Brookfield
Properties

Design guidelines for sustainable workspaces

INDIA

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Overview

This document presents a framework of guidelines that are aligned with Brookfield Properties' objective of achieving Net-zero greenhouse gas (GHG) emissions by 2040 or sooner. The guidelines are aligned with Brookfield Properties' ESG commitments, which include reducing carbon emissions, promoting diversity, equity, and inclusion, and upholding the highest ethical standards.

An integrated approach is intended to develop, operate, and renovate properties to achieve optimum energy efficiency, occupant satisfaction, and reduced carbon emissions. Best-in-class environmental certifications are sought for all new and existing office developments through innovative environmental strategies with a people-centric vision to achieve industry leading environmental and social performance.

It is important to note that these guidelines are intended to complement, but not supersede, the evolving project design brief. A project evaluation matrix must be established at the concept design stage to review compliance with these guidelines. This matrix will be reviewed at each project milestone to ensure adherence to the project's vision and enable the achievement of best-in-class certification.

Key aspects

1 Energy efficiency

2 Water efficiency

3 Waste management

4 Building materials

5 Health and well-being

6 Diversity, equity and inclusion

7 Site and external development

8 Embodied carbon

Established green certification targets

Certification system	Benchmark
ECBC*	ECBC+/Super ECBC
IGBC Green New Buildings (Tenant occupied)	Gold/Platinum
IGBC Health & Well-Being	Gold/Platinum
LEED Building Design + Construction (Core & shell)	Gold/Platinum
LEED Interior Design + Construction (Commercial interiors)	Gold/Platinum
The WELL Certification	Gold/Platinum

**Beyond adhering to the prescribed design benchmarks, greenfield projects shall actively pursue one or more green certifications as deemed applicable.*

1
Energy efficiency

Sr. No	Design parameter	Benchmark	Remarks
1.1	Energy performance index	**Must achieve BEE 5-star rating ≤ 80-100 kWh/m2/yr.**	*Energy Performance Index (EPI) shall be calculated in kWh/m²/yr, as per guidelines defined by ECBC for 8-10hr operation.*
1.2	Passive design features	**≥ 2%** energy savings of total annual energy consumption.	*Passive design features include optimum building orientation, building massing, WWR, daylighting etc.*
1.3	Envelope load in w/sq.ft.	**≤ 1.5-2 W/sq.ft.**	*Calculated on total built-up area excluding basement.*
1.4	Energy metering and management	Install advanced energy metering for all whole-building energy sources and any individual energy end use that is **10% or more of the total annual use**. And demonstrate that the **Building Management System (BMS)** is in place to monitor the following systems (HVAC, lighting, VT, water pumps, RE systems, power backup systems etc).	*At building mains, installed meters must be capable of monitoring Energy use (kWh), Energy Demand (kW) and total Power Factor on an hourly basis. Sub-meters for building services must be installed as defined in latest ECBC guidelines.*
1.5	Low-emitting vehicles (ev)	Provide charging facilities or dedicated parking spaces with charging points for **≥ 5-10% of the parking spaces** (excl. visitors).	*Local norms must vbe taken into consideration. Avoid electric charging in stack and mechanized parking.*
1.6	Artificial lighting design (interiors)	**Main office areas, ≤ 5.0 – 6.0 W/m²** Building entry/exits, staircases : ≤ 2 W/m² Parking spaces (basements) : ≤ 1.5 W/m² Food court : ≤ 6 W/m², Gymnasiums : ≤ 5.0 W/m²	*Calculations and assumptions must be as per ECBC guidelines.*
1.7	Artificial lighting design (exteriors)	**General Landscape : ≤ 1.0 W/m²** Open driveways & parking lots : ≤ 1.0 W/m² , Pedestrian walkways : ≤ 1.0 W/m² Façade lighting : ≤ 2.5 W/m² (on vertical façade area)	*Calculations and assumptions must be as per ECBC guidelines.*

2
Water efficiency

Sr. No	Design parameter	Benchmark	Remarks
2.1	Efficient/low-flow plumbing fixtures	**≥ 30%** reduction in fixture flow-rates from baseline.	*Baseline flow rates to be considered based on green certification targets.*
2.2	Rainwater harvesting, roof and landscape	Retain maximum possible runoff from at minimum, the 80th percentile of regional or local rainfall events by installing permanent infiltration or collection features (e.g., vegetated swale, rain garden, rainwater cistern).	*Consider rainwater harvesting guidelines (as and when available) from the National Building Code (NBC) of India-2016, part 11 – approach to sustainability, section 7.2 – rainwater harvesting- surface runoff.*
2.3	Waste-water treatment and reuse	**100%** of waste-water to be treated suitably and utilised for landscaping, flushing, and cooling tower make-up water etc.	
2.4	Design to reduce water consumption	Indoor Biophilia must be installed in self-irrigating planters (ref approved list of makes). Discourage the design and integration of non-functional aesthetic water-bodies like ponds, fountains etc. indoor and outdoors.	

3

Waste management

Sr. No	Design parameter	Benchmark	Remarks
3.1	Handling of demolition and waste materials during construction	**≥ 80%** of waste generated during construction is diverted from landfills, for reuse or recycling. Diverted materials must include at least 3 material streams.	*Consider guidelines (as and when available) from the National Building Code (NBC) of India, 2016 and Construction & Demolition Waste Management Rules, 2016.*
3.2	Organic waste management, post-occupancy	**≥ 95%** of the organic waste treated on-site through installation of organic waste converters or similar systems.	*Consider hazardous waste management guidelines as prescribed by the Ministry of Environment & Forest (MoEF), Government of India.*
3.3	Segregation of waste, post-occupancy	**100%** segregation of waste at source & centralised (campus level) segretation of E-waste, hazardous waste etc.	

4

Building materials

Sr. No	Design parameter	Benchmark	Remarks
4.1	Sustainable sourcing of materials	≥ **25%** of the total building materials (by cost) as/scope are manufactured locally within a distance of 400 km.	*Extraction and processing of raw materials need not be considered as part of this credit calculation.*
4.2	Modularity and recyclability	▪ Min. **20% GGBS** (or similar) recycled content in concrete for structural elements. ▪ Consider **>40% GGBS** (or similar) recycled content in concrete for non-structural uses. ▪ Encourage use of **15%-25%** recycled content in structural steel/rebars etc. ▪ Prioritise use of secondary or re-rolled steel for non-structural components.	*For definitions, refer IGBC Net Zero Waste Manual.* *% recycled content may vary based on the structural codes, project location and project specific structural consultant's approval.*
4.3	Certified building materials (core and shell)	Min. **10** different permanently installed building materials, products, and equipment by 3 different manufacturers that are certified by recognized third-party organizations or pre-approved by IGBC/USGBC/IWBI. **Remarks- No. of materials may vary/change based on the certifications the project is applying for.*	*Materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts.*
4.4	Certified building materials (Interiors)	Min. **15** distinct, permanently installed products (including flooring, insulation, wet-applied products, ceiling and wall assemblies and systems) and furniture, ingredients are disclosed by the manufacturer, **a disclosure organization or a third party through one of the following:** ▪ **A Declare Label,** operated by the International Living Future Institute. ▪ A Health Product Declaration (HPD) published in the HPD Public Repository, operated by the Health Product Declaration Collaborative. ▪ A Cradle-to-Cradle Certified; product, or a product with a Material Health Certificate from the Cradle-to-Cradle Products Innovation Institute. ▪ A Product Lens Certification, operated by UL. ▪ A Product Health Declaration, operated by Global Green Tag. ▪ A manufacturer inventory containing CAS numbers of all individual compounds down to 1,000 ppm (0.1%). If the product contains a trade secret compound, GHS hazards of category 1 or 2 are listed, and a concentration range is provided for each undisclosed component. **Remarks- No. of materials may vary/change based on the certifications the project is applying for.*	

4

Building materials

Sr. No	Design parameter	Benchmark	Remarks
4.5	Low-emitting materials	**≥ 75%** of area as/scope uses adhesives, paints, sealants, coatings, flooring, wall paneling, ceilings, insulation (including interiors) meet the VOC emissions evaluation and 100% meet the VOC content evaluation or salvaged/re-used. Composite wood and agri-fiber materials must not contain added urea-formaldehyde resins.	*Compliance details for the credit shall be as per relevant LEED guidelines.*
4.6	Whole building life-cycle assessment	**≥ 10%** reduction from baseline building for global warming potential (greenhouse gases in kg CO2e) and **≥ 10%** reduction from baseline building in atleast 3 of the following: ▪ Depletion of the stratospheric ozone layer, in kg CFC-11e; ▪ Acidification of land and water sources, in moles H+ or kg SO2e; ▪ Eutrophication, in kg nitrogen eq or kg phosphate eq; ▪ Formation of tropospheric ozone, in kg NOx, kg O3 eq, or kg ethene; and ▪ Depletion of nonrenewable energy resources, in MJ using CML/depletion of fossil fuels in TRACI.	*Detailed guidelines for assessment shall be as per prevalent LEED guidelines.*

5
Health and well-being

Sr. No	Design parameter	Benchmark	Remarks
5.1	Monitor indoor air quality	Monitor & displace key IAQ parameters in all regularly occupied spaces and ensure that 80% of the measurements are well within the established threshold values for Class-A commercial office buildings: ▪ PM 2.5 : < 25µg/m^3 ▪ PM 10 : < 50 µg/m^3 ▪ CO^2 : Max. 350 ppm above ambient ▪ TVOC ▪ Indoor temperature	*Consider guidelines (as and when available) from the National Building Code (NBC) of India, 2016 and Construction & Demolition Waste Management Rules, 2016.*

6

Diversity, equity and inclusion

Sr. No	Design parameter	Benchmark	Remarks
6.1	Universal design	Minimum compliance criteria as per National Building Code (NBC) of India 2016, RPWD Act 2016 and Harmonized Guidelines & Space Standards on Barrier Free Built Environment for Persons with Disability & Elderly Persons, 2016. IRC 2020. **Dedicated restrooms:** ▪ Provide at least one restroom per floor in the building or as defined by the local byelaw, in an easily accessible location. ▪ 1 cubicle and 1 urinal dedicated to ambulant users in every toilet. ▪ In addition to male female toilets, provide for one gender neutral toilet per toilet bank, accompanied by clear signage - single user restroom includes a sink and a water closet to display neutrality. ▪ Sanitary products provision in female and all gender/single user restrooms. **Integrate storage facilities for personal mobility devices.**	*Design the building/campus to allow independent accessibility for varying spectrum of disability – permanent, temporary and situational and cater to the evolutionary changes in the life cycle of a person.* *Minimum compliance criteria as per National Building Code (NBC) of India 2016, RPWD Act 2016 and Harmonized Guidelines & Space Standards on Barrier Free Built Environment for Persons with Disability & Elderly Persons, 2016. IRC 2020.*
6.2	Wayfinding	Integrate strategies that **help individuals intuitively navigate** through the project like signages, tactile maps, symbols, auditory cues, information systems, images, colour selection that considers colour blindness etc.	
6.3	Equity	▪ Mother's room with ergonomically designed furniture and storage. ▪ Creche' that's is central location with easy accessibility on arrival/departure. Connection to outdoors is highly recommended.	
6.4	Technology	▪ Avoid technology that interferes with hearing aids/alternate communication aids, alert caution where electromagnetic frequency is high - spaces, devices etc.	
6.5	Encourage physical activity	**Indoor provisions:** A dedicated fitness facility available within the project boundary at no cost to regular occupants and includes ≥ 2 types of exercise equipment (e.g., free weights, treadmill). The space must be sized to cater to ≥ 5% of regular occupants at any time, or 25m2 + 0.1m2 per regular occupant (up to max. 930 m2) . **Outdoor provisions:** Min. 1 of the following outdoor physical activity spaces is within the campus or max. 400 m walking distance of the project boundary and available at no cost to regular occupants: ▪ Useable green space (e.g., park, walking/biking trail). ▪ Recreational field or court. ▪ Fitness zone that includes all-weather fitness equipment.	

7

Site and external development

Sr. No	Design parameter	Benchmark	Remarks
7.1	Green cover (landscape)	Maximize the use of green cover in the form of organic farming on unused tower terraces etc.	*Potted plants shall not be considered as vegetation for any calculations.*
7.2	Mitigating urban heat islands	**≥ 75%** of exposed roof & non-roof impervious areas are under tree cover (and/or) with open grid pavers/grass pavers (and/or) hardscape materials with an SRI of at least 29 (and not higher than 64). **≥ 90%** of surface parking spaces must be under cover of a roof structure or appropriate natural vegetation.	*Includes all existing and new off-street parking spaces that are leased or owned by the project. Any roof used to shade or cover parking must have a 3-year aged SRI of at least 32 (or initial SRI >39), or be covered by energy generation systems, such as solar thermal collectors, photovoltaics etc.*
7.3	Water consumption in landscape	**>75%** of landscape planting beds must have water saving strategies like drip irtrigation system or equivalent. Or show that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period. **100% reduction** in landscape water requirement from the calculated baseline for the site's peak watering month.	*Reductions must first be achieved through plant species selection and irrigation system efficiency.*
7.4	Preservation or transplantation of trees	Preserve or transplant **≥ 75%** of existing fully grown trees within the project site/campus and plant 12 tree saplings/acre; that can mature into grown up trees within the next 5 years on the project site, including existing and transplanted trees.	
7.5	Encourage walkability, create a pedestrian friendly development	All exterior building walls incorporate some or combination of the following design elements on the first floor or first 5.5 vertical m, whichever is less: ▪ Windows or glazing that provide transparency into the space. ▪ Overhangs such as canopies, awnings, eaves or shades. ▪ Biophilic design elements (e.g., plants, nature patterns, natural building materials). ▪ Mixed building textures, colors, murals, art and/or other design elements.	

7

Site and external development

Sr. No	Design parameter	Benchmark	Remarks
7.6	Productive landscape	Provide a permanent and accessible space for food production meeting the following requirements: ▪ The space includes garden or greenhouse with food-bearing plants or edible landscaping (e.g., fruit trees, herbs) or hydroponic or aeroponic farming system. ▪ The space is at least 0.09 m2 per regular occupant (not less than 18.5 m2).	*The area specified is the actual growing area (vertical or horizontal) used for the production of food-bearing plants. For hydroponic and aeroponic farming systems, the project may halve the growing area calculations, given higher yield.*

Notes:
- *Applicable only for those projects which have at least 10% of the site area landscaped.*
- *Landscape areas over built structures such as basements, podium, roofs, etc., may be considered.*

8

Embodied carbon – reduction strategies

Sr. No	Principles	Key areas	Strategies to reduce carbon footprint
8.1.1	Improve quality + reduce quantity + higher recycled content	Design and technology	▪ Optimize structural grid sizes & building heights – shorter grids or innovative technologies to reduce the size of columns, beams and slabs required, effectively leading to overall reduction in the quantity of cement and reinforcement. ▪ Prioritize re-use of existing structures, doors, hard finishes, furniture, metal elements etc.
8.1.2		Carbon	▪ 40% recycled content (GGBS) in concrete (~5% reduction in embodied carbon when compared to 20% GGBS content). ▪ Consider higher strength concrete grades like M50 or M60 to reduce the size of structural members and effectively consume lesser cement. ▪ Instead of conventional brickwork & blockwork, opt for AAC blockwork OR dry-wall compositions for internal walls. ▪ Use of Low-carbon Cement for Primary structure. ▪ Instead of conventional blockwork for external walls, opt for ACC low-carbon cement OR LC3 cement. ▪ Prioritize products with EPDs (Environmental Product Declarations).
8.1.3		Steel	▪ Opt for high-grade steel to reduce the quantity of rebars required (moving from Fe500 to Fe600 leads to ~15% reduction in rebar quantity). ▪ Consider higher recycled content - upto 40% in rebars & 20% in structural steel (compared to virgin steel leads to ~14% reduction in embodied carbon). ▪ Consider use of secondary or re-purposed steel for small scale structures. ▪ Prioritize products with EPDs (Environmental Product Declarations).
8.1.4	Responsible sourcing + recycled content + low maintenance and replacement	Alternative material	▪ Recycle or re-use of demolition waste. ▪ Prioritise locally manufactured materials over imported or large distance transportation (<300kms). ▪ Choose Modular dry partitions or pre-cast panels to allow faster construction and future flexibility. ▪ On-site treatment and responsible disposal of construction waste.

Design and planning compliance

The design, planning or upgradation of all new offices and assets belonging to Brookfield Properties shall comply with the guidelines set within this document. These guidelines must be read in conjunction with the prevalent standards for anthropometrics and universal accessibility. Any variation from these guidelines must seek approval from the respective department heads of Design, MEP, AV/IT, Projects & Operations.
This document is the result of collaborative efforts of key departments involved in achieving successful design and upgradation for Brookfield's Assets.

Abbreviations

ECBC – Energy conservation and building code
IGBC – Indian green building council
USGBC – U.S. green building council
LEED – Leadership in energy and environmental design

Standards & References

National Building Code-2016, Volume 1 & 2
The Rights of Persons with Disabilities Act, 2016
Harmonized Guidelines and Space Standards for Barrier-Free Built Environment for persons with Disability and Elderly Persons – 2016 (CPWD)
Energy Conservation Building Code of India (ECBC) - 2017
IGBC Green New Buildings Rating Manual (Version 3.0, September 2016)
IGBC Green Interiors Rating Manual (Version 1.0, 2021)
IGBC Net Zero Energy (Pilot Version, November 2018)
IGBC Net Zero Water (Pilot Version, May 2022)
IGBC Net Zero Waste (Pilot Version, October 2020)
USGBC LEED Building Design & Construction (Version 4.1, July 10, 2020)
USGBC LEED Interior Design & Construction (Version 4.1, October 2021)
The WELL Building Standard (Version 2, 2020)
The WELL Equity Rating Standard (Version Q4, 2022)

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