refurbishment (Partial) – Where a building or portion of a building is vacated and withdrawn from stock for refurbishment, which normally is restricted to cosmetic improvements.

Relative Humidity (RH)

Ratio of the amount of water vapour in air at a specific temperature to the maximum capacity of the air to hold moisture at that temperature.

Remediation

Efforts to counteract some or all of the effects of pollution after it has been released into an environment.*

Renewable Energy

An energy source that, from an earth perspective, is continually replenished.*

Renewable Resources

Resources that can be replenished at a rate equal to or greater than its rate of depletion (i.e. solar, wind, geothermal and biomass resources).*

Glossary

Riparian Buffer Zone (RBZ)

Describe lands adjacent to streams where vegetation is strongly influenced by the presence of water.

SABS

See South African Bureau of Standards

SANS

See South African National Standard

SAPOA

see South African Property Owners Association

Shared Building Infrastructure

Infrastructure shared by two or more buildings, including, but not limited to: waste services, delivery yards, toilet facilities and car parks.

Shell and Core

A shell and core installation includes finishes and fitout to common areas only with services capped off within the riser at each floor and tenant areas left as a structural shell.

Sick Building Syndrome (SBS)

(1) A human health condition in which infections linger, caused by exposure to contaminants within a building as a result of poor ventilation; (2) Building whose occupants experience acute health and/or comfort effects that appear to be linked to time spent therein, but where no specific illness or cause can be identified. Complaints may be localised in a particular room or zone, or may spread throughout the building and may abate on leaving the building.*

Solar Reflectance Index (SRI)

A value that incorporates both solar reflectance and emittance in a single value to represent a material's temperature in the sun. SRI quantifies how hot a surface would get relative to standard black and standard white surfaces. It is calculated using equations based on previously measured values of solar reflectance and emittance as laid out in the American Society for Testing and Materials Standard E 1980. It is expressed as a fraction (0.0 to 1.0) or percentage (0% to 100%).

South African Bureau of Standards (SABS)

See <http://www.sabs.co.za>

South African National Standard (SANS)

Standards written by SABS which are normally not mandatory unless referenced by legislation

South African Institute of Architects (SAIA)

See <http://www.saia.org.za>

South African Property Owners Association (SAPOA)

See <http://www.sapoa.org.za>

Source Reduction

As applied to solid waste, reducing the generation of waste in the first place (as opposed to later re-using or recycling waste).*

Specifications

Specifications refer to written documentation that are prepared for and submitted to a contractor, at the tender stage of a project, in order for a contractor to price a building

Glossary

development. Many credits require extracts from specifications to be submitted to show compliance with their Credit Criteria. Circumstances under which alternatives to extracts to specifications are allowed to be submitted in compliance with the Documentation Requirements of a credit, are provided in the section titled 'A guide to the reader of the Technical Manual' section of this Technical Manual.

SRI

See Solar Reflectance Index

Standard Hours of Occupancy

8am to 6pm, Monday to Friday.

Sustainable Development

An approach to progress that meets the needs of the present without compromising the ability of future generations to meet their needs.*

Technical Working Group (TWG)

An advisory panel convened by the GBCSA and designated as the 'Technical Working Group'.

Tender Drawings

Tender drawings are drawings that are prepared for and submitted to a contractor, at the tender stage of a project, in order for a contractor to price a building development. Many credits require tender drawings to be submitted to show compliance with their Credit Criteria. Circumstances under which alternatives to tender drawings are allowed to be submitted in compliance with the Documentation Requirements of a credit, are provided in the 'A guide to the reader of the Technical Manual' section of this Technical Manual.

Tenancy Fitout Guide (TFG)

A detailed guide for the design team responsible for the fitout containing information on the green building features of the base building and recommendations on how to achieve the green building potential of the tenancy.

Test Reference Year (TRY)

A year's worth of recorded hourly weather data which represents a 'typical' year of weather data for that specific location.

Thermal Comfort

A means of describing occupant comfort which takes into account air temperature, radiant temperature, humidity, draught, clothing value and activity rates.

Tri-generation

A form of energy generation where electrical energy is produced on-site (typically via gas) whilst at the same time waste heat is extracted from the equipment to provide energy to other systems (such as mechanical systems).

UA

See Usable Area.

Uniform Design Sky

A modelled design sky with a standard, constant illuminance across the entire hemisphere.

Usable Area (UA)

The floor area capable of exclusive occupation by the tenant (refer SAPOA definition 1st Aug 2005). Consists of the total area of the building enclosed by the Dominant face, adjusted by deducting all Common Areas and Major Vertical Penetrations. No deductions shall be made for columns.

Glossary

VAV systems

Variable Air Volume air conditioning systems.

Ventilation

The process of supplying and removing air in building spaces by natural or mechanical means.

Virgin materials

Previously unprocessed materials. A tree that is cut into lumber to make pallets is an example of a virgin material. Lumber recovered from broken pallets to make new pallets is not a virgin material but a recyclable material (US EPA).

VLT

Visual Light Transmittance, which refers to the amount of visual light a material allows to be transferred through itself.

Volatile Organic Compounds (VOCs)

VOCs are organic compounds that produce vapours readily at room temperature and normal atmospheric pressure.

Waste Management Plan (WMP)

A document which outlines how construction and demolition waste will be collected for recycling and recycled, and how the recycling of that waste will be recorded.

WC

Water Closet (i.e. toilet).

WHB

Wash Hand Basin.

Work Setting

A table or workstation with a chair. Tables which have more than one chair provided are considered to be equivalent to one work setting for each two chairs provided.

Xeriscape Garden

A water-conserving garden or garden requiring no additional watering. For Green Star SA purposes, it is acceptable to irrigate a xeriscape garden during the first year, but once established the garden must not be irrigated.

* Definitions taken from 'Glossary: Green Glossary for High Performance Green Buildings' (2004), produced in partnership by Antron and IFMA (International Facility Management Association).

A guide to the reader of the Technical Manual

AIM OF CREDIT

Asserts which environmental issue this component of the rating tool is targeting, what the guiding principles behind it are, and what the desired environmental outcomes are.

CREDIT CRITERIA

Explains clearly how the Aim of Credit section is to be met. Where the Aim of Credit is the guiding principle, Credit Criteria outlines measures that must be undertaken within a project to achieve it. It is important to read this section carefully as every project must meet the criteria outlined in this section for the credit to be awarded.

DOCUMENTATION REQUIREMENTS

Describes the requirements that a project needs to meet for its submission to be successful when assessed by the Assessors. Assessors will not ask for documentation that is not listed in the Documentation Requirements.

Please note that the Assessors are not in a position to make assumptions on the design, but must make a decision based on evidence provided. All documentation must therefore be provided to the letter of the Technical Manual.

ADDITIONAL GUIDANCE

This section contains additional information which is applicable to some projects. Where applicable, all information in Additional Guidance is mandatory. The Assessors reserve the right to determine whether or not the project needs to meet the requirements of this section.

BACKGROUND

Explains why the issue in this component of the rating tool is important, with relevant information and statistics; it also explains how the issue is pertinent to the type of project addressed by the tool.

REFERENCES & FURTHER INFORMATION

All credits within the GBCSA rating tools are based on science and research; some of this research is provided as reference material in this section. The GBCSA recommends reading more about the issues in the credits; several interesting suggestions for further reading are provided in this section.

Carbon Introduction

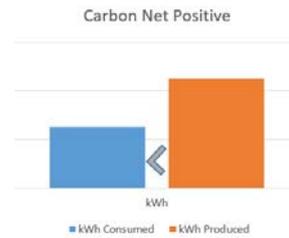
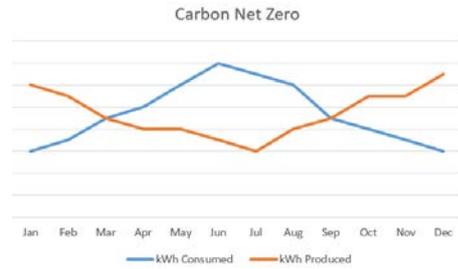
CARBON

Currently producing 1/3 of the worlds CO2, the built environment needs to be at the forefront of attempting to drastically reduce the amount of CO2 generated.



A Net Zero/Net Positive - Carbon building is defined as:

“A building that is highly energy-efficient, and the remaining energy use is from renewable energy, preferably on-site but also off-site where absolutely necessary, so that there are zero net carbon emissions on an annual basis (Net Zero), or if the energy from renewable energy results in more energy being produced than what is used on site (Net Positive)”.



Greenhouse gas emission factor data

The ultimate goal of this credit is to reduce the amount of greenhouse gasses produced through the use of energy. To this end the collected energy usage data is converted to their respective CO2 emissions for the final comparison.

The following table provides the kg CO₂ / kWh figures used in the calculator.

Table 6 CO2 emission of energy sources

Energy sources	kg CO ₂ / kWh
Mains Electricity	1.2
Diesel	0.267
LPG	0.227
Natural Gas	0.202
Coal	0.354
Biogas	0.025
Town Gas (coal)	0.160

Renewable energy sources (excluding biomass) will be regarded as completely emission free for the purposes of this credit.

Carbon Introduction

LEVELS

There are 5 Levels for which the standard has been created, of which the Technical Manual spells out the details for Level 1 and 2, but not for 3-5 for which the GBCSA believe the industry is not ready for yet. As and when GBCSA receives substantiated applications for Level 3-5 GBCSA will develop criteria and documentation requirements for these levels.

Level 1 : Building Emissions

Level 2 : Base Building Emissions + Building Occupant Emissions

Level 3 : Embodied Emissions

Emissions associated with:

Extraction and processing of raw materials

Manufacturing of materials and equipment for use in the building

Transport of materials and equipment to the site

Construction and installation of the building structure, systems and equipment

For informational purposes only, this level is not yet available for certification.

Level 4 : Renovation Emissions

Emissions associated with substantial changes to the building, usually involving the use of external energy-using equipment and building professionals

For informational purposes only, this level is not yet available for certification.

Level 5 – Deconstruction Emissions

Emissions from demolishing the building, transport during this process, and those resulting from re-use, recycling and final disposal of waste material

For informational purposes only, this level is not yet available for certification.

ELIGIBILITY & FUNDAMENTALS

1. New Build or Major Refurbishment projects at Design or As Built stage can pursue and achieve a modelled certification:

Certification Available	GBCSA reason for allowing this
Level 1 Net Zero Carbon certification (Modelled)	<p>In a simulated model it is possible to use the Design / As Built Specifications to separate between base building and occupant (plug load) items, and thus one is able to model only for Level 1 (base building).</p> <p>Net Positive certification is not made available where occupant emissions are not known, because GBCSA will not award a certification using notional values for occupant emissions, but require the actual specifications and thus predicted occupant emissions from the occupant (as per Level 2 below).</p>

Carbon Introduction

<p>Level 2 Net Zero / Net Positive Carbon certifications (Modelled)</p>	<p>In the same way as described above, one can use the integrated fitout Design / As Built specifications which the occupant has decided on, when these are available, and include these in the model, and therefore do the simulation including the actual predicted occupant emissions.</p>
<p>For both Level 1 & 2 modelled certifications can only be awarded using Design or As Built documentation within 2 years from the practical completion of the project, where the certification must be awarded to the project within 2 years of practical completion, in line with Green Star New Build requirements.</p>	
<p>Modelled certification can be pursued by tenants, buildings and precincts. Where the project boundary is not clear, this must be resolved by the project before or within one month of full registration with the GBCSA. Projects must submit with their submission a clear indication of the project boundary, to illustrate the extent to which the certification applies. In mixed use buildings portions of a building can be certified in this category, only if there is a distinct entrance to the portion being certified, and where all energy related carbon emissions have been apportioned to the portion being certified – this must be clarified and motivated to the GBCSA for approval in the same ‘project boundary’ eligibility ruling request.</p>	
<p>To achieve a Net Positive Carbon certification requires at least a 5% or greater proportion of renewables, which must be fed into the neighbourhood or precinct electrical grid to be eligible for Net Positive Carbon certification.</p>	
<p>There are no ecology related conditional requirements, unless the project is also targeting one of the Green Star tools where this does apply.</p>	
<p>All projects must submit with their submission:</p> <ul style="list-style-type: none"> • A Signed Net Zero AP Declaration • Completed Pre-submission checklist • Overview of the project and project boundary defined in the general section 	
<p>Net Zero & Net Positive certifications awarded by the GBCSA are valid for 3 years from the date of certification. The GBCSA reserves the right to withdraw a certification, if there is clear evidence the GBCSA is given that shows the project not to be complying with the commitments made for the 3 year duration of the certification validity period.</p>	

2. Existing buildings / tenants / precincts in operation can only pursue and achieve (Measured):

<p>Certification Available</p>	<p>GBCSA reason for allowing this</p>
<p>Level 2 Net Zero / Net Positive Carbon certification (Measured)</p>	<p>In an operational context it is in most case quite difficult to separate out the energy consumption between base building and occupant operations because metering has not always been set up in this way. Further to this, at this stage, all emissions related to the base building and occupant behaviour are real, and therefore must be included.</p>

Carbon Introduction

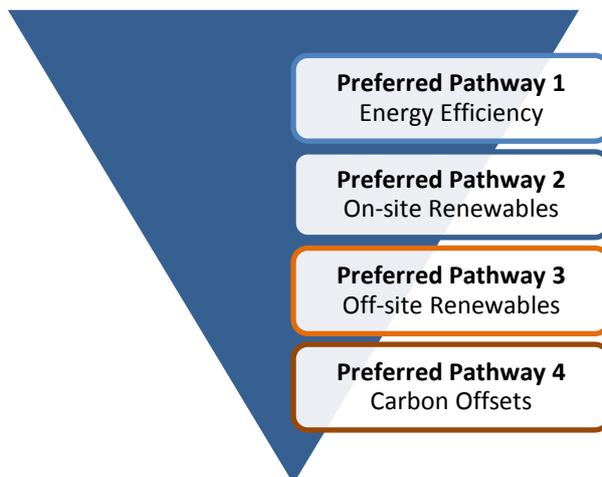
12 consecutive months of operational consumption data is required to be eligible for this rating.
Operational certification can be pursued by tenants, buildings and precincts. Where the project boundary is not clear, this must be resolved by the project before or within one month of full registration with the GBCSA. Projects must submit with their submission a clear indication of the project boundary, to illustrate the extent to which the certification applies. In mixed use buildings portions of a building can be certified in this category, only if there is a distinct entrance to the portion being certified, and where all energy related carbon emissions have been apportioned to the portion being certified – this must be clarified and motivated to the GBCSA for approval in the same ‘project boundary’ eligibility ruling request.
To achieve a Net Positive Carbon certification requires at least a 5% or greater proportion of renewables, which must be fed into the neighbourhood or precinct electrical grid to be eligible for Net Positive Carbon.
There are no ecology related conditional requirements.
All projects must submit with their submission: <ul style="list-style-type: none"> • A Signed Net Zero AP Declaration • Completed Pre-submission checklist • Overview of the project and project boundary defined in the general section
Net Zero & Net Positive certifications awarded by the GBCSA are valid for 3 years from the date of certification. The GBCSA reserves the right to withdraw a certification, if there is clear evidence the GBCSA is given that shows the project not to be complying with the commitments made for the 3 year duration of the certification validity period.

PATHWAYS OF ACHIEVEMENT

In line with international best practice, the GBCSA considers best practice for achieving a Net Zero or Net Positive Carbon status to be done according to a pathway that starts with on-site energy efficiency, after this considering on-site renewables, and only after this considering off-site renewables or carbon offsets. One would not want to have a highly energy inefficient site that achieves a Net Zero / Net Positive rating, as it demonstrates that very little has been done to deal with the on-site in-efficiency.

The GBCSA has illustrated this principle in the following way, to illustrate the preferred pathway to Net Zero / Net Positive:

Carbon Introduction



Pathways 3 & 4 will only be available to projects once the project team have demonstrated that they have met 75% of the *Onsite Energy Checklist* measures as detailed below.

Pathway 3 - Off-Site Renewables can be any off-site renewable system in the particular country that certification is being targeted, owned or contracted with by the project owner that is targeting Net Zero / Net Positive certification.

Pathway 4 - Carbon Offsets have been defined by GBCSA as those carbon emissions traded through well established, trusted voluntary carbon trading schemes that include rigorous audits and certification processes. The GBCSA has approved the following schemes to date (refer to the GBCSA’s TC/CIR online portal for any updates to this):

- Credible Carbon
- Gold Standard
- Climate, Community and Biodiversity Standard (CCBS)
- Verified Carbon Standard (VCS)
- ImpactChoice

On-site Energy Checklist

For Net Zero or Net Positive Carbon buildings to be eligible to use Pathways 3 & 4, the project must be able to tick Yes to 75% of the measures listed below.

1. Does your project have wall insulation greater than the SANS 10400-XA Energy usage and SANS 204 Energy efficiency in buildings.	Y / N
2. Does your project have roof insulation greater than the SANS 10400-XA Energy usage and SANS 204 Energy efficiency in buildings.	Y / N
3. Does your project have double glazing?	Y / N
4. Does your project have a shading co-efficient of 0.3?	Y / N
5. Does your project have exclusively LED internal lighting?	Y / N
6. Does your project have exclusively LED external lighting?	Y / N
7. Does your project have any of the below lighting controls for more than 50% of the GLA:	Y / N

Carbon Introduction

- PIR sensors? - Daylight sensors?	
8. Does your project HVAC system have a COP > 3 (or is it naturally ventilated with natural cooling)	Y/N
9. Does your project have heat reclaim?	Y/N
10. Does your project have any other type of HVAC energy efficient system? If so state what this is.	Y/N
11. For Retail projects (only) Does your project refrigeration system have a COP > 3?	Y/N/ NA
12. Does your project have non-resistive electric water heating for 50% or more of the domestic hot water?	Y/N
13. Does your project have > 50% of the equipment/appliances installed as energy efficient (for example Energy Star and A+ rated)?	Y/N
14. Does your project have energy sub-meters?	Y/N
15. Does your project have a BMS or other smart monitoring and control system?	Y/N
16. Does your project roof have a high Solar Reflectance Index (>75) for over 50% of roof?	Y/N
17. Does your project having shading (internal or external) to all the windows?	Y/N
18. Does your project have a roof garden?	Y/N
19. Does your project have onsite renewable energy technologies? If so what is it? And how many kW?	Y/N
20. Does your project have educational/awareness material targeting the User?	Y/N

Carbon: Level 1 – Base Building Emissions

AIM OF CREDIT

The Net Zero Carbon - Level 1: Base Building Emissions certification rewards projects that demonstrate annual net zero energy related emissions from the base building services when modelled over a period of 12 consecutive months.

CRITERIA

The Level 1 – Base Building Emissions addresses fixed building services from the base building (i.e. non-Tenant/Occupant) and excludes occupant energy uses.

Base building emissions are those from fixed building services:

- Heating
- Cooling
- Ventilation
- Fixed Lighting (non-Tenant)
- Miscellaneous fans & pumps
- Hot water
- Vertical Transportation

Net Zero Carbon - Level 1: Base Building Emissions is achieved when the “Base Building Carbon Emissions (actual building)” in the relevant rating tool energy calculator value is **0kgCO₂/m²/year**. Where the carbon emissions from the building are equal or less than the onsite renewable energy carbon emissions reductions, the project does not need to run the notional building model, the project only needs to model the actual building model.

Net Positive Carbon - Level 1: Base Building Emissions – This is **not applicable** for Level 1, because being Net Positive should also include occupant-generated emissions.

METHODOLOGY

Pathways 1 & 2

For a tenant targeting a Net Zero only for their tenanted space, and for precincts, projects are to propose the modelling methodology that is closely aligned with the Green Star modelling protocol methodology, via an eligibility ruling prior to registration or within one month of registration.

For buildings the proposed methodology is to undertake the calculations as per the relevant Green Star Energy Modelling Protocol. This is demonstrated as the “Base Building Carbon Emissions (actual building)” in the Green Star rating tool – as per the image below:

Carbon: Level 1 – Base Building Emissions

Green Star SA - Office Design v1.1		Points Achieved:		-	
Energy Calculator					
Overall Generation Efficiency	100.0%				
Type of fuel used	mains electricity	1.20			
Amount of fuel used (caloric value in kWh)	0		0.00	0.00	
TOTALS					
Energy usage (notional building)			0.0	kWh/m ² /year	
Energy usage (actual building)			0.0	kWh/m ² /year	
Carbon emissions (notional building)			0.0	kgCO ₂ /m ² /year	
Carbon emissions (actual building)			0.0	kgCO ₂ /m ² /year	
Base Building Carbon emissions (notional building)			0.0	kgCO ₂ /m ² /year	
Base Building Carbon emissions (actual building)			0.0	kgCO ₂ /m ² /year	Net Zero – Level 1
PERCENTAGE IMPROVEMENT OVER NOTIONAL BUILDING			0%		
Energy Calculator Results (Compliance Route 1 only):				-	

EDGE Tool – For EDGE users this will be using the EDGE calculator which will include an indication of pathway 1, 2, 3 and 4 built into the EDGE App.

Pathway 3 & 4

To be eligible to pursue Pathway 3 & 4, the project must be able to tick Yes to 75% of the measures listed in the On-site Energy Checklist.

DOCUMENTATION REQUIREMENTS

Modelled (Carbon Level 1)	Measured (Carbon Level 1)
Design (New Build or Major Refurbishment) <ul style="list-style-type: none"> Net Zero Short Report Net Zero AP Certificate Energy modelling report Copy of the completed Green Star Energy Calculator Extract(s) from the specifications Tender drawings Additionally for naturally ventilated spaces: <ul style="list-style-type: none"> Natural Ventilation Report Additionally for Pathway 3 & 4: <ul style="list-style-type: none"> Short Report additional section(s) 	Not Available

Carbon: Level 1 – Base Building Emissions

<ul style="list-style-type: none"> • Proof (e.g. As Built Drawings and calculations of carbon emissions savings) of contribution from off-site renewable source(s) • Proof (e.g. Certificate) of contribution from offset scheme or letter of commitment from the client 	
<p>As Built (New Build or Major Refurbishment)</p>	
<ul style="list-style-type: none"> • Net Zero Short Report • Net Zero AP Certificate • Energy modelling report • Copy of the completed Green Star SA Energy Calculator • Extract(s) from the Commissioning Report(s) • As built drawings • Extract(s) from Specifications (For Level 2 this must include tenant specifications) <p>Additionally for naturally ventilated spaces:</p> <ul style="list-style-type: none"> • Natural Ventilation Report <p>Additionally for Pathway 3 & 4:</p> <ul style="list-style-type: none"> • Short Report additional section(s) • Proof (e.g. As Built Drawings and calculations of carbon emissions savings) of contribution from off-site renewable source(s) • Proof (e.g. Certificate) of contribution from offset scheme (for the first year) and letter of commitment from the client (for future years within the certification validity period) 	

Net Zero Short Report prepared by a Net Zero AP describing how the Net Zero Credit Criteria have been met by detailing the methodology and calculations.

Net Zero AP Certificate for the person that has been responsible for the Net Zero submission to the GBCSA.

Energy modelling report in accordance with the applicable Green Star Energy Calculator & Modelling Protocol Guide for the relevant rating tool.

- Following the structure defined in the Green Star Energy Calculator & Modelling Protocol Guide; and
- Clearly identifying all assumptions made for tenant and other loads (e.g. occupant density) – for Level 2 this must include actual tenant loads; and
- Clearly identifying all of the design-driven inputs and referencing drawings; and
- Clearly corresponding to the design.
- Whenever assumptions are used, they must be justified and conservative.

Carbon: Level 1 – Base Building Emissions

Copy of the completed Green Star Energy Calculator to show what energy values have been entered for the actual and notional building.

Extract(s) from the specifications demonstrating that all the inputs used in the energy simulation are reflected in the current design. (For Level 2 this must include tenant specifications)

Tender or As Built drawings demonstrating that all applicable building services, façade details and materials are the same as described in the energy modelling report. Either Tender or As Built drawings must be used consistently throughout one submission depending on what stage the project is – projects cannot mix and match using Tender and As Built drawings on one submission.

Natural Ventilation Report prepared by a mechanical engineer that describes how the building has been designed to be naturally ventilated and confirms that analysis has been carried out to check that internal comfort conditions will be acceptable to the occupants. See full requirements in the relevant Green Star Technical Manual ENE-1.

For Pathway 3 + 4

Short report additional sections, not to exceed five pages, prepared by the Net Zero AP, to include:

- Copy of the completed Onsite Energy Checklist
- Photos or specifications of each of the items listed in the Onsite Energy Checklist, to verify that this forms part of the project. Each photo or specification must include a description of where specifically (location) these items exist in the project - for example, a photo of the LED lights used note that these are found in kitchens and bathrooms on floors 3, 6 and 8.
- Description of an off-site renewables or offsets used, including a calculation of how much carbon emissions was required to be offset by these off-site mechanisms

Proof of contribution from off-site renewable source(s) for example As Built Drawings or aerial photographs plus indication of the size of the system in kWh per annum and resultant kgCO₂ saved for the project. A certificate or letter from the owner of this offsite system is required highlighting that the kgCO₂ allocated to this project is not and will not be allocated to any other project as an offset.

Proof of contribution from offset scheme and letter of commitment from the client providing evidence of the purchased kWh or for the difference to be purchased for the 3 years the Net Zero certificate will be valid. This must be in the form of a certificate for the first year at least, and a signed letter of commitment from the project owner committing to purchase carbon offsets for the remainder of the period not covered by the certificate.

ADDITIONAL GUIDANCE

Refer to the 'Carbon Introduction' to important items that refer to all kinds of Net Zero / Net Positive Carbon certifications.

Carbon: Level 2 – Occupant Emissions

AIM OF CREDIT

The Net Zero Carbon - Level 2: Occupant Emissions certification rewards projects that demonstrate annual net zero energy consumption from relevant emissions from the base building services and emissions from user occupants, when modelled or measured over a period of 12 consecutive months.

CRITERIA

The Level 2 - Occupant Emissions addresses both the fixed building services from the base building, as described in Carbon: Level 1, as well as, the operational energy use.

Occupant emissions are those relating to operational energy use by the building occupants and include, but not limited to:

- Electrical appliances
- Tenant lighting
- Plug loads
- Operational and process energy

Net Zero Carbon - Level 2: Occupant Emissions is achieved when the “Carbon Emissions (actual building)” in the Green Star Rating Tool value is **0kgCO₂/m²/year**. Where the carbon emissions from the building are equal or less than the onsite renewable energy carbon emissions reductions, the project does not need to run the notional building model, the project only needs to model the actual building model.

Net Positive Carbon - Level 2: Occupant Emissions is achieved when the “Carbon Emissions (actual building)” in the Green Star Rating Tool value is **5% above zero**. Where the carbon emissions from the building are equal or less than the onsite renewable energy carbon emissions reductions, the project does not need to run the notional building model, the project only needs to model the actual building model.

ADDITIONAL GUIDANCE

Refer to the ‘Carbon Introduction’ to important items that refer to all kinds of Net Zero / Net Positive Carbon certifications.

METHODOLOGY - MODELLED

For modelled projects:

Pathways 1 & 2

For a tenant targeting a Net Zero only for their tenanted space, and for precincts, projects are to propose the modelling methodology that is closely aligned with the Green Star modelling protocol methodology, via an eligibility ruling prior to registration or within one month of registration.

For buildings the proposed methodology is to undertake the calculations as per the relevant Green Star Energy Modelling Protocol, **including** the allowance for the Tenant/occupant which is to be taken from **actual** Tenant specifications and cannot be assumed using notional values.

Carbon: Level 2 – Occupant Emissions

This is demonstrated as the ‘Carbon Emissions (actual building)’ in the Green Star rating tool – as per the image below:

Green Star SA - Office Design v1.1			
Energy Calculator		Points Achieved:	-
Base building on site electricity generation	0		
Overall Generation Efficiency	100.0%		
Type of fuel used	mains electricity	1.20	
Amount of fuel used (calorific value in kWh)	0		0.00 0.00
TOTALS			
Energy usage (notional building)		0.0	kWh/m ² /year
Energy usage (actual building)		0.0	kWh/m ² /year
Carbon emissions (notional building)		0.0	kgCO ₂ /m ² /year
Carbon emissions (actual building)		0.0	kgCO ₂ /m ² /year
Base Building Carbon emissions (notional building)		0.0	kgCO ₂ /m ² /year
Base Building Carbon emissions (actual building)		0.0	kgCO ₂ /m ² /year
PERCENTAGE IMPROVEMENT OVER NOTIONAL BUILDING		0%	
Energy Calculator Results (Compliance Route 1 only):			-

Net Zero – Level 2

For Net Positive Level 2 projects the notional building does not need to be modelled, only the actual building, as long as the energy efficiency of the actual project is at least 50% more efficient (in terms of energy intensity in kWh/m²/annum) than the current SANS 10400 Part XA levels for such a building type, or compared to other current international best practice energy intensity levels where the building type does not have energy intensities defined in SANS 10400 XA.

EDGE Tool – For EDGE users this will be using the EDGE calculator which will include an indication of pathway 1, 2, 3 and 4 built into the EDGE App.

Pathway 3 & 4

To be eligible to pursue Pathway 3 & 4, the project must be able to tick Yes to 75% of the measures listed in the On-site Energy Checklist.

METHODOLOGY - MEASURED

The proposed methodology is to take actual operational metered data for 12 consecutive months using actual meter readings, and subtracting the total on-site renewables, plus offsite renewable and offsets to get to either Net Zero or Net Positive Carbon.

This is illustrated in example below for Net Zero Carbon:

- i) Total actual annual energy consumption related CO₂ emissions: 100'000 kgCO₂
- ii) Total onsite renewable energy production related CO₂: 70'000 kgCO₂
- iii) Total offsite renewable energy production related CO₂: 20'000 kgCO₂
- iv) Total Carbon offset for that year: 10'000 kgCO₂

From the above example items ii), iii) and iv) added together must equal i) for the project to qualify as a Net Zero Carbon project. For the project to achieve Net Positive Carbon, items ii), iii) and iv) added together must be at least 5% greater than i).

Carbon: Level 2 – Occupant Emissions

DOCUMENTATION REQUIREMENTS

Modelled (Carbon Level 2)	Measured (Carbon Level 2)
<p>Design (New Build or Major Refurbishment)</p> <ul style="list-style-type: none"> • Net Zero Short Report • Net Zero AP Certificate • Energy modelling report • Copy of the completed Green Star Energy Calculator • Extract(s) from the specifications including Tenant specifications • Tender drawings <p>Additionally for naturally ventilated spaces:</p> <ul style="list-style-type: none"> • Natural Ventilation Report <p>Additionally for Pathway 3 & 4:</p> <ul style="list-style-type: none"> • Short Report additional section(s) • Proof (e.g. As Built Drawings and calculations of carbon emissions savings) of contribution from off-site renewable source(s) • Proof (e.g. Certificate) of contribution from offset scheme (for the first year) and letter of commitment from the client (for future years within the certification validity period) 	<ul style="list-style-type: none"> • Net Zero Short Report • Net Zero AP Certificate • Annual electricity consumption data • Letter from Facilities Manager <p>Additionally for Pathway 3 & 4:</p> <ul style="list-style-type: none"> • Short Report additional section(s) • Proof (e.g. As Built Drawings and calculations of carbon emissions savings) of contribution from off-site renewable source(s) • Proof (e.g. Certificate) of contribution from offset scheme (for the first year) and letter of commitment from the client (for future years within the certification validity period)
<p>As Built (New Build or Major Refurbishment)</p> <ul style="list-style-type: none"> • Net Zero Short Report • Net Zero AP Certificate • Energy modelling report • Copy of the completed Green Star Energy Calculator • Extract(s) from the Commissioning Report(s) • Extract(s) from the specifications including Tenant specifications • As built drawings 	

Carbon: Level 2 – Occupant Emissions

Additionally for naturally ventilated spaces:

- Natural Ventilation Report

Additionally for Pathway 3 & 4:

- Short Report additional section(s)
- Proof (e.g. As Built Drawings and calculations of carbon emissions savings) of contribution from off-site renewable source(s)
- Proof (e.g. Certificate) of contribution from offset scheme (for the first year) and letter of commitment from the client (for future years within the certification validity period)

Net Zero Short Report prepared by a Net Zero AP describing how the Net Zero Credit Criteria have been met by detailing the methodology and calculations.

Net Zero AP Certificate for the person that has been responsible for the Net Zero submission to the GBCSA.

Energy modelling report in accordance with the applicable Green Star Energy Calculator & Modelling Protocol Guide for the relevant rating tool.

- Following the structure defined in the Green Star Energy Calculator & Modelling Protocol Guide; and
- Clearly identifying all specifications and other loads (e.g. occupant density) – for Level 2 this must include actual tenant loads; and
- Clearly identifying all of the design-driven inputs and referencing drawings; and
- Clearly corresponding to the design.
- Whenever assumptions are used, they must be justified and conservative.

Copy of the completed Green Star Energy Calculator to show what energy values have been entered for the actual and notional building.

Extract(s) from the specifications demonstrating that all the inputs used in the energy simulation are reflected in the current design, including Tenant specifications.

Tender or As Built drawings demonstrating that all applicable building services, façade details and materials are the same as described in the energy modelling report. Either Tender or As Built drawings must be used consistently throughout one submission depending on what stage the project is – projects cannot mix and match using Tender and As Built drawings on one submission.

Natural Ventilation Report prepared by a mechanical engineer that describes how the building has been designed to be naturally ventilated and confirms that analysis has been carried out to check that internal conditions will be acceptable to the occupants. See full report requirements in the Green Star Office v1.1 Technical Manual ENE-1.

For Pathway 3 + 4

Short report additional sections, not to exceed five pages, prepared by the Net Zero AP, to include:

Carbon: Level 2 – Occupant Emissions

- Copy of the completed Onsite Energy Checklist
- Photos or specifications of each of the items listed in the Onsite Energy Checklist, to verify that this forms part of the project. Each photo or specification must include a description of where specifically (location) these items exist in the project - for example, a photo of the LED lights used note that these are found in kitchens and bathrooms on floors 3, 6 and 8.
- Description of an off-site renewables or offsets used, including a calculation of how much carbon emissions was required to be offset by these off-site mechanisms

Proof of contribution from off-site renewable source(s) for example As Built Drawings or aerial photographs plus indication of the size of the system in kWh per annum and resultant kgCO₂ saved for the project. A certificate or letter from the owner of this offsite system is required highlighting that the kgCO₂ allocated to this project is not and will not be allocated to any other project as an offset.

Proof of contribution from offset scheme and letter of commitment from the client providing evidence of the purchased kWh or for the difference to be purchased for the 3 years the Net Zero certificate will be valid. This must be in the form of a certificate for the first year at least, and a signed letter of commitment from the project owner committing to purchase carbon offsets for the remainder of the period not covered by the certificate.

Annual electricity consumption data of 12 months consecutive months of electricity consumption data comprised of utility bills or meter readings signed off by contractor or facilities person responsible for meter readings.

Letter from Facilities Manager confirming that the energy data collected and submitted is an accurate record of all the energy used for the 12 month period for the project, and confirming that the meters are correctly calibrated. This must include all energy uses, whether electricity, gas, diesel, except where these are only for emergency back-up purposes.

ADDITIONAL GUIDANCE

Refer to the 'Carbon Introduction' to important items that refer to all kinds of Net Zero / Net Positive Carbon certifications.

Performance period

Performance period relates to the continuous time period during which a credit is measured or data is collected. For Green Star SA – Existing Building Performance certification, the performance period is the most recent 12-month period of operations preceding the submission for certification.

The end of the performance period data-set should not be older than 3 months at the time of submission. Note: the Energy and Water Data need not be from the exact same period, provided the point above applies.

Metered energy consumption data for the last 12 months of the building's operation.

Energy consumption data for the past 12 months must have been collected in order for the minimum requirement criteria in this credit to be met.

Sources of acceptable data

Energy consumption data collected for the building must be verifiable with sources such as Municipal or Eskom accounts for correctness. Alternatively, signed verification from a utility metering contractor (outsourced or in-house) may be presented.

Carbon: Level 2 – Occupant Emissions

Collected energy data must cover the energy use associated with the whole building, including source information (e.g. Municipal, Solar, Diesel Generators etc.) Buildings producing their own energy on site must indicate the alternative/renewable energy component separately from the traditional energy sources.

If there are any missing accounts or data points, the missing data point may be interpolated for completeness by using the average of the actual information available. A maximum of 3 months in the 12 month period may be interpolated.

Energy use must include all building energy consumption; this could include but not be limited to:

- All common areas,
- Air-conditioning and plant
- Vertical Transport
- Tenant sub-metered areas
- External lighting

Municipal/Eskom Accounts

Data from utility accounts (as opposed to metered data) will only be accepted if no more than 3 months of data in the 12 month period is estimated.

REFERENCES

Credible Carbon

<https://www.crediblecarbon.com/>

Climate, Community and Biodiversity Standard (CCBS)

<http://www.climate-standards.org/>

Gold Standard (GS)

<https://www.goldstandard.org/>

Verified Carbon Standard (VCS)

<https://verra.org/>

ImpactChoice

http://www.thecarbonreport.co.za/main_logo/

South Africa National Standards. SANS 10400-XA:2011, The application of the National Building Regulations, Part X: Environmental sustainability, Part XA: Energy usage in buildings. Pretoria: SABS Standards Division, 2011.

- SANS 204:2011 Energy efficiency in buildings.
- SANS 50001:2011 Energy management systems - requirements with guidance for use.
- SANS 50010:2011 Measurement and verification of energy savings.

ENERGY STAR benchmarking tools

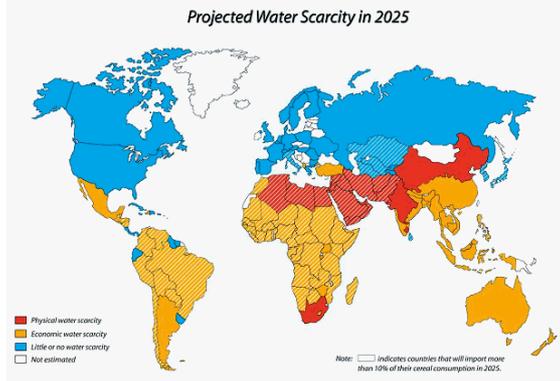
<http://www.energystar.gov/>

Carbon: Level 2 – Occupant Emissions

Water Introduction

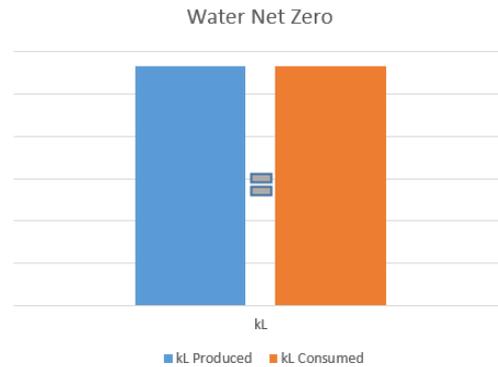
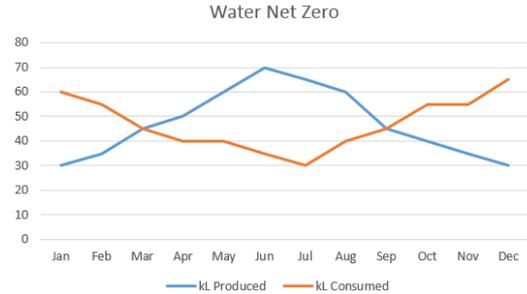
WATER

Global water consumption has risen almost ten-fold since 1900, and many parts of the world are now reaching the limits of their supply.



A Net Zero/Net Positive - Water building can be defined as:
“A building that is designed, constructed and operated to greatly reduce total water consumption, and then use harvested, recycled and reused water such that the amounts of water consumed is the same as the amounts of water that is produced (Net Zero), or if the water recycled/ produced is greater than the water consumed (Net Positive).”

All water produced by the project must be reused.



Water Introduction

LEVELS

There are 5 Levels for which the standard has been created, of which the Technical Manual spells out the details for Level 1 and 2, but not for 3-5 for which the GBCSA believe the industry is not ready for yet. As and when GBCSA receives substantiated applications for Level 3-5 GBCSA will develop criteria and documentation requirements for these levels.

Level 1 : Base Building Consumption

Not Applicable for Net Zero Water Level 1, because it is not clear and consistent which water systems are base building systems and which are tenant systems.

Level 2 : Base Building Consumption + Building Occupant Consumption

Unregulated consumption related to water used by the building occupants during operation - including all water appliances.

Level 3 : Embodied Consumption

Water consumption associated with:

Extraction and processing of raw materials

Manufacturing of materials and equipment for use in the building

Transport of materials and equipment to the site

Construction and installation of the building structure, systems and equipment.

For informational purposes only, this level is not yet available.

Level 4 : Renovation Consumption

Water consumption associated with substantial changes to the building, usually involving the use of external energy-using equipment and building professionals.

For informational purposes only, this level is not yet available.

Level 5 – Deconstruction Consumption

Water consumption from demolishing the building, transport during this process, and those resulting from re-use, recycling and final disposal of waste material.

For informational purposes only, this level is not yet available.

ELIGIBILITY & FUNDAMENTALS

- New Build or Major Refurbishment projects at Design or As Built stage can pursue and achieve a modelled certification:**

Certification Available	GBCSA reason for allowing this
Not available: Level 1 Net Zero / Net Positive Water certification (modelled)	Not Applicable for Net Zero Water Level 1, because it is not clear and consistent which water systems are base building systems and which are tenant systems.
Level 2 Net Zero / Net Positive Water certifications (modelled)	It is possible to model the overall building and occupant water consumption.
Level 2 modelled certifications can only be awarded using Design or As Built documentation within 2 years from the practical completion of the project, where the	

Water Introduction

<p>certification must be awarded to the project within 2 years of practical completion, in line with Green Star New Build requirements.</p>
<p>Modelled certification can be pursued by tenants, buildings and precincts. Where the project boundary is not clear, this must be resolved by the project before or within one month of full registration with the GBCSA. Projects must submit with their submission a clear indication of the project boundary, to illustrate the extent to which the certification applies. In mixed use buildings portions of a building can be certified in this category, only if there is a distinct entrance to the portion being certified, and where all energy related carbon emissions have been apportioned to the portion being certified – this must be clarified and motivated to the GBCSA for approval in the same ‘project boundary’ eligibility ruling request.</p>
<p>To achieve a Net Positive Water certification requires at least a 5% or greater proportion of on-site water capture & re-use, which must be fed into the neighbourhood or precinct water grid for reuse to be eligible for Net Positive Water certification.</p>
<p>There are no ecology related conditional requirements, unless the project is also targeting one of the Green Star tools where this does apply.</p>
<p>All projects must submit with their submission:</p> <ul style="list-style-type: none"> • A Signed Net Zero AP Declaration • Completed Pre-submission checklist • Overview of the project and project boundary defined in the general section
<p>Net Zero & Net Positive certifications awarded by the GBCSA are valid for 3 years from the date of certification. The GBCSA reserves the right to withdraw a certification, if there is clear evidence the GBCSA is given that shows the project not to be complying with the commitments made for the 3 year duration of the certification validity period.</p>

2. Existing buildings / tenants / precincts in operation can only pursue and achieve:

Certification Available	GBCSA reason for allowing this
<p>Level 2 Net Zero / Net Positive certification (Measured)</p>	<p>In an operational context it is in most cases quite difficult to separate out the water consumption between base building and occupant operations because metering has not always been set up in this way. Further to this, at this stage, all water consumption related to the base building and occupant behaviour are real, and therefore must be included.</p>
<p>12 consecutive months of operational consumption data is required to be eligible for this rating.</p>	
<p>Operational certification can be pursued by tenants, buildings and precincts. Where the project boundary is not clear, this must be resolved by the project before or within one month of full registration with the GBCSA. Projects must submit with their submission a clear indication of the project boundary, to illustrate the extent to which the certification applies. In mixed use buildings portions of a building can be certified in this category, only if there is a distinct entrance to the portion being certified, and where all energy related carbon emissions have been apportioned to the portion being certified – this must be clarified</p>	

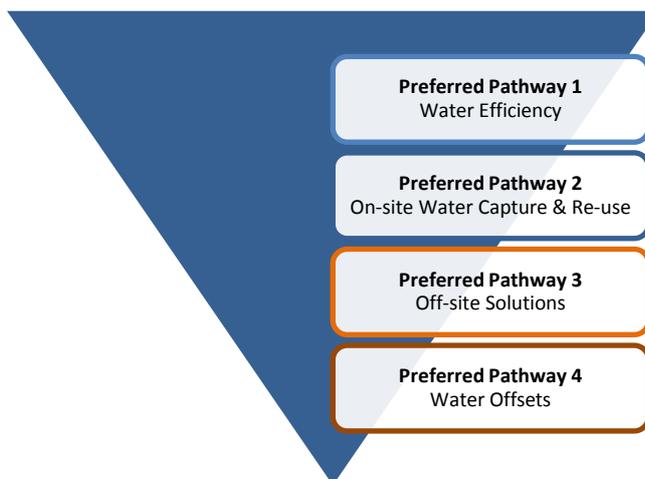
Water Introduction

and motivated to the GBCSA for approval in the same 'project boundary' eligibility ruling request.
To achieve a Net Positive Water certification requires at least a 5% or greater proportion of on-site water capture & re-use, which must be fed into the neighbourhood or precinct water grid to be eligible for Net Positive Water certification.
There are no ecology related conditional requirements.
All projects must submit with their submission: <ul style="list-style-type: none"> • A Signed Net Zero AP Declaration • Completed Pre-submission checklist • Overview of the project and project boundary defined in the general section
Net Zero & Net Positive certifications awarded by the GBCSA are valid for 3 years from the date of certification. The GBCSA reserves the right to withdraw a certification, if there is clear evidence the GBCSA is given that shows the project not to be complying with the commitments made for the 3 year duration of the certification validity period.

PATHWAYS OF ACHIEVEMENT

In line with international best practice, the GBCSA considers best practice for achieving a Net Zero or Net Positive Water status to be done according to a pathway that starts with on-site water efficiency, after this considering on-site water capture and re-use, and only after this considering off-site water capture and re-use systems or water offsets. One would not want to have a highly water in-efficient site that achieves a Net Zero / Net Positive rating, as it demonstrates that very little has been done to deal with the on-site in-efficiency.

The GBCSA has illustrated this principle in the following way, to illustrate the preferred pathway to Net Zero / Net Positive:



Pathways 3 & 4 will only be available to projects once the project team have demonstrated that they have met 75% of the *Onsite Water Checklist* measures as detailed below.

Water Introduction

Pathway 3 - Off-Site Solutions can be any off-site water capture and re-use system in the particular country that certification is being targeted, owned or contracted with by the project owner that is targeting Net Zero / Net Positive certification.

Pathway 4 - Water Offsets the GBCSA has not come across any such schemes, and projects are thus required to motivate through a technical clarification for the GBCSA to review and approve a water offset scheme a project wishes to use.

On-site Water Checklist

For Net Zero or Net Positive Water buildings to be eligible to use Pathways 3 & 4, the project must be able to tick Yes to 75% of the measures listed below.

1. Does your project have all tap fittings with 6l/min flow rates or less? (either the fitting itself or flow restrictor)	Y / N
2. Does your project have all shower fittings with 8l/min flow rates or less? (either the fitting itself or flow restrictor)	Y / N
3. Does your project have all WCs with 3/6 litre flush systems?	Y / N
4. Does your project have all urinals with flush capacities of less than 1l per urinal?	Y / N
5. Does your project have PIR or timer controls on all tap fittings?	Y / N
6. Does your project have drip irrigation (only applicable to projects with landscaping or gardens)?	Y / N / NA
7. Does your project have water efficient appliances, where applicable?	Y / N
8. Does your project have an Air cooled AC System? (or cooling tower with using non-potable water)	Y / N
9. Does your project have educational/awareness material targeting the User?	Y / N
10. Does your project have water sub-meters?	Y / N
11. Does your project have a BMS or other smart monitoring and control system or leak detection system for the projects water usage?	Y / N
12. Does your site have onsite rainwater harvesting? How many litres?	Y / N
13. Does your site have onsite greywater system? How many litres?	Y / N

Water: Level 2 – Occupant Consumption

AIM OF CREDIT

The Net Zero Water - Level 2: Occupant Consumption certification rewards projects that demonstrate annual net zero water consumption from the consumption related to water used by the building occupants – including all water appliances, i.e. Base Building Consumption + Occupant Consumption

CRITERIA

Modelled – for New Build, Major Refurbishments & New systems in Existing Buildings

Net Zero Water - Level 2: Occupant Consumption is achieved when the 'Net Potable (Mains) Water Consumption' in the Green Star Rating Tool value is **0L/day/m²**.

Net Positive Water - Level 2: Occupant Consumption is achieved when the 'Net Potable (Mains) Water Consumption' in the Green Star Rating Tool value is **5% above zero**.

Measured – for Existing Buildings in operation

Net Zero Water - Level 2: Occupant Consumption is achieved when the actual metered water consumption data demonstrates that the project consumes as much potable water from the municipality as it produces on site from water capture and re-use.

Net Positive Water - Level 2: Occupant Consumption is achieved when the actual metered water consumption data demonstrates that the project captures and re-uses at least 5% more water compared to the use of potable water from the municipality.

For projects that wish to be rewarded for the use of basement seepage water in a Net Zero / Net Positive project targeting a modelled or measured rating:

1. The project must undertake 75% of the viable aspects of water efficiency AND on-site water solutions *before* they are able to use basement seepage water as an option. Projects are to answer *Yes* to 75% of the Onsite Water Checklist in the Water Introduction section of this Technical Manual; or give a detailed explanation of why an element is not viable for their project.
2. Demonstrate through meter readings or pump capacities that the basement seepage volumes being extracted as part of the Net Zero / Net Positive certification are equal to or less than what they were prior to targeting Net Zero / Net Positive certification. (GBCSA will not reward projects Net Zero / Net Positive certification where they extract more water than was being previously expelled to storm water)
3. Install water meters to the basement seepage water connected to BMS or other monitoring/management system.
4. Develop and commit to a Seepage Water Management Plan

Water: Level 2 – Occupant Consumption

METHODOLOGY - MODELLED

Pathways 1 & 2

The proposed methodology is to undertake the calculations as per the relevant Green Star New Build credit WAT-1 Modelling Protocol, **including** the actual number of Tenant occupants which is to be taken from **actual** Tenant documentation (where these match the actual tenant specifications) and cannot be assumed to be the same. Where the tenant specifications are different to the WAT-1 calculator and for Net Positive projects, the project must prepare its own detailed water model.

This is demonstrated as the “Net Potable (Mains) Water Consumption” in the Green Star Rating Tool – as per the image below:

TOTAL REDUCED POTABLE WATER USE		
Predicted Water Consumption from Fixtures	0.00	L/day/m ²
Predicted Recycled/Harvested Water available to Fixtures	0.00	L/day/m ²
NET POTABLE (MAINS) WATER CONSUMPTION	0.00	L/day/m²
POINTS ACHIEVED:	0	

Net Zero – Level 2

Where there is no relevant Green Star tool available, or the project tenant specifications are different to the WAT-1 pre-set components, projects are to prepare their own detailed water model. Where there is on-site capture and re-use of water, this will require storage. Because the storage has a limited volume, projects must undertake a detailed water balance calculation accounting for monthly water use and water capture volumes.

Pathway 3 & 4

To be eligible to pursue Pathway 3, projects must first tick Yes to 75% of the measures listed in the On-site Water Checklist in the Water Introduction section of this Technical Manual.

METHODOLOGY - MEASURED

The proposed methodology is to take actual operational metered data for 12 consecutive months from actual meter readings, and subtracting the total on-site water re-use, plus offsite re-use and offsets to get to either Net Zero or Net Positive Water.

This is illustrated in example below for Net Zero Water:

- i) Total actual annual potable municipal water consumption: 100'000 kL
- ii) Total onsite annual water capture, storage and re-use: 100'000 kL

From the above example items ii) must equal i) for the project to qualify as a Net Zero Water project. For the project to achieve Net Positive Water, items ii) must be at least 5% greater than i).

Where the water meter does not measure the net water volume used on site, calculations are required the meter readings from the municipal water use and meter readings from water capture and reuse and storage systems, that are then used in the calculations (the water model) to demonstrate compliance with the Net Zero / Net Positive requirements.

Water: Level 2 – Occupant Consumption

DOCUMENTATION REQUIREMENTS

Modelled	Measured
<p>Design (New Build or Major Refurbishment)</p> <ul style="list-style-type: none"> • Net Zero Short Report (1) • Net Zero AP Certificate • Extract(s) from the Specifications • Tender schematic hydraulic drawings • Completed Potable Water Calculator <p>If rainwater harvesting or water reuse systems are installed, the following is also required:</p> <ul style="list-style-type: none"> • Evidence of approval from the relevant authority <p>Additionally for Pathway 3 & 4:</p> <p><i>Note: GBCSA approved CIR is required before submitting any documentation for these paths.</i></p> <ul style="list-style-type: none"> • Short Report additional section(s) • Proof (e.g. As Built Drawings and calculations of water savings) of contribution from off-site source(s) • Proof of contribution from GBCSA approved offset (approved via prior CIR) <p>Where Basement Seepage Water is used, the following must be provided:</p> <ul style="list-style-type: none"> • Basement Seepage Water Short Report • As Built drawings (or specifications) • Commitment letter from Client • Seepage Water Management Plan 	<ul style="list-style-type: none"> • Net Zero Short Report (1) • Net Zero AP Certificate • Annual water consumption data • Letter from the Facilities Manager <p>Additionally for Pathways 3 & 4:</p> <p><i>Note: GBCSA approved CIR is required before submitting any documentation for these paths.</i></p> <ul style="list-style-type: none"> • Short Report additional section(s) • Proof (e.g. As Built Drawings and calculations of savings) of contributions from off-site source(s). • Proof of contribution from GBCSA approved offset (approved via prior CIR) <hr/> <p>Basement Seepage Water</p> <ul style="list-style-type: none"> • Basement Seepage Water Short Report • As Built drawings / specifications • Commitment letter from Client • Seepage Water Management Plan
<p>As Built (New Build or Major Refurbishment)</p> <ul style="list-style-type: none"> • Net Zero Short Report (1) • Net Zero AP Certificate 	

Water: Level 2 – Occupant Consumption

- Technical datasheets from the contractor
- Evidence of approval from the relevant authority
- Completed Potable Water Calculator

If rainwater harvesting or water reuse systems are installed, the following is also required:

- As built schematic hydraulic drawings
- Evidence of approval from the relevant authority
- Extract(s) from Commissioning Report

Additionally for Pathways 3 & 4:

Note: GBCSA approved CIR is required before submitting any documentation for these paths.

- Short Report additional section(s)
- Proof (e.g. As Built Drawings and calculations of savings) of contribution from off-site source(s)
- Proof of contribution from GBCSA approved offset (approved via prior CIR)

Where Basement Seepage Water is used, the following must be provided:

- Basement Seepage Water Short Report
- As Built drawings (or specifications)
- Commitment letter from Client
- Seepage Water Management Plan

Net Zero Short Report (1) prepared by a Net Zero AP describing how the Net Zero Credit Criteria have been met by detailing the methodology and calculations, including:

- Descriptions of all the water-efficient features in the building;
- Justifications of the predicted water savings, wherever not solely achieved by fittings/fixtures; and calculations undertaken for the Potable Water Calculator or detailed water balance calculations, including the capacity of all the water reuse, collection and storage systems; and
- Where greywater, blackwater or rainwater systems are to be installed, and the contribution determined by the design team rather than using calculators in the Green Star SA – Office tool, then calculations demonstrating the reduction in potable water

Water: Level 2 – Occupant Consumption

consumption must be submitted by a qualified and experienced consultant who has been involved in the design of such systems.

Net Zero AP Certificate for the person that has been responsible for the Net Zero submission to the GBCSA

MODELLED

Extract(s) from the Specifications listing and describing:

- All hydraulic fixtures and fittings in the project including water usage rates;
- All water reuse systems; and
- All water collection systems with a specific mention of the capacity of the system.

Technical datasheets from the contractor indicating the water usage rates of all fixtures and fittings installed in the building along with confirmation that they were installed.

Tender schematic hydraulic drawings indicating the water usage rates of all fixtures and fittings installed in the building along with confirmation that they were installed.

As built schematic hydraulics drawings showing the location of all water reuse, collection and storage systems.

Extract(s) from Commissioning Report demonstrating that the relevant systems have been commissioned and operate as intended by the design; and referencing the Operations and Maintenance (O&M) Manual, clearly indicating that all the intended hydraulic fixtures and fittings and all water reuse, collection and storage systems have been installed.

Completed Potable Water Calculator from Green Star WAT-1 and per the Water Calculator Modelling Protocol -. Where projects do not use the Water calculator, they are to provide a copy of their water balance calculations showing monthly water demand, capture and storage and re-use.

Evidence of approval from the relevant authority for treated water used to supply drinking water

For Pathway 3 + 4

Short report additional sections, not to exceed five pages, prepared by the Net Zero AP, to include:

- Copy of the completed Onsite Water Checklist
- Photos or specifications of each of the items listed in the Onsite Water Checklist, to verify that this forms part of the project. Each photo or specification must include a description of where specifically (location) these items exist in the project - for example, a photo of the taps used note that these are found in kitchens and bathrooms on floors 3, 6 and 8.
- Description of an off-site water capture and re-use systems or water offsets used, including a calculation of how much water was required to be offset by these off-site mechanisms

Proof of contribution from off-site water source(s) for example As Built Drawings or aerial photographs plus indication of the size of the system in kL per annum and resultant kL saved for the project. A certificate or letter from the owner of this offsite system is required highlighting that the kL allocated to this project is not and will not be allocated to any other project as an offset.

Proof of contribution from GBCSA approved offset (approved via prior CIR) – it is not yet clear what offsite and offset options might be acceptable to the GBCSA and therefore the

Water: Level 2 – Occupant Consumption

project must motivate their proposed solution via a CIR for approval prior to the submission. Only once approved by the GBCSA can the project use the approach in a submission.

MEASURED

Annual water consumption data of 12 months consecutive months of consumption data comprised of utility bills or meter readings signed off by contractor or facilities-related person responsible for meter readings.

Letter from Facilities Manager confirming that the water consumption data collected and submitted is an accurate record of all the water used for the 12 month period for the project, and confirming that the meters are correctly calibrated. This must include all water uses, whether municipal, groundwater, or captured and re-used rain, grey or black water.

BASEMENT SEEPAGE WATER

Basement Seepage Water Short Report including:

- The completed Onsite Water Checklist, detailing which items were achieved, and
- A brief description of system design, including number of pumps, flow rate tank capacities, any water quality treatment, metering strategy, and how the water is incorporated or reuse within the building;
- Rationale and estimation of volume of water to be extracted. This must include a confirmation from a suitably qualified professional that the natural seepage rate is not being exceeded by the project by providing measured data of the natural seepage flow rate
- Details and evidence of seepage water extraction measurements and volumes before the Net Zero project and after, to illustrate equal or less volume after Net Zero has been targeted

Tender drawings (or specifications) detailing:

- Location of pumps;
- Location of the water meter for the basement seepage water;
- Management system – BMS or other management system to which the pumps and meters are linked.

As Built drawings detailing:

- Location of pumps;
- Location of the water meter for the basement seepage water;
- Management system – BMS or other management system to which the pumps and meters are linked.

Commitment letter from client committing to implementation of a Seepage Water Management Plan to be tabled at regularly occurring management meetings, as set out in Additional Guidance.

Seepage Water Management Plan as set out in Additional Guidance.

Water: Level 2 – Occupant Consumption

ADDITIONAL GUIDANCE

Water consumption reduction

To ensure optimum water use efficiency the following aspects can be considered.

1. Analyze water consumption
 - Water account structuring
 - Staff encouragement and possible incentive programme to ensure responsible water use behavior
 - Water leak detection
 - Water meter / sub meter installations
 - Load investigation / record keeping
 - Low pressure regulators
2. Reduce water consumption by installing:
 - Low flow shower heads and taps
 - Low flush or waterless toilets
 - Moisture sensor irrigation
 - Water saving appliances
 - Dual water systems
3. Re-use by installing:
 - Irrigation integration
 - Grey water collection
 - Rain water collection
 - Mechanical water use
 - Fire system water use
4. Recycle by installing
 - Black water recycling
 - Grey water recycling
 - Irrigation water recycling
 - Condensation recovery
 - Non-potable water use
5. Monitor by implementing:
 - Education programmes
 - Water reduction strategies
 - Development of strategies
 - On site specific water balance
 - Assess local authorities

Performance period

Performance period relates to the continuous time period during which a credit is measured or data is collected. For Green Star SA – Existing Building Performance certification, the performance period is the most recent 12-month period of operations preceding the submission for certification.

The end of the performance period data-set should not be older than 3 months at the time of submission. Note: the energy and water data need not be from the exact same period, provided the point above applies.

Metered consumption data for the last 12 months of the building's operation.

Water consumption data for the past 12 months must have been collected in order to demonstrate compliance with the credit criteria. This data will be used to measure against

Water: Level 2 – Occupant Consumption

benchmarks and quantify improvements in water consumption efficiency during the performance period.

Sources of acceptable data

Water consumption data collected for the building must be verifiable with sources such as:

- Municipal accounts, or
- Metering data signed off by independent metering contractor, or
- Metering data signed off by Facilities Manager if monitored in-house

Collected water data must cover the water use associated with the whole building. If there are any missing accounts or data points, the missing data point may be interpolated for completeness, using the average of the known information except when the missing data point is the first one or the last one of a series. A maximum of 3 months in the 12 month period may be interpolated.

Water use must include all building water consumption, including but not be limited to:

- Occupant amenity water (toilets, kitchenettes, etc.)
- Heat rejection water (cooling towers / evaporative cooling)
- Outdoor taps & wash-down areas
- Tenant consumption (e.g. restaurant kitchens etc.)
- Irrigation of landscaping serving the building being certified
- Pools & water features serviced by the building
- Sports field irrigation if the building being certified services the sports field

'Water' refers to potable water servicing the building from municipal sources. Recycled / reused water and rainwater must not be included in the metered water consumption for this credit. Borehole Water used for anything other than irrigation is not considered to be a sustainable water source for the purposes of this credit and as such it must be included in the metered water consumption.

Municipal Accounts

Data from utility accounts (as opposed to metered data) will only be accepted if no more than 3 months of data in the 12 month period is estimated.

Seepage Water Management Plan

The Seepage Water Management Plan should clearly and simply set out the management plan to:

- Document monthly the volume of water collected from basement seepage
- Purpose for which this volume of water is used
- Describe any water quality issues/risks, and what mitigation plans are in place
- Give details of any environmental and health and safety risks associated with the abstraction and use of this water, and what risk mitigation plans are in place
- Highlight any particular usage issues that the building occupants should be aware of related to the seepage water abstraction or use
- Review seepage water performance and issues at monthly (or regularly occurring, at least once a quarter) management meetings

Water Quality at Source

It is the responsibility of the project team to ensure that all standards and legislation is complied with as well as any applicable Water Use Licence Application (WULA) is acquired in the correct time frames.

Innovation Point opportunities for Green Star Projects:

Replenishment / Recharge

Water: Level 2 – Occupant Consumption

The GBCSA believe that replenishment/recharge should be a key consideration for projects that construct into the water table. However at this point there is not enough science and research to detail specifically how this should occur at a building level, besides creating more vegetated and penetrable surfaces that allow water to percolate back underground. Thus, at this point in time there is no requirement for projects to demonstrate replenishment recharge to the water table, but there is an opportunity for projects to target this in Green Star project as Innovation 3 credits.

The GBCSA encourage innovative ways to recharge the water table, and encourage projects to submit these as **Innovation3 Credits**.

Hydrocensus & Water balance

The GBCSA believe that a hydrocensus would be of value when abstracting ground water, to understand the existing ground water abstraction in the neighbourhood and understand the impact of additional abstraction. The GBCSA do not have adequate information to set clear guidance on requirements for this, and can therefore not require projects to undertake this. It is therefore proposed to be rewarded through Green Star Innovation 3 credits. A suggestion for a credit is set out below, to be reviewed and fine-tuned in detail by projects targeting this as an Innovation 3 credit in their submissions:

A suitable qualified professional* can provide:

- Hydrocensus information on how much groundwater will be abstracted from the resource. During a hydrocensus, information on other borehole positions, depth of boreholes, volumes abstracted should be gathered from a suitable neighbourhood surrounding the project site (defined by the suitably qualified professional).
- An initial water balance to calculate whether the specific neighbourhood is suitable groundwater abstraction.
- Hydrocensus surveys and water balance to be undertaken by suitably qualified professional every 3 years.

*Suitably Qualified Professional

An example of a suitably qualified could be an environmental geologist or geo-hydrologist that has 3 years' work experience in undertaking EIAs (including water samples and water testing's), that is a member of the Ground Water Division of GSSA *Geological Society of SA) – projects submitting an innovation credit can motivate why/how a professional is suitably qualified to undertake the work related to this credit.

The GBCSA encourage innovative ways for project to understand the impact on their own and the neighbourhood's ground water abstraction on the water table, and encourage projects to submit these as **Innovation 3 Credits**.

FURTHER INFORMATION

Water is essential for life. In a lot of cases this water is used unconsciously and unnecessarily. In a water scarce country this is going to weight heavy on the future. The saving and conservation of water is therefore essential.

Rainwater, Grey water & Blackwater

Collecting rainwater from roofs and other impervious surfaces can add to the amount of sustainable water available for use in buildings. Retail centres with large roof areas are particularly well suited for rainwater collection.

Grey water can be recovered from sinks and showers, washing machines, cooling towers and other water sources that do not contain food or human waste. This water can be stored for irrigation and toilet flushing but needs to be used within a short period following collection to avoid having extensive treatment requirements. In locations where on-site black water treatment is generally not permitted, projects should consider contacting local authorities to discuss the benefits of on-site water treatment for the project and local infrastructure.

Water: Level 2 – Occupant Consumption

Water Efficiency Labelling Scheme

The South African Government, through the Department of Water Affairs (DWA), is currently working with the South African National Standards to introduce the Water Efficiency Labelling and Standards

(WELS) Scheme that involves the introduction of national mandatory water efficiency labelling and minimum performance standards for domestic water-using devices.

Landscaping Water Efficiency

Potable water demand can be reduced through the installation of water-efficient irrigation systems (such as sub-soil or drip irrigation) or through the use of sustainable water for landscape irrigation.

A 'xeriscape garden' is defined as a water-conserving garden, or garden requiring no additional watering. Where a 'xeriscape garden' has been installed, provisions must be made to remove any irrigation system within twelve months and ensure that the landscape will not receive watering after that time. Evidence will include, but will not be limited to, a report from the landscape architect confirming why the design can be classified as 'xeriscape'.

Heat Rejection

The use of water based heat rejection systems that consume huge amounts of water through cooling towers is wide spread because of the high Water efficiency of such systems.

Minimising or eliminating the use of potable water in heat rejection systems or completely eliminating the need for mechanical cooling in buildings can achieve significant savings in both Water and water.

The use of non-chemical dosing (such as ionisation, UV treatment, etc.) can save water by avoiding more frequent flushing of cooling tower water systems.

Laundry Equipment

The typical laundry utilises a washer technology called washer-extractors. This type of machine ranges in size from about 16 kg up to 1 766 kg in the largest laundries. The name washer-extractor is used because after each portion of the wash cycle (soak, suds, pre-wash, wash, rinse, or finish) an extraction imparting centrifugal force removes the water and detergent contents from the wash wheel to the drain.

Other equipment found in large industrial laundries are tunnel washers (or continuous batch washers), which is an industrial laundry machine designed for heavy loads. Tunnel washers are inherently water-efficient; water is used several times before being sent to the drain. Average water consumption of this type of equipment is 16 litres per kilogram of laundry, which is 2/3 of the typical washer extractor.

Water recycling in laundry processes can be done quite easily. The last rinse water used in an industrial washer can be reused as a pre-wash for the next wash cycle. Larger commercial and industrial laundries have been utilising this technology for decades. For smaller laundries it is not common practice due to the high upfront cost. However in recent year, washing machine manufacturers have been designing systems that are less expensive and require less space.

Most commercial washer-extractors can be retrofitted with a tank to save the final rinse water, which can then be reused as pre-wash in the next load. It is possible to cut the potable water consumption by 30% by reusing water from the final rinse cycle for the next load.

Large Kitchens

Inefficient use of water in kitchen operations is usually a result of equipment design and/or behavioural patterns. The main types of water using equipment found in kitchens are

Water: Level 2 – Occupant Consumption

dishwashers, sinks, woks, steamers, pre-wash spray rinse units, ice-making machines and garbage disposal units.

Dishwashers

Substantial savings can be made with a new dishwasher; newer models use less water, also different type of dishwashers has different flow rates. Below are the most common ones with their average water consumption.

REFERENCES

GBCSA Energy & Water Performance (EWP) Benchmarking Tool
www.GBCSA.org.za

Water Efficiency Guide: Office and Public Buildings, Australian Government, Department of The Environment and Heritage, 2006, ISBN 06425 52878

Best Practice – How to achieve the most efficient use of water in commercial food service facilities.

www.Waterstar.com

South African Weather Service
www.weathersa.co.za

South Africa Department of Water Affairs
www.dwa.gov.za

Water Efficiency South Africa
www.waterefficiency.co.za

Waste Introduction

WASTE

South African households, commerce, institutions and manufacturers generated 98 million tonnes of waste that was disposed to landfill in 2011.¹ Impacts include contamination of surface and ground water resources and soil; emissions (methane, CO2 and others) due to natural decomposition processes; incineration and illegal burning; health and safety risks; unsightly landfill sites, etc.

A Net Zero/Net Positive - Waste building can be defined as:
*“A building that reduces, reuses, and recovers its waste streams to convert them to valuable resources with zero solid waste sent to landfills over the course of the year (Net Zero), or where the building can take waste from other sites and divert it for reuse, and not to landfill (Net Positive).
 (Applicable to both construction and buildings in operation)*

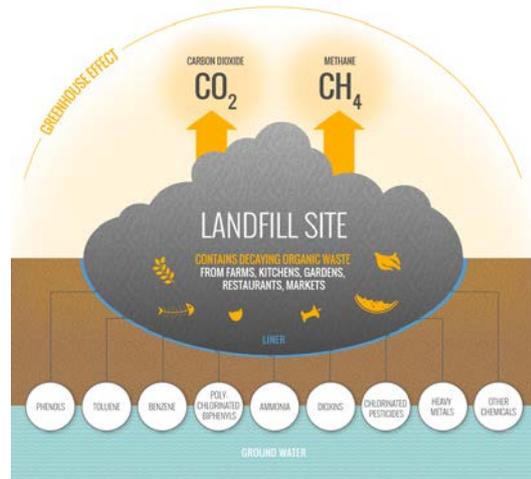


Image: (Gazasia, 2017)

1. (Department of Environmental Affairs, 2012)

Waste Introduction

LEVELS

There are 5 Levels for which the standard has been created, of which the Technical Manual spells out the details for Level 1 and 2, but not for 3-5 for which the GBCSA is not offering certification yet. As and when GBCSA receives substantiated applications for Level 3-5 GBCSA will develop criteria and documentation requirements for these levels.

Level 1 : Construction Waste Generation

Measures only waste from the construction of the New Build / Major Refurbishment project that avoids landfill

Level 2 : Occupant Waste Generation

Existing building operational waste generated by the building during operation that avoids landfill.

Level 3 : Embodied Waste Generation

Waste consumption associated with:
 Extraction and processing of raw materials
 Manufacturing of materials and equipment for use in the building (excludes any waste recycled under Level 1)
 For informational purposes only, this level is not yet available.

Level 4 : Renovation Waste Generation

Waste consumption associated with substantial changes or renovations to the building.
 For informational purposes only, this level is not yet available.

Level 5 : Deconstruction Waste Generation

Waste associated with demolition of the building, including the re-use, recycling and final disposal of building material.
 For informational purposes only, this level is not yet available.

ELIGIBILITY & FUNDAMENTALS

- New Build or Major Refurbishment projects at As Built stage can pursue and achieve a measured certification:**

Certification Available	GBCSA reason for allowing this
Not available: Design & Modelled	GBCSA will not award a Net Zero / Net Positive Waste rating for a commitment to reducing construction waste to landfill, but only allow this in measured form.
Level 1 Net Zero / Net Positive Waste certifications (measured)	Reductions in construction waste to landfill can easily be measured and reduced, and can be done by As Built stage of a construction project.

Waste Introduction

<p>To achieve a Net Positive Waste certification requires at least a 5% or greater proportion of waste from other sites being added to the waste being diverted from landfill on the project site targeting Net Positive Waste certification.</p>
<p>There are no ecology related conditional requirements, unless the project is also targeting one of the Green Star tools where this does apply.</p>
<p>Because hazardous waste requires very specific legally required processes to be followed, it is not always possible for projects to avoid the treated hazardous waste going to landfill – any hazardous waste that goes to landfill must be offset for any project to achieve a Net Zero or Net Positive rating. The % and kgs of hazardous waste will also be noted on the project’s certificate from the GBCSA.</p>
<p>All projects must submit with their submission:</p> <ul style="list-style-type: none"> • A Signed Net Zero AP Declaration • Completed Pre-submission checklist • Overview of the project and project boundary defined in the general section
<p>Net Zero & Net Positive certifications awarded by the GBCSA are valid for 3 years from the date of certification. The GBCSA reserves the right to withdraw a certification, if there is clear evidence the GBCSA is given that shows the project not to be complying with the commitments made for the 3 year duration of the certification validity period.</p>

2. Existing buildings / tenants / precincts in operation can pursue and achieve a measured certification:

Certification Available	GBCSA reason for allowing this
Level 2 Net Zero / Net Positive Waste certifications (measured)	Reductions in occupant operational waste to landfill can easily be measured and reduced, and must be demonstrated for a period of 12 consecutive months.
Not Available: Level 2 Net Zero / Net Positive Waste certifications (modelled)	GBCSA will not be awarding Net Zero or Net Positive certification in operations based on modelled sites projecting what is possible. 12 months operational evidence is required demonstrating Net Zero or Net Positive compliance.
12 consecutive months of operational waste related data is required to be eligible for this rating.	
Level 2 certification can be pursued by tenants, buildings and precincts. Where the project boundary is not clear, this must be resolved by the project before or within one month of full registration with the GBCSA. Projects must submit with their submission a clear indication of the project boundary, to illustrate the extent to which the certification applies. In mixed use buildings portions of a building can be certified in this category, only if there is a distinct entrance to the portion being certified, and where all waste has been apportioned to the portion being certified – this must be clarified and motivated to the GBCSA for approval in the same ‘project boundary’ eligibility ruling request.	
To achieve a Net Positive Waste Level 2 certification requires at least a 5% or greater proportion of waste being received from other sites that is also diverted from landfill.	

Waste Introduction

There are no ecology related conditional requirements, unless the project is also targeting one of the Green Star tools where this does apply.

All projects must submit with their submission:

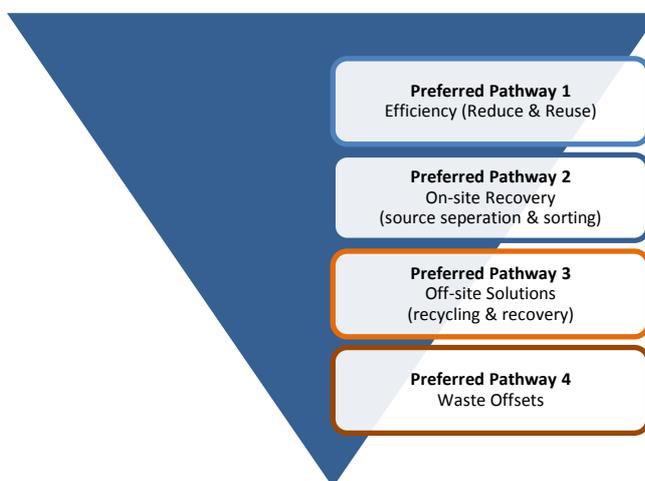
- A Signed Net Zero AP Declaration
- Completed Pre-submission checklist
- Overview of the project and project boundary defined in the general section

Net Zero & Net Positive certifications awarded by the GBCSA are valid for 3 years from the date of certification. The GBCSA reserves the right to withdraw a certification, if there is clear evidence the GBCSA is given that shows the project not to be complying with the commitments made for the 3 year duration of the certification validity period.

PATHWAYS OF ACHIEVEMENT

The GBCSA considers best practice for achieving a Net Zero or Net Positive Waste status to be done according to a pathway that starts with reduction and reuse of waste on-site, after this considering on-site recovery through sorting and separation, and only after this considering off-site sorting and separation, and then only offsets. One would not want to have a highly waste in-efficient site that achieves a Net Zero / Net Positive rating, as it demonstrates that very little has been done to deal with the on-site in-efficiency.

The GBCSA has illustrated this principle in the following way, to illustrate the preferred pathway to Net Zero / Net Positive:



Pathways 3 & 4 will only be available to projects once the project team have demonstrated that they have met 100% of the *Onsite Waste Checklist* measures as detailed below.

Pathway 3 - Off-Site Solutions can be any off-site waste recycling and recovery system to which the project chooses to take its recyclable waste, owned or contracted with by the project owner that is targeting Net Zero / Net Positive certification.

Pathway 4 - Waste Offsets have been defined by GBCSA as those waste related equivalent carbon emissions traded through well established, trusted voluntary carbon trading schemes that include rigorous audits and certification processes. The GBCSA has approved the following schemes to date (refer to the GBCSA’s TC/CIR online portal for any updates to this):

Waste Introduction

- Credible Carbon
- Gold Standard
- Climate, Community and Biodiversity Standard (CCBS)
- Verified Carbon Standard (VCS)
- ImpactChoice

Onsite Waste Checklist

For Net Zero or Net Positive Waste buildings to be eligible to use Pathways 3 & 4, the project must be able to tick Yes to ALL of the measures listed below.

LEVEL 1 – Construction Waste	
1. Does your project have a Site Waste Management Plan that details how to reduce waste and how and where to recycle the different waste streams?	Y / N
2. Does your project's construction site have separate designated bins/skips for different waste streams?	Y / N
3. Does your project require sizing and cutting of materials off-site (where applicable) to avoid waste generation?	Y / N
4. Does your project have educational/awareness material targeting the contractors on waste minimisation and avoidance of landfill? (e.g. 'Tool box talks')	Y / N
LEVEL 2 – Occupant Waste	
1. Does your project implement on-site waste recycling?	Y / N
2. Does your project undertake Waste Stream Audits of Ongoing Consumables?	Y / N
3. Does your project have an Operational Waste and Materials Management Plan?	Y / N
4. Does your project have educational/awareness material targeting the staff on waste minimisation and avoidance of landfill? (e.g. signage, waste seminars, communication to staff)	Y / N

Waste: Level 1 – Construction Waste (CW)

AIM

The Net Zero / Net Positive Waste - Level 1: Construction Waste certification rewards projects that demonstrate net zero waste from construction activities over the duration of the construction period or addresses an additional 5% (or more) of waste from other sites.

CRITERIA

Net Zero Waste - Level 1: Construction Waste is achieved when it is measured to be 0kg/year to landfill.

Net Positive Waste - Level 1: Construction Waste is achieved when it is measured to be 5% above zero.

METHODOLOGY - MEASURED

The methodology undertakes actual measurements of the construction waste streams, potentially including construction waste from other sites, as per the relevant Green Star New Build MAN-7 credit criteria.

Pathways 1 & 2

The proposed methodology is to undertake the calculations as per the relevant Green Star New Build credit MAN-7 credit.

This is demonstrated as:

100% (by mass) of all demolition and construction waste is diverted from landfill and reused or recycled.

Pathway 3 & 4

To be eligible to pursue Pathway 3, the project must be able to tick Yes to 100% of the measures listed in the Onsite Waste Checklist.

DOCUMENTATION REQUIREMENT

Modelled	Measured
Not Available	As Built (New Build & Major Refurbishments) <ul style="list-style-type: none"> • Net Zero Short Report (1) • Net Zero AP Certificate • Waste Management Plan Additionally for Pathways 3 & 4: <ul style="list-style-type: none"> • Short Report additional section(s)

Waste: Level 1 – Construction Waste (CW)

	<ul style="list-style-type: none"> • Contracts or Proof of contribution from off-site source(s) • Waste Management licenses • Letter from Waste Recycling Facility • Proof (e.g. Certificate) of contribution from offset scheme (for the first year) and letter of commitment from the client (for future years within the certification validity period)
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Net Zero Short Report (1) prepared by a Net Zero AP describing how the Net Zero Credit Criteria have been met by detailing the methodology and calculations, including:

- Tabulation of all categories of waste (wood, metal, concrete, general, etc.) with their corresponding quantities and indicating how they were reused/recycled.
- Summary and reference to receipts demonstrating the waste types, waste recipients, total amount (by mass) of waste and dates removed from site within a table.
- Appended receipts to verify the reporting methodology per each waste type and/or recipient service provider with dates and quantities indicated. Only requires the very first and final waste removal receipt. It is not necessary to append all receipts within the submission, provided that all receipts are however summarised within the short report.
- Where pathway 3 or 4 is applied, the Net Zero AP must have inspected the offsite waste recycling facility and verify that the items that are claimed to be recycled in the 'Letter from Waste Recycling Facility' are actually recycled and do not end up going to landfill or to some untraced avenue.

Waste Management Plan specifically used for the site, describing how all generated waste is monitored, which types of waste will be collected for recycling or for reuse, how recycling will occur, and who is responsible for the various aspects of the plan. The waste management plan should include instructions to crew and sub-contractors on recycling and reuse procedures. The waste management plan is to be developed and approved prior to demolition (if applicable) or construction start, and is to be implemented for the entire construction duration.

Net Zero AP Certificate for the person that has been responsible for the Net Zero submission to the GBCSA.

For Compliance Pathways 3 + 4

Short report additional sections, not to exceed two pages, prepared by the suitably qualified waste professional, to include:

- Copy of the completed Onsite Waste Checklist
- Photos or specifications of each of the items listed in the Onsite Waste Checklist, to verify that this forms part of the project. Each photo or specification must include a description of where specifically (location) these items exist in the project - for example, a photo of the waste bins used note that these are found in kitchens and bathrooms on floors 3, 6 and 8.
- Description of an off-site waste systems or waste offsets used, including a calculation of how much waste was required to be offset by these off-site mechanisms

Waste: Level 1 – Construction Waste (CW)

Waste Management Licenses from relevant offsite organisations responsible for offsite recycling of the project's waste, for the duration of the 3 year certification validity period or a letter of commitment from the organisation to renew their license for this period.

Letter from Waste Recycling Facility confirming that all items that are recorded by the project as being recycled are actually recycled by the offsite waste recycling facility, and confirming that none of these end up going to landfill.

Proof of contribution from off-site source(s) demonstrating the relationship between the project and the offsite organisation, describing what the offsite organisation is responsible for.

Proof of contribution from offset scheme and letter of commitment from the client providing evidence of the purchased kgCO₂ and for the difference to be purchased for the 3 years the Net Zero certificate will be valid.

ADDITIONAL GUIDANCE

It must be clearly demonstrated that evidence accounts for all of the demolition and construction waste, that the stipulated proportion of waste has been reused or recycled.

Waste: Level 2 – Operational Waste

AIM

The Net Zero / Net Positive Waste - Level 2: certification rewards projects that demonstrate net zero waste from occupant operational activities over 12 consecutive months or an additional 5% (or more) of waste from other sites that is diverted from landfill.

CRITERIA

Net Zero Waste - Level 2: Operational Waste is achieved when it is measured to be 0kg/year to landfill over 12 consecutive months.

Net Positive Waste - Level 2: Operational Waste is achieved when it is measured to be at least 5% more than 0kg/year to landfill over 12 consecutive months where the additional 5% is waste received and recycled from other sites.

METHODOLOGY - MEASURED

The methodology undertakes actual measurements of operational waste streams, including audits and waste management plans in accordance with the Green Star Existing Building Performance tool.

Pathways 1 & 2

Demonstrate waste management practices are in place through ongoing waste measurement and data collection, and waste management plans on site.

Pathway 3 & 4

To be eligible to pursue Pathway 3 & 4, the project must be able to tick Yes to 100% of the measures listed in the Onsite Waste Checklist.

DOCUMENTATION REQUIREMENT

Modelled	Measured
Not Available	Existing buildings / tenants / precincts <hr/> <ul style="list-style-type: none"> • Net Zero Short Report (1) • Net Zero AP Certificate • Waste Management Plan • Waste Recycling Records Additionally for Pathways 3 & 4: <ul style="list-style-type: none"> • Short Report additional section(s) • Contracts or Proof of contribution from off-site source(s)

Waste: Level 2 – Operational Waste

	<ul style="list-style-type: none"> • Waste Management licenses • Letter from the Waste Recycling Facility • Proof (e.g. Certificate) of contribution from offset scheme (for the first year) and letter of commitment from the client (for future years within the certification validity period)
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Net Zero Short Report (1) prepared by a Net Zero AP describing how the Net Zero Credit Criteria have been met by detailing the methodology and calculations, including:

- Tabulation of all categories of waste (wood, metal, concrete, general, hazardous waste etc.) with their corresponding quantities and indicating how they were reused/recycled.
- Summary and reference to receipts demonstrating the waste types, waste recipients, total amount (by mass) of waste and dates removed from site within a table.
- Appended receipts to verify the reporting methodology per each waste type and/or recipient service provider with dates and quantities indicated. Only requires the very first and final waste removal receipt. It is not necessary to append all receipts within the submission, provided that all receipts are however summarised within the short report.

Waste Management Plan specifically used for the site, describing how all generated waste is monitored, which types of waste will be collected for recycling or for reuse, how recycling will occur, and who is responsible for the various aspects of the plan. The waste management plan should include instructions to crew and sub-contractors on recycling and reuse procedures. The waste management plan is to be developed and approved prior to demolition (if applicable) or construction start, and is to be implemented for the entire construction duration. For guidance on the Waste Management Plan, refer to the Green Star Existing Building Technical Manual.

Net Zero AP Certificate for the person that has been responsible for the Net Zero submission to the GBCSA.

For Compliance Pathways 3 + 4

Short report additional sections, not to exceed two pages, prepared by the suitably qualified waste professional, to include:

- Copy of the completed Onsite Waste Checklist
- Photos or specifications of each of the items listed in the Onsite Waste Checklist, to verify that this forms part of the project. Each photo or specification must include a description of where specifically (location) these items exist in the project - for example, a photo of the waste bins used note that these are found in kitchens and bathrooms on floors 3, 6 and 8.
- Description of an off-site waste systems or waste offsets used, including a calculation of how much waste was required to be offset by these off-site mechanisms

Waste Management Licenses from relevant offsite organisations responsible for offsite recycling of the project's waste, for the duration of the 3 year certification validity period or a letter of commitment from the organisation to renew their license for this period

Waste: Level 2 – Operational Waste

Letter from Waste Recycling Facility confirming that all items that are recorded by the project as being recycled are actually recycled by the offsite waste recycling facility, and confirming that none of these end up going to landfill.

Proof of contribution from off-site source(s) demonstrating the relationship between the project and the offsite organisation, describing what the offsite organisation is responsible for.

Proof of contribution from offset scheme and a letter of commitment from the client providing evidence of the purchased kgCO₂ or for the difference to be purchased for the 3 years the Net Zero certificate will be valid.

ADDITIONAL GUIDANCE

It must be clearly demonstrated that evidence accounts for all of the operational waste, that the stipulated proportion of waste has been reused or recycled.

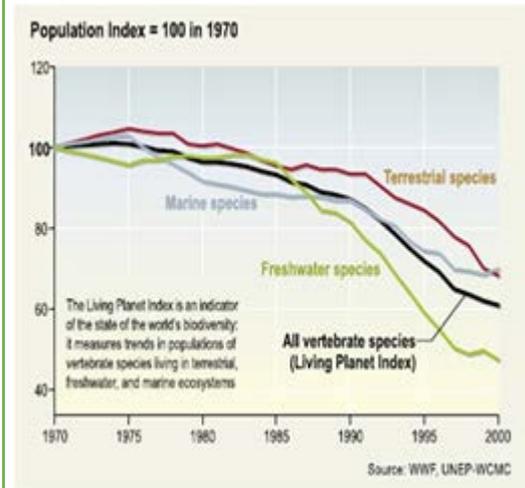
Ecology Introduction

ECOLOGY

At least 40 per cent of the world's economy and 80 per cent of the needs of the poor are derived from biological resources. In addition, the richer the diversity of life, the greater the opportunity for medical discoveries, economic development, and adaptive responses to such new challenges as climate change. The human species will not survive on this earth if ecosystems continue to decline to a point where the environment can no longer sustain human life.

A Net Zero/Net Positive - Ecology building can be defined as:

“A building that does not reduce the ecological value of the site during development for Greenfield sites (Net Zero), and increases the ecological value of the site for brownfield sites, greenfield sites and/or existing developments (Net Positive).”



Ecology Introduction

LEVELS

There are 5 Levels for which the standard has been created, of which the Technical Manual spells out the details for Level 1 and 2, but not for 3-5 for which the GBCSA is not offering certification yet. As and when GBCSA receives substantiated applications for Level 3-5 GBCSA will develop criteria and documentation requirements for these levels.

Level 1 : Development Ecology (Measured)

Where a development project site shows an improvement in the ecological value from pre-development to post development state, whether greenfield (Net Zero or Net Positive available) or brownfield (only Net Positive available).

Level 2 : Operational Ecology (Measured)

Where an existing building in operational shows an improvement in the ecological value of the site (only Net Positive available).

Level 3

This level is not available.

Level 4

This level is not available.

Level 5

This level is not available.

ELIGIBILITY & FUNDAMENTALS

- New Build or Major Refurbishment projects at As Built stage can pursue and achieve a measured certification:**

Certification Available	GBCSA reason for allowing this
Not available: Modelled at Design stage	GBCSA will not award a Net Zero / Net Positive Ecology rating for a commitment to improving ecological value, but rather only to what can be demonstrated at the end of the development project.
Level 1 Net Zero / Net Positive Ecology certifications (measured)	<p>Improvements in the ecological value of the development site can be measured pre- and post-development at As Built stage, and can achieve either a Net Zero or Net Positive Ecology rating.</p> <p>Greenfield sites can be either Net Zero or Net Positive.</p> <p>Brownfield sites can only be Net Positive.</p>

Ecology Introduction

There are no ecology related conditional requirements, unless the project is also targeting one of the Green Star tools where this does apply.

All projects must submit with their submission:

- A Signed Net Zero AP Declaration
- Completed Pre-submission checklist
- Overview of the project and project boundary defined in the general section

Net Zero & Net Positive certifications awarded by the GBCSA are valid for 3 years from the date of certification. The GBCSA reserves the right to withdraw a certification, if there is clear evidence the GBCSA is given that shows the project not to be complying with the commitments made for the 3 year duration of the certification validity period.

2. Existing buildings / precincts in operation can pursue and achieve a measured certification:

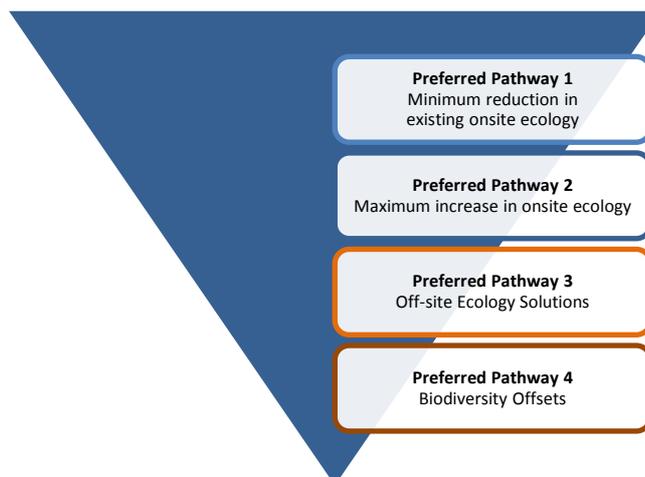
Certification Available	GBCSA reason for allowing this
Level 2 Net Positive Ecology certifications (measured)	GBCSA awards Net Positive Ecology certifications to existing buildings sites in operation where there is an improvement in the ecological value of the site. This is not for a new construction project on the site, but for ecological increase on an existing facility.
Not Available: Level 2 Net Zero Ecology	GBCSA will not be awarding Net Zero for existing building sites in operation – this shows no improvement to an existing site around a building.
Level 2 certification can be pursued by buildings and precincts. Where the project boundary is not clear, this must be resolved by the project before or within one month of full registration with the GBCSA. Projects must submit with their submission a clear indication of the project boundary, to illustrate the extent to which the certification applies.	
There are no ecology related conditional requirements, unless the project is also targeting one of the Green Star tools where this does apply.	
All projects must submit with their submission:	
<ul style="list-style-type: none"> • A Signed Net Zero AP Declaration • Completed Pre-submission checklist • Overview of the project and project boundary defined in the general section 	
Net Zero & Net Positive certifications awarded by the GBCSA are valid for 3 years from the date of certification. The GBCSA reserves the right to withdraw a certification, if there is clear evidence the GBCSA is given that shows the project not to be complying with the commitments made for the 3 year duration of the certification validity period.	

Ecology Introduction

PATHWAYS OF ACHIEVEMENT

The pathways are not as applicable in the ecology context, but the GBCSA proposes a similar pathway nevertheless, where project must start by doing as much as physically possible on site, including things such as green roofs etc, and only as a last resort is there an option to use biodiversity offsets.

The GBCSA has illustrated this principle in the following way, to illustrate the preferred pathway to Net Zero / Net Positive:



Pathways 3 & 4 will only be available to projects that conform to relevant offsetting policies - the South African National Biodiversity Offsetting Policy and Environmental Offsetting Policy (this policy requires extensive onsite solutions to be addressed before offsetting is permitted).

Pathway 3 - Off-Site Solutions can be any off-site ecology installation by the owner themselves to act as a form of offset (and that is in accordance with the South African National Biodiversity Offsetting Policy and Environmental Offsetting Policy)

Pathway 4 - Biodiversity Offsets can be any off-site ecology installation by a third party that is contracted with by the project owner to act as a form of offset (and that is in accordance with the South African National Biodiversity Offsetting Policy and Environmental Offsetting Policy).

Ecology: Level 1 – Development Ecology

AIM

The Net Zero / Net Positive Ecology - Level 1: Development Ecology certification rewards projects that demonstrate either a net zero change in the ecology for greenfield sites) or a net positive change in the ecology for of a brownfield or greenfield site, when comparing the pre versus post development state of the site.

CRITERIA

Net Zero Ecology - Level 1: Development Ecology is achieved for greenfield sites when there is no net reduction in the ecological values of the site from pre to post development. For brownfield sites Net Zero is not available.

Net Positive Ecology - Level 1: Development Ecology is achieved for greenfield site when there is a positive increase in the ecological value of the site from pre to post development. (+2 from New Build Eco-4 calculator).

Net Positive Ecology - Level 1: Development Ecology is achieved for brownfield site when there is a positive increase in the ecological value of the site from pre to post development. (Change in Ecological Diversity Index of greater than 10 from the New Build Eco-4 calculator)

DOCUMENTATION REQUIREMENT

Modelled	Measured
Not Available	<p>As Built (New Build & Major Refurbishments)</p> <ul style="list-style-type: none"> • Net Zero Short Report (1) • Net Zero AP Certificate • As Built drawings with landscaping area schedule • Extracts from completed Eco-4 calculator <p>Additionally for Pathways 3 & 4:</p> <ul style="list-style-type: none"> • Short Report additional section(s) • Contracts or Proof of contribution from off-site source(s) • Proof of contribution from offset scheme (to be approved via prior CIR)

Net Zero Short Report (1) prepared by a Net Zero AP describing how the Net Zero Credit Criteria have been met by detailing the methodology and calculations.

Ecology: Level 1 – Development Ecology

Net Zero AP Certificate for the person that has been responsible for the Net Zero submission to the GBCSA.

As Built drawings with landscaping area schedule which shows what plants have been selected for what area (in m²) of the landscaped site. The landscaping schedule must detail the area and species of all nominated planting.

Extracts from completed Eco-4 calculator showing how the project has completed all areas corresponding to the landscaping schedule and how the project achieve the required points on the calculator.

For Compliance Pathways 3 + 4

Short report additional sections, not to exceed two – four pages, prepared by the suitably qualified ecologist, to include:

- Description of an off-site systems or biodiversity offsets used, including a detailed explanation as to how this meets the relevant biodiversity offset standard.

Proof of contribution from off-site source(s) demonstrating the relationship between the project and the offsite organisation, describing what the offsite organisation is responsible for.

Proof of contribution from offset scheme providing evidence of the biodiversity offset to be valid for the 3 years the Net Zero certificate will be valid. This must be motivated to the GBCSA as an appropriate form of evidence via a CIR prior to submission – the project can only apply for this approach using a GBCSA approved CIR.

ADDITIONAL GUIDANCE

Refer to the Green Star New Build Eco-4 credit for additional guidance.

Ecology: Level 2 – Operational Ecology

AIM

The Net Positive Ecology - Level 2: Operational Ecology certification rewards projects that demonstrate a net positive change in the ecology for existing operational sites with or a net positive change in the ecology that takes place over a period of time.

CRITERIA

Net Positive Ecology - Level 2: Operational Ecology is achieved for operational site when there is a positive increase in the ecological value of the site over a period of time as per the relevant Green Star New Build Eco 4 credit criteria at date of original Occupation (for "Land Types Before Construction"), and then measure the current Occupant Ecology (for " Land Types After Construction") (+2 from New Build Eco-4 calculator required).

DOCUMENTATION REQUIREMENT

Modelled	Measured
Not Available	<p>As Built (New Build & Major Refurbishments)</p> <ul style="list-style-type: none"> • Net Zero Short Report (1) • Net Zero AP Certificate • Appropriately dated drawings or aerial photographs with landscaping area schedule • Extracts from completed Eco-4 calculator <p>Additionally for Pathways 3 & 4:</p> <ul style="list-style-type: none"> • Short Report additional section(s) • Contracts or Proof of contribution from off-site source(s) • Proof of contribution from offset scheme (to be approved via prior CIR)

Net Zero Short Report (1) prepared by a Net Zero AP describing how the Net Zero Credit Criteria have been met by detailing the methodology and calculations.

Net Zero AP Certificate for the person that has been responsible for the Net Zero submission to the GBCSA.

Drawings or aerial photographs with landscaping area schedule which shows the site at original occupation and then again at a later time when changes have been implemented showing what plants have been selected for what area (in m)² of the landscaped site. The landscaping schedule must detail the area and species of all nominated planting.

Ecology: Level 2 – Operational Ecology

Extracts from completed Eco-4 calculator showing how the project has completed all areas corresponding to the landscaping schedule and how the project achieve the required points on the calculator.

For Compliance Pathways 3 + 4

Short report additional sections, not to exceed two pages, prepared by the suitably qualified ecologist, to include:

- Description of an off-site systems or biodiversity offsets used, including a detailed explanation as to how this meets the relevant biodiversity offset standard.

Proof of contribution from off-site source(s) demonstrating the relationship between the project and the offsite organisation, describing what the offsite organisation is responsible for.

Proof of contribution from offset scheme providing evidence of the biodiversity offset to be valid for the 3 years the Net Zero certificate will be valid. This must be motivated to the GBCSA as an appropriate form of evidence via a CIR prior to submission – the project can only apply for this approach using a GBCSA approved CIR.

ADDITIONAL GUIDANCE

Refer to the Green Star New Build Eco-4 credit for additional guidance.