IGBC

Confederation of Indian Industry

INDIA'S
LEADERSHIP IN
SUSTAINABLE URBAN MOBILITY

Accelerating Towards a Greener Future
with Sustainable Transit

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INDIA's Leadership in SUSTAINABLE URBAN MOBILITY

मनोहर लाल
MANOHAR LAL

आवासन और शहरी कार्य मंत्री एवं
विद्युत मंत्री
भारत सरकार
Minister of
Housing and Urban Affairs; and
Minister of Power
Government of India

Message

The metro system plays a pivotal role in shaping a sustainable and efficient urban transport network, aligning with India's vision of becoming a Developed Nation (Vikshit Bharat) by 2047. As urbanization accelerates, the government is proactively developing eco-friendly infrastructure to accommodate the growing urban population. Our visionary Prime Minister is committed to environmental conservation and green urban transport remains central to his vision for future cities, with energy efficiency as a key policy priority.

The Ministry of Housing and Urban Affairs continues to support innovative solutions for making urban infrastructure energy-efficient and sustainable. The Delhi Metro Rail Corporation (DMRC) stands as a global benchmark in green urban transport, consistently setting new standards in energy efficiency and commuter convenience.

I appreciate IGBC's partnership with DMRC and its role in shaping a comprehensive framework for energy-efficient metro development and introducing a world-class sustainability rating system for mass rapid transit system. I am pleased to share this dossier, which highlights India's remarkable achievements in green urban mobility and outlines our vision for a sustainable future.

I encourage collective efforts from public and private organizations to build cities that balance urban growth with environmental sustainability, ensuring a better future for all.

(Manohar Lal)

Office:- Room No. 104-C, Nirman Bhawan, New Delhi-110011; Phone: 011-23061232, 23063495, 23061166, 23061162, 23062089 (Fax)

Message from

Managing Director,
Delhi Metro Rail Corporation
and Chief Executive Officer,
i-Metro

Over the past two decades, our nation has witnessed a transformative journey in urban transportation, with metro systems playing a pivotal role in enhancing connectivity and improving the quality of life in our cities.

As of January 2025, India's metro network spans more than 1,000 kilometers across 21 cities, making it the third largest globally. This remarkable achievement reflects our commitment to sustainable and efficient urban mobility. Notably, the recent inauguration of the 13 km stretch of the Delhi-Ghaziabad-Meerut Namo Bharat corridor between Sahibabad and New Ashok Nagar marks a significant milestone in regional connectivity, benefiting millions with high-speed and comfortable travel.

The Union Cabinet's approval of the 26.5 km Rithala-Kundli section of Delhi Metro Phase-IV further demonstrates our dedication to expanding the metro network. This corridor will significantly enhance connectivity between Delhi and Haryana, improving access to residential, commercial, and industrial zones.

Our progress goes beyond the National Capital Region. Cities like Bengaluru, Pune, and Ahmedabad are witnessing rapid metro expansions, contributing to the nation's overall development. These projects are part of a larger roadmap towards a developed India, aligning with our mission to provide fast, safe, and reliable travel options to our citizens.

The Delhi Metro Rail Corporation (DMRC) and CII's Indian Green Building Council (IGBC) signed a Memorandum of Understanding (MoU) in 2014 to develop a green certification system for Mass Rapid Transit Systems (MRTS). The IGBC Green MRTS Rating is the world's first exclusive sustainability rating for metro and monorail systems. It helps implement green concepts in design and construction to minimize environmental impact while enhancing the commuter experience.

Our collaboration with IGBC has been active in promoting green building standards within metro systems. Looking ahead, DMRC is committed to further enhancing our sustainability initiatives. We have set a target to achieve a 5% reduction in overall energy consumption in the next year, aiming to decrease the energy intensity of our operations.

We in DMRC and i-Metro are delighted to associate with IGBC in organizing the 5th edition of IGBC's International Conference of Green Metro Summit 2025.

I extend my heartfelt appreciation to all stakeholders, including the government, industry partners, and the citizens of India, for their unwavering support in this journey. Together, we are transforming urban mobility and setting new benchmarks in sustainable development.

Wishing the conference all success as we collectively explore innovative solutions for the future of urban transportation.

Vikas Kumar
Managing Director,
Delhi Metro Rail Corporation and
Chief Executive Officer,
i-Metro

Message from

National Chairman,
CII - Indian Green Building Council and
Managing Director,
Blue Star Limited

Today, the Delhi Metro, under visionary leadership, has transformed urban transit constructing state-of-the-art stations that adhere to the highest international safety standards. With millions of Delhiites relying on its seamless service, the Metro stands as an innovation for all.

In line with this remarkable journey, the Government of India, through its progressive policies and transformative initiatives, remains persistent in its commitment to modernizing metro infrastructure with an emphasis on sustainability. The rapid expansion of metro networks in cities such as Mumbai, Delhi, Bengaluru, and Hyderabad exemplify this dedication. Recent announcements of new corridors, the electrification of transit systems, and the introduction of energy-efficient rolling stock highlight our collective vision for a greener, more resilient public transport system. Delhi Metro Rail Corporation (DMRC) is involved in many metro rail authorities across India.

Shri Manohar Lal Khattar, Minister of Housing and Urban Affairs, Minister of Power, Government of India, has recently highlighted the government's push for energy-efficient metro operations—integrating renewable energy solutions, implementing advanced automation technologies, and promoting green certifications across metro stations. Digital innovations, including AI-driven operations, real-time monitoring systems, and passenger-centric enhancements, are revolutionizing our metro networks.

DMRC's commitment to sustainability is evident in its innovative approach: nearly all of its new projects are registered with IGBC, with several achieving the IGBC's Platinum Rating, setting a benchmark for metro systems across Tier I and II cities in India. Notably, DMRC became the world's first railway project to claim carbon credits, and its headquarters at Metro Bhawan—as well as all associated residential buildings—have earned IGBC's Green Building Certification. As a founding member of IGBC and as an MoU partner, DMRC has helped in developing both the New and Existing Metro Rating Systems, making them stands out as the only fully green metro rail network in the world.

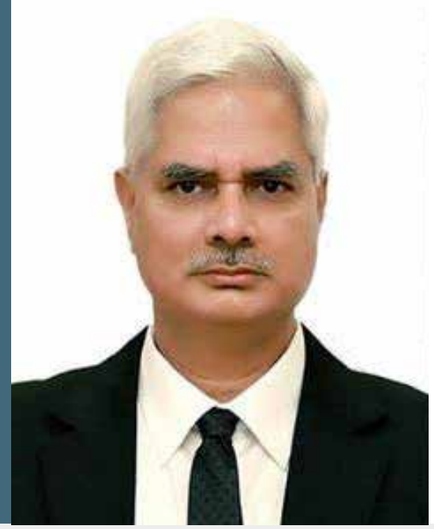
Supporting this sustainable transformation is CII's Indian Green Building Council (IGBC). In close collaboration with DMRC and metro rail authorities, IGBC has championed initiatives such as the 'IGBC Green MRTS Rating' system—the world's first framework designed to evaluate the environmental performance of both underground and overhead metro stations.

IGBC spearheads the Green and Net Zero Building Movement in India with the passion and dedication of its members and leaders across its 30 regional chapters. IGBC today has the world's second-largest registered green building footprint of more than 13.04 Billion Sq.Ft with over 15,040+ registered projects adopting IGBC's Green and Net Zero Rating Systems. Our aspiration is that when we celebrate 100 years of Independence in the year 2047, India will be the world leader in Green Buildings & Green Infrastructure, and metros across the country would contribute a lion's share to this monumental achievement.

B Thiagarajan
National Chairman,
CII - Indian Green Building Council and
Managing Director,
Blue Star Limited

Message from

Chairman,
International Conference on Green Metro Systems 2025 and
Director (Electrical),
Delhi Metro Rail Corporation



India's metro network has emerged as the foundation of sustainable urban mobility, transforming the way millions commute daily. From the pioneering Delhi Metro system to the expanding networks in cities such as Mumbai, Bangalore, Chennai, and beyond, the country has several more under construction.

The Hon'ble Prime Minister of India, Shri Narendra Modi, has proudly highlighted that India now boasts the world's third-largest metro network, having achieved the milestone of 1000 km. Recent developments highlight the rapid progress in this sector. New corridors in cities such as Agra and Pune have significantly improved connectivity and eased congestion. The adoption of future-ready technologies, the implementation of energy-efficient operations, and the integration of renewable energy all underscore India's commitment to green mobility. The government's vision for metro expansion emphasizes innovation, safety, and sustainability in urban transport.

The first-of-its-kind Conference on Green Metro Systems was conceptualized and organized by CII's Indian Green Building Council (IGBC) in partnership with Delhi Metro Rail Corporation (DMRC) in 2015. It was designed to bring together the world's urban rail community to exchange best practices, address industry challenges, and explore new innovations. Since then, the conference has grown each year, engaging diverse stakeholders from the transit industry and fostering insightful discussions and valuable networking opportunities.

IGBC has played a crucial role in ensuring that metro rail networks meet global sustainability benchmarks. Numerous metro stations and depots have achieved IGBC's green certifications, demonstrating a firm commitment to energy efficiency, water conservation, and enhanced passenger comfort. These efforts position India as a leader in sustainable transit infrastructure, setting a global example for urban transport.

As metro networks continue to expand, the focus must remain on integrating smart mobility solutions, ensuring seamless last-mile connectivity, and enhancing the overall commuter experience. The journey ahead is promising, and with continued collaboration and innovation, India's metro systems will serve as a model for efficient and eco-friendly urban transport.

We are thankful to all the metro rail authorities across the country and all stakeholders of metro rail systems for their active participation and support to all our initiatives.

O H Pande
Chairman,
International Conference on Green Metro Systems 2025
and Director (Electrical),
Delhi Metro Rail Corporation

Message from

National Vice-Chairman,
CII-Indian Green Building Council and
Managing Director,
CSR Estates

India's metro systems are leading our nation's journey toward sustainable urban mobility. With our metro networks expanding rapidly across the country, CII's Indian Green Building Council along with all the Metro Rail Authorities across the country are setting new benchmarks in urban transit and environmental stewardship.

For example, DMRC's commitment to sustainability is evident in its innovative approach: all of its new metro rail network projects are registered with IGBC, with several achieving the IGBC's Platinum Rating, setting a benchmark for metro systems across Tier I and II cities in India. Notably, DMRC became the world's first metro rail project to claim carbon credits, and its headquarters at Metro Bhawan—as well as all associated residential buildings—have earned IGBC's Green Building Certification.

In close collaboration with metro rail authorities nationwide, IGBC has been driving this sustainable transformation. IGBC's Green MRTS Rating System evaluates the environmental performance of both underground and overhead metro stations. This promotes best practices in energy conservation and water efficiency while also playing a key role in reducing carbon emissions across our metro networks.

These combined efforts are a testament to the Indian government's broader vision for a cleaner and greener future. By designing all metro infrastructures as green which enables adoption of future ready technologies, together with our stakeholders we continue to create urban spaces that are both resource efficient and environmentally responsible. As we continue to expand and enhance our metro systems, we remain dedicated to reducing our carbon footprint and improving the quality of urban life across the nation.

Together, through innovation and collaboration, India's metro systems are driving the way for a sustainable future in urban mobility—one where every journey contributes to the well-being of our environment and people of the country.

C Shekar Reddy
National Vice Chairman,
CII - Indian Green Building Council and
Managing Director,
CSR Estates Ltd

CII - Green Business Centre

Adopting the green path today is no longer a choice, but an imperative for ensuring a sustainable tomorrow. With a vision of facilitating India's transformation into one of the global leaders in green business by 2025, CII has adopted a multi-pronged approach to equip the industry with the latest & emerging concepts, tools and skills to gain a competitive advantage in sustainable development.

The CII - Green Business Centre (CII), a CII Centre of Excellence on green business, set up in 2004 in Hyderabad, was a timely step in this direction. Today, the centre offers services covering green buildings, green companies, energy management, green products, and renewable energy. The centre has developed green ratings and certifications, and undertakes audits, advocacy, cleantech projects, capacity building, and outreach initiatives.

Confederation of Indian Industry

IGBC

About
CII-Indian Green Building Council

Indian Green Building Council (IGBC), part of CII is a committee-based, member-driven organisation that is playing a catalytic role in building a greener and healthier India. The Council has the unique distinction of pioneering and spearheading the 21st century modern green building movement in India.

IGBC strongly espouses that green buildings and green built environment not only address ecological issues and concerns but also enables in enhancing the quality & wellbeing of the occupants and in the process build a healthier India. Building on this imperative, IGBC has adopted a 'movement approach' and works closely with all the national and international stakeholders.

The council offers a wide array of services that include -developing new green building rating programmes, certification services and green building training programmes. The council organises Green Building Congress, which is now recognised as a major event in Asia.

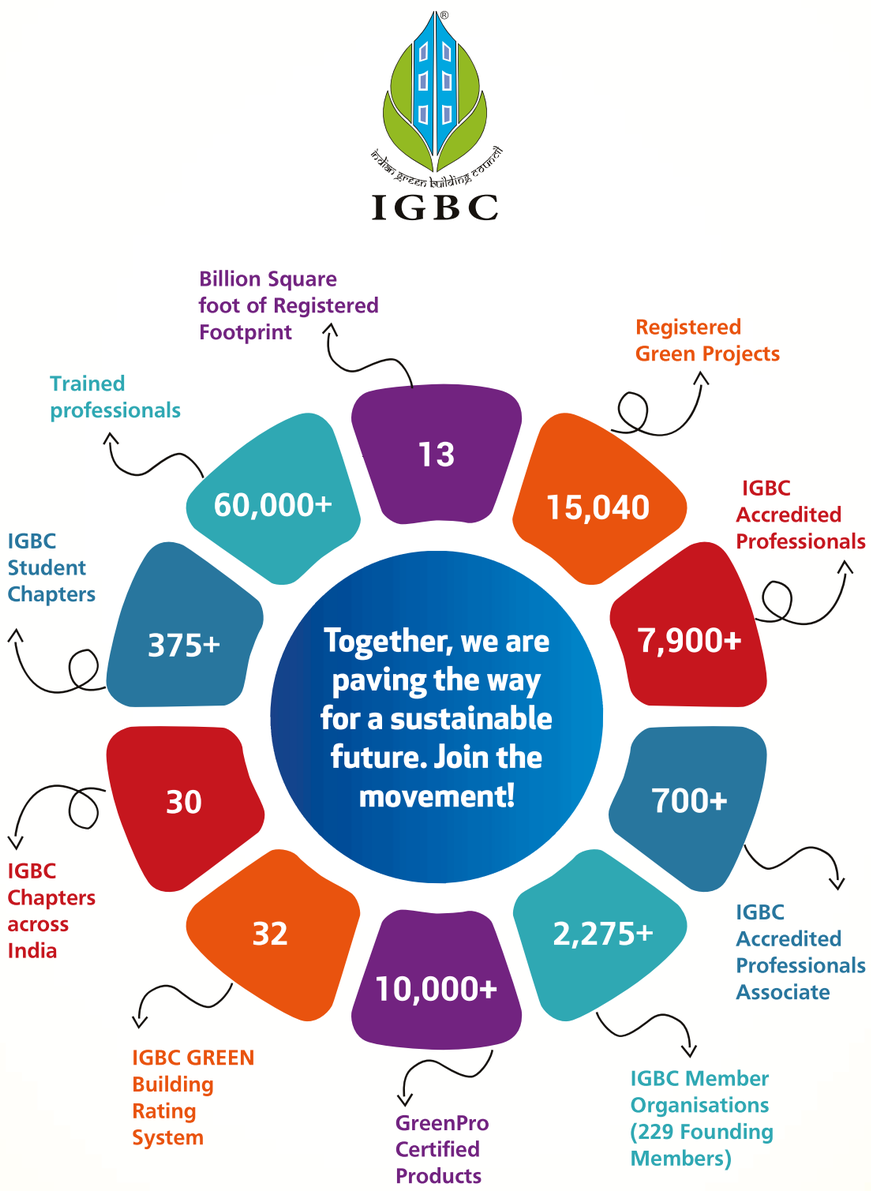
The vision of the council is, "To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025"

Vision

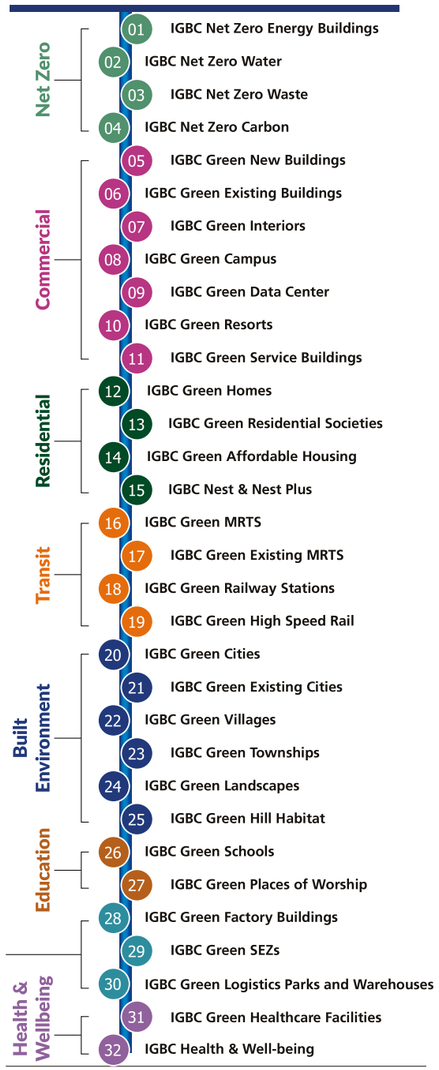
To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025.

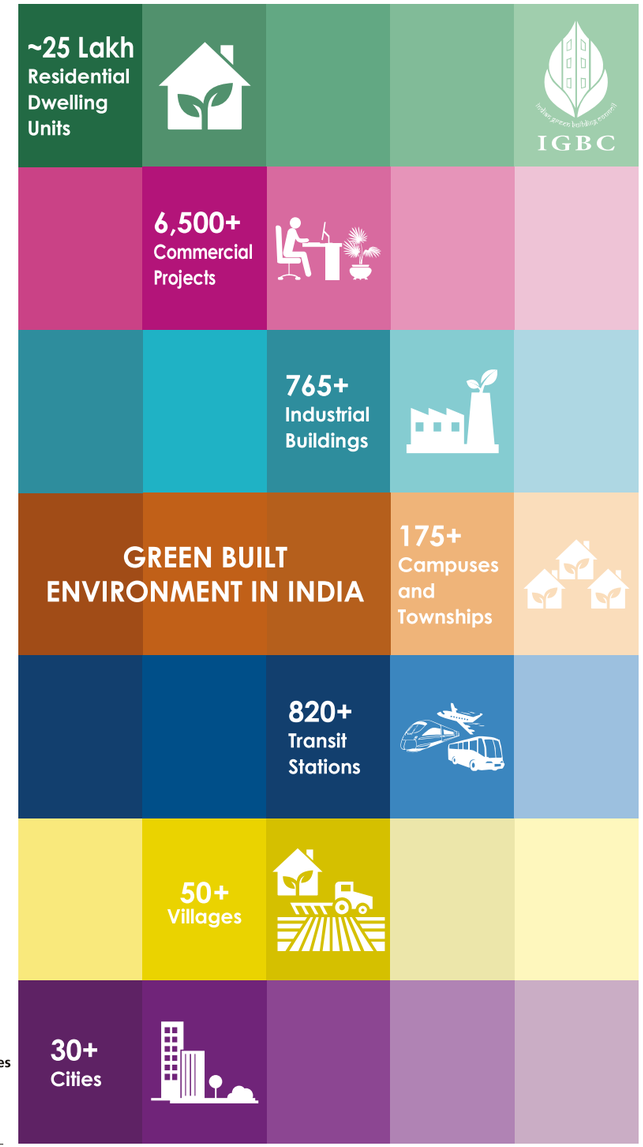
GREEN BUILT ENVIRONMENT IN INDIA
THE GROWING NUMBERS

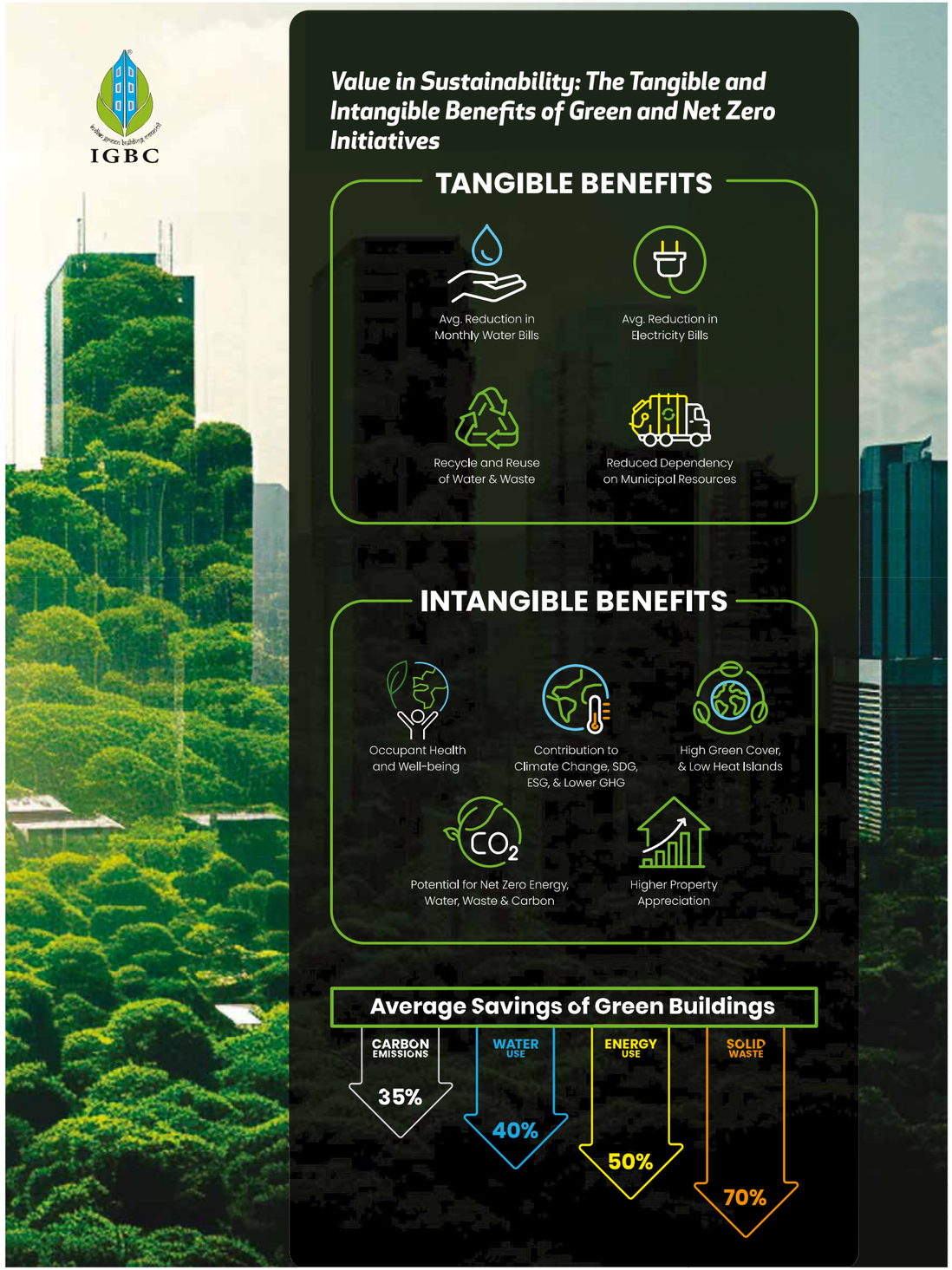
(As on 1st February, 2025)



IGBC
GREEN & NET ZERO BUILDING RATINGS

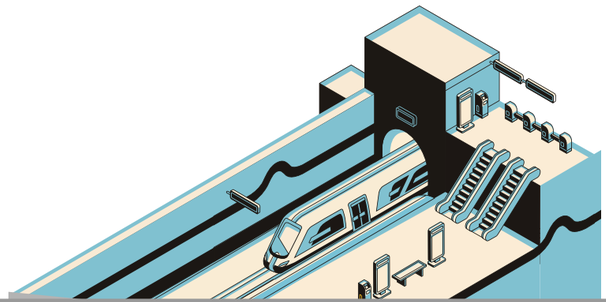






Glimpses of First Expert Committee Meeting on IGBC Green MRTS Rating System

20 June, 2014 : DMRC Metro Bhawan



GREEN MOBILITY

The concept of
Green Mobility

India has been experiencing phenomenal growth in urban population in the last few decades. The percentage of urban population has increased from 27.81 percent in 2001 to 31.16 % in 2011. As of 2023, this figure has risen to approximately 36.36%. As a result, India is witnessing tremendous growth in transportation sector and the share of personalised modes of transport such as two-wheelers and four-wheelers is increasing exponentially. This in turn is resulting in increased GHG emissions and poor air quality in Indian cities. The transport sector is the second-largest contributor to carbon dioxide (CO_2) emissions in India, accounting for 12% of the country's energy-related CO_2 emissions. Besides CO emissions, the sector also gives rise to negative impacts such as road congestion, local air pollution, noise and accidents.

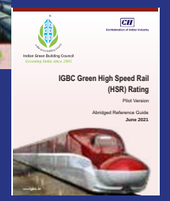
The need of the hour is to promote low carbon Transport in India. Opportunities exist to make India's transport growth more sustainable by aligning development and climate agenda. India's National Action Plan on Climate Change (NAPCC) recognizes that GHG emissions from transport can be reduced by adopting a multifaceted approach through a combination of measures like increased use of public transport, adoption of cleaner fuels, promotion of EVs, and implementation of policies aimed at sustainable urban development.

Rail and metro transportation play a vital role in sustainability by offering energy-efficient, low-emission alternatives that help reduce traffic congestion and air pollution, aligning with global climate goals. To reach their full potential and ultimately set the standard in carbon management in transportation, these systems must decarbonize.

IGBC Green MRTS Rating
(For New Metro Rail Projects)
Green Rating addressing design & construction

IGBC Green Existing MRTS Rating
(For Operational Metro Rail Projects)
Green Rating addressing operational performance

IGBC Green Railway Stations Rating
(For New & Operational Railway Stations)
Green Rating addressing design, construction and operational performance



IGBC Green High Speed Rail Stations
Green Rating addressing design, construction and operational performance

IGBC Green MRTS Rating for
New Metro Rail Projects

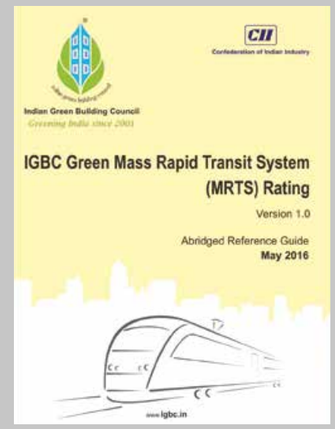
IGBC Green Mass Rapid Transit System (MRTS) Rating. is a tool to enable new rail-based MRTS to apply green concepts during design & construction, so as to further reduce environmental impacts that are measurable.

Building on this imperative, cities across the country are developing metro rail systems to make travel easier & comfortable for commuters across cities. This at the same time is going a long way in bringing down GHG emissions and facilitating a Greener India. Against this background, CII's Indian Green Building Council (IGBC) has launched IGBC Green Mass Rapid Transit System (MRTS) Rating.

IGBC Green MRTS Rating has been develop ed with the support of key stakeholders from Ministry of Urban Development, Metro Rail Authorities, General Consultants, Contractors, Technology Providers, Metro Rail Operators and Green Building Consultants. Essentially, IGBC Green Building Rating System enables the designer to apply integrated green concepts and reduce environmental impacts that are measurable.

The Rating System addresses the most important national priorities which include -water conservation, waste management, energy efficiency, reduced use of fossil fuels and lesser dependence on usage of virgin materials. The overarching principle of IGBC Green MRTS Rating is to enhance commuter experience.

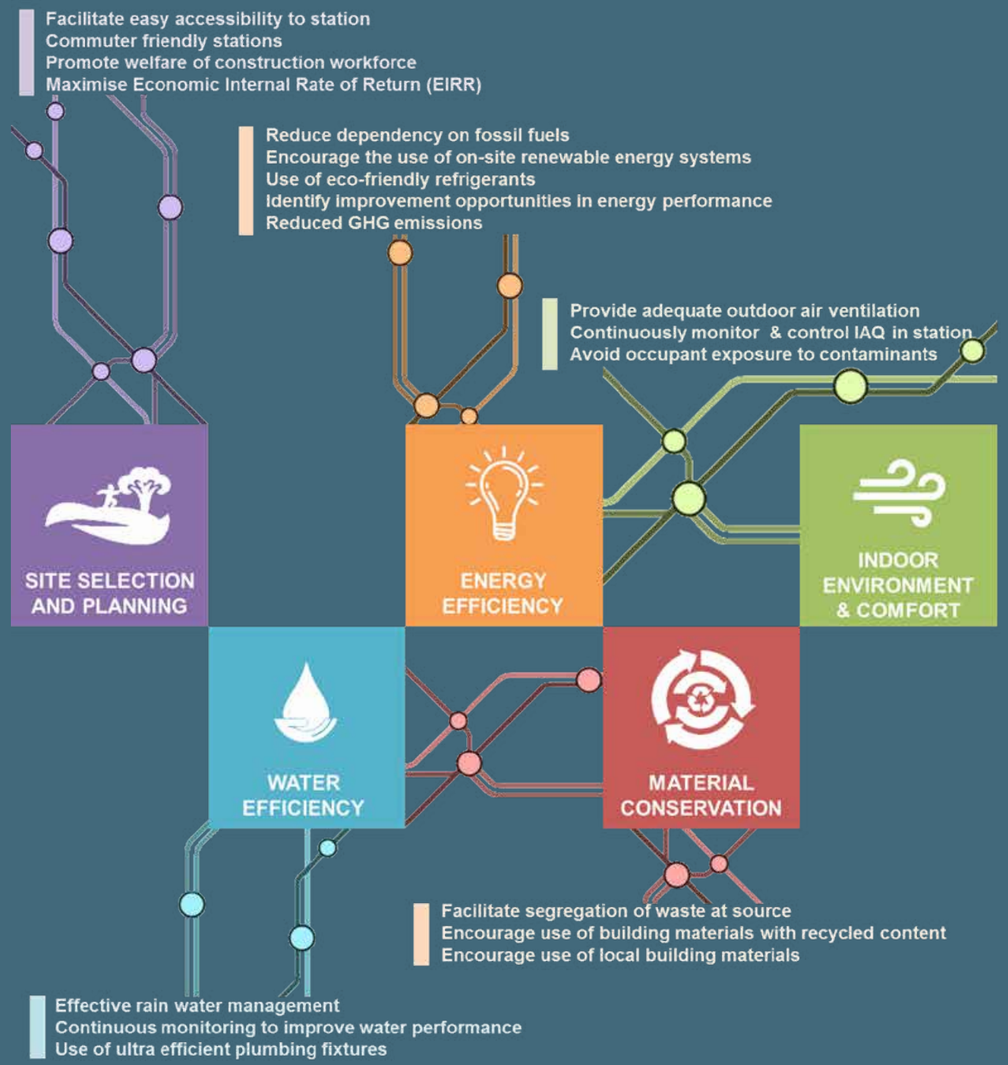
World's First-of-its-kind Green Rating for Metro Projects



IGBC Green MRTS Rating launched at Green Building Congress 2014 by Mr K. T. Rama Rao, Minister for Panchayat Raj and IT, Govt. of Telangana

Green MRTS Assessment Framework

All New Metrorail projects can apply green concepts
in the design, construction & operation based on the framework

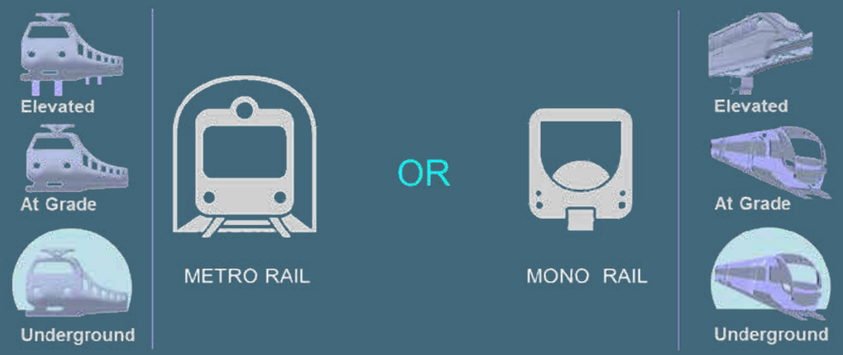


Benefits for Metro projects adopting IGBC Green MRTS Framework

1. Reduced dependency on private vehicles thereby minimising the environmental impacts associated with the use of fossil fuels
2. Integration with other modes of public transport thereby enhancing connectivity
3. Enhanced station accessibility to improve first & last mile

1. Maximise resource efficiency
2. Increased environmental awareness among commuters
3. Enhanced commuting experience

Scope of IGBC Green MRTS Rating



Green Metro Rail Movement in India

17 Metro Rail Authorities have adopted IGBC Green MRTS Rating Program for Design, Construction and Operation & Maintenance

Addresses green design & construction of Metros:

- ★ Site Selection and Planning
- ★ Water Efficiency
- ★ Energy Efficiency
- ★ Material Conservation
- ★ Indoor Environment and Comfort
- ★ Innovation

World's first Exclusive rating system to address Sustainability in Metro Rail systems

World-class standards in sustained performance and enhanced commuter comfort & experience

Enhances operational performance in Existing Metros:

- ★ Site and Station Management
- ★ Water Efficiency
- ★ Energy Efficiency
- ★ Indoor Environment and Comfort
- ★ Innovation

METRO STATIONS going Green : 720+

METRO STATION Green Footprint : 520 Million sq.ft

GREEN METRO Running Length : 650 Kms

IGBC Green Existing MRTS Rating for

Operational Metro Rail Projects

IGBC Green Existing Mass Rapid Transit System (MRTS) Rating is a tool to enable operational rail based MRTS to apply green concepts and sustain performance of system with respect to the green features during operation, so as to further reduce environmental impacts that are measurable.

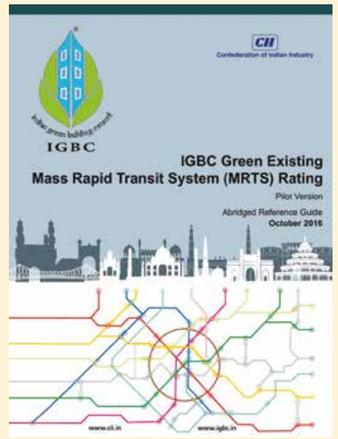
It is estimated that by the year 2030, the urban population would rise to 42% of the total population of the country. India is witnessing tremendous growth in transportation sector and the share of private modes of transport such as two-wheelers and four-wheelers is increasing exponentially.

To increase the share of public transport, many Indian cities are developing Rail based Mass Rapid Transit Systems (MRTS). Currently metro rail system (a type of rail based MRTS) is operational in 17 Indian cities. 5 more cities are developing metros which are under different stages of construction and 8 more cities are planning to have metro systems. Similarly several cities are planning for mono rail and light rail systems which are under various stages of development.

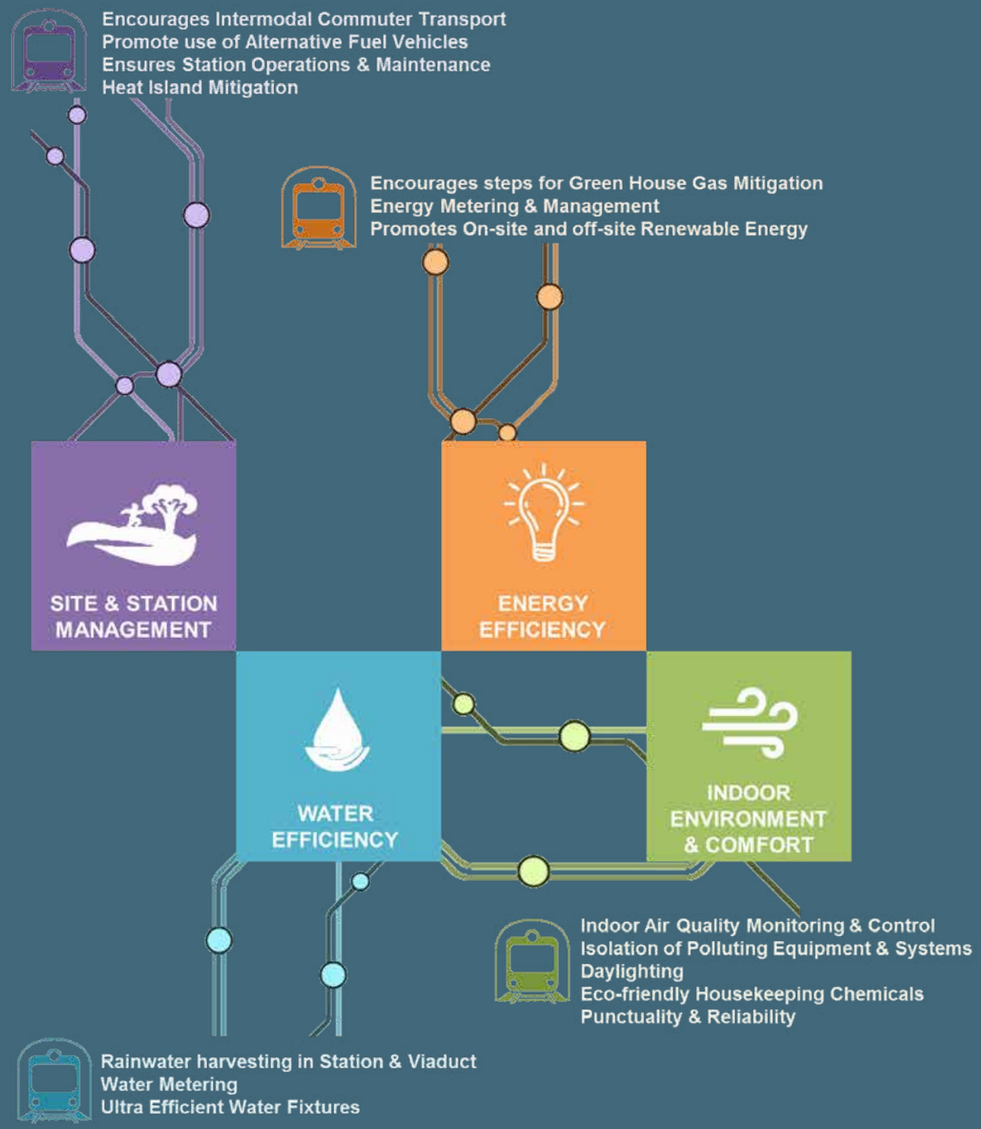
Now that several MRTS projects are designed & constructed as 'green', it is extremely important for the projects to be operated as 'green' from day 'one'.

The overarching objective of IGBC Green Existing MRTS Rating is to facilitate MRTS operators in implementation of green strategies, measure their impacts and sustain the performance in the long run, while enhancing commuter comfort & experience.

World class standards addressing sustained performance and enhanced commuter comfort & experience



IGBC Green Existing MRTS Rating launched at Green Building Congress 2016 by Mr Ashish Kumar Singh. IAS, Principal Secretary. PWD, Govt. of Maharashtra



Green features of
IGBC Certified Metro Stations

Site Environment Management : Aims to minimise negative impacts of construction activities on surroundings

Integration with other Modes of Transport : Encourages integration of MRTS network with other modes of transport thereby improving connectivity

Intermodal Commuter Transport : Facilitates accessibility to station, thereby improving the first and the last mile connectivity

Rain Water Harvesting, Station & Viaduct : Encourages effective rain water management, thereby enhancing ground water table

Water Monitoring : Encourage continuous monitoring to improve water performance of the station, thereby reducing the usage of potable water

Energy Efficiency, Traction & Nontraction : Enhances energy efficiency of the project to reduce dependency on fossil fuels, thereby minimising environmental impacts.

On-site Renewable Energy : Encourage the use of on-site renewable energy systems, to minimise the environmental impacts associated with use of fossil fuels

Green House Gas Mitigation : Facilitate reduction in Green House Gas (GHG) emissions through use of MRTS, thereby mitigating global warming

Platform Screen Doors at platforms of DMRC

Compensatory plantation of 66,000 saplings in 1:25 ratio & 129 year old tree transplanted by CMRL

Around 35% energy savings through Regenerative Braking in DMRC Rolling Stock

Vertical garden on metro pillars of KMRL

Dedicated cycle paths by L&T Metro, Hyd

1 MW solar power plant at DMRC metro station

Enhanced daylight at platforms of CMRL

Feeder bus facility of DMRC operating on CNG

GHG reduction through modal shift in Green Metros

DELHI METRO RAIL CORPORATION (DMRC)

Delhi NCR

दिल्ली मेट्रो रेल कॉरपोरेशन लिमिटेड
Delhi Metro Rail Corporation Limited

KEY GREEN FEATURES OF METRO PROJECT

SITE PLANNING

- Continuous air quality and noise level assessments during construction phase.
- Basic facilities for construction workforce.
- Integration of metro network with all modes of public transport, improving the first and last mile connectivity for commuters.
- Universal accessibility measures for elderly and differently abled.
- Plantation of 10 saplings for every uprooted tree.
- Dust control measures during construction phase.
- Re-cycling of construction waste material to preserve the environment.

ENERGY MANAGEMENT

- Use of regenerative braking system in rolling stock, leading to over 35% of energy savings on an average.
- DMRC has installed 50 MWp of solar PV in its premises and procuring 345 MU of solar energy per annum from REWA, Madhya Pradesh. DMRC is also procuring 2 MW of Green Power from Waste to Energy plant at Ghazipur.
- GHG emission reduction of more than 60% through modal shift from conventional modes of transport
- LPD (Lighting Power Density) reduction of more than 35% over minimum LPD requirement of ASHRAE 90.1-2010 benchmark
- VRF Units for the HVAC Systems resulting in a percentage improvement of about 25% in design efficiency as compared to ASHARAE 90.1-2010 benchmark.
- LED fixtures for 100% general lighting and display panels inside the train and signages inside the station

WATER MANAGEMENT

- Use of Ultra-low flow fixtures resulting in more than 33% reduction in water consumption compared to IGBC baseline
- Rainwater harvesting systems to capture more than 80% of storm water runoff from stations and 100% from viaducts

MATERIAL CONSERVATION

- Effective waste management to divert over 100% of construction waste from going to landfills.
- 23% of civil material used in the project is material produced with recycled content.
- 21% of civil material used in the project is sourced locally, within 400 kms of the project sites

INDOOR ENVIRONMENT & COMFORT

- More than 75% of regularly occupied spaces with adequate daylight in elevated stations
- Well ventilated platforms & concourse in stations, meeting minimum fresh air requirements.
- Eco-friendly & green chemicals used for housekeeping applications

The Delhi Metro has shown the world that India is capable of competently executing complex infrastructure projects of mammoth proportions while having a strong resolve towards conservation of the environment. IGBC has been working closely with DMRC in this regard, ensuring that the sustainable public transport can go a long way in resolving many grave environmental challenges that our cities face. It must also be added that the Delhi Metro is the first ever rail-based organization in the world to claim carbon credits for its 'regenerative braking' and 'modal shift' projects.

HYDERABAD METRO

HYDERABAD METRO RAIL LIMITED
L&T METRO RAIL (HYDERABAD) LIMITED

Hyderabad

L&T Metro Rail Hyderabad

KEY GREEN FEATURES OF METRO PROJECT

SITE PLANNING

- Continuous air quality and noise level assessments during construction phase.
- Basic facilities for construction workforce.
- Integration of metro network with all modes of public transport.
- All the stations are located within a 100m walking distance from the nearest bus station / rickshaw stand
- Discounted parking fee for Electric vehicles, Shuttle bus service at stations
- Universal accessibility measures for elderly and differently abled.
- Plantation of 500 saplings across the city
- More than 90% of the median area below viaduct with native species

ENERGY MANAGEMENT

- Over 40.4% of energy savings through regenerative braking system.
- Energy efficiency through high efficient building envelope systems
- 49% reduction in lighting power density (LPD) – 0.30 Watt / Sq.ft. as compared to ASHRAE baseline of 0.77 Watt / Sq.ft. (100% LED fixtures in station).
- 25.7% improvement in efficiency of HVAC equipment and systems over baseline criteria.
- 53% of average annual consumption is from Renewable sources – Solar PV on the rooftops of the buildings and stations
- 55% GHG emission reduction through modal shift from conventional modes of transport

WATER MANAGEMENT

- 47% reduction in water usage through ultra-low flow fixtures.
- 80% of storm water runoff from stations and 60% from viaducts is harvested

MATERIAL CONSERVATION

- 100% of construction waste generated is diverted from going to landfills.
- 39% of civil material used in the project is sourced locally, within 400 kms of the project sites.

INDOOR ENVIRONMENT & COMFORT

- 75% of all regularly occupied areas (platform and concourse level) in the station are day-lit.
- Use of low VOC paints, sealants and adhesives for healthy indoor environment

"Hyderabad Metro has obtained prestigious IGBC Platinum rating for 57 elevated stations for its technical innovations and adoption of green initiatives. This shows Hyderabad Metro's commitment towards the use of green energy and minimizing carbon footprint of the project. L&T Metro has initiated "Clean Development Mechanism - CDM" registration process under United Nations Framework Convention on Climate Change (UNFCCC) along with our Ministry of Environment & Forests."

- Shri KVB Reddy
MD & CEO, LTMRHL

CHENNAI METRO RAIL LIMITED (CMRL)

Chennai

KEY GREEN FEATURES OF METRO PROJECT

SITE PLANNING & STATION MANAGEMENT

- Top soil preservation: 10% of the excavated soil has been reutilized for construction of tunnels & underground station areas.
- Integration with intercity/ intra city sub urban railway. MRTS network plan is well integrated with bus terminus and airport.
- Stations within 100m walkable distance from a bus stop, dedicated drop-off zones, secured bicycle parking and motorcycle parking facility
- Universal Access Measures for wheelchair bound commuters, visually impaired commuters and hearing impaired commuters at all the stations & trains
- 25 new saplings planted for every uprooted tree
- Last mile connectivity

ENERGY MANAGEMENT

- Daylighting at street and concourse levels for energy efficiency.
- 33% energy savings through regenerative braking system.
- Full height platform screen doors (PSDs) at stations, leading to enormous energy saving in HVAC operations.
- LED Fixtures for 100% general lighting and display panels inside the train
- GHG emission reduction (in tCO2e) in year 2031 is projected to be 56.7%.
- Integration of solar panels on roofs for sustainable energy generation.

WATER MANAGEMENT

- 41.7% reduction in water usage through use of low flow faucets, water closets, health faucets and urinals.
- Rain Water Harvesting System at stations to harvest 100% of the run-off generated from roof and non-roof areas to the percolation pits.

MATERIAL CONSERVATION

- Environment Management Plan addressing construction waste management (proper segregation at scrap yard with signage, agreement with TNWML for bio-medical waste disposal and sale of construction waste to scrap dealers)
- Local materials sourced for the project is more than 95%.
- 21% of civil material used in the project is material with recycled content.

INDOOR ENVIRONMENT & COMFORT

- Use of low VOC paints, sealants and adhesives for healthy indoor environment
- Eco-friendly & green products used for housekeeping applications
- CO2 sensors and monitors have been installed in public areas of underground stations of CMRL for maintaining the indoor air quality.
- Commuter facilities.

> "Chennai Metro is committed to go green and minimize carbon foot print. All metro stations are awarded with Platinum rating"

Thiru M. A. Siddique
I.A.S., Managing Director,
Chennai Metro Rail Limited/

KOCHI METRO RAIL LIMITED (KMRL)

Kochi

KEY GREEN FEATURES OF METRO PROJECT

SITE PLANNING & STATION MANAGEMENT

- Continuous air quality and noise level assessments during construction phase.
- Basic facilities for construction workforce.
- Integration of metro network with all modes of public transport.
- Discounted parking fee for Electric vehicles at stations.
- Universal accessibility measures for elderly and differently abled.
- Prevention of heat island effect from roof and non-roof by covering 100% roof area with high SRI paints and Solar PV panels and non-roof area with Light coloured paver blocks
- Plantation of 2,500 saplings across the city (20 saplings for every uprooted tree)
- Provision of cycle tracks to promote first & last mile connectivity

ENERGY MANAGEMENT

- Commissioning of every equipment & systems has been done by various third party agencies
- Over 56% of energy savings through regenerative braking system.
- 35% reduction in lighting power density (LPD) – 0.30 Watt / Sq.ft. as compared to ASHRAE baseline of 0.77 Watt / Sq.ft. (100% LED fixtures in station).
- 2.0475 MWp of Solar PV system amounting to 100% of average annual non-traction consumption
- 50% GHG emission reduction through modal shift from conventional modes of transport

WATER MANAGEMENT

- 40% reduction in water usage through ultra-low flow fixtures.
- Rainwater harvesting systems to capture more than 80% of storm water runoff from stations and 100% from viaducts

MATERIAL CONSERVATION

- 80% of construction waste generated is diverted from going to landfills.

INDOOR ENVIRONMENT & COMFORT

- 75% of all regularly occupied areas (platform and concourse level) in the station are day-lit.
- Use of low VOC paints, sealants and adhesives for healthy indoor environment
- Use of green certified products for housekeeping applications

UTTAR PRADESH METRO AGRA METRO RAIL PROJECT

Agra

KEY GREEN FEATURES OF METRO PROJECT

SITE PLANNING

- Continuous air quality and noise level assessments were conducted during the construction phase.
- Basic facilities such as PPE, sanitation, and drinking water were provided for the construction workforce.
- The metro network is well integrated with intercity and intracity transport systems, enhancing first- and last-mile connectivity.
- Universal accessibility measures include ramps, tactile paths, and designated spaces inside trains for differently abled commuters.
- For every tree removed during construction, Agra Metro has planted 10 new saplings to maintain the green cover.
- Effective dust control measures, including wheel washing facilities and water sprinkling, were implemented.
- Construction and demolition waste was segregated and managed per IGBC guidelines.

ENERGY MANAGEMENT

- More than 40% energy savings have been achieved through regenerative braking systems.
- 100% of lighting inside stations and trains consists of LED fixtures.
- The metro system plans to procure solar power for operations, reducing dependency on fossil fuels.
- GHG emissions are projected to be reduced by over 56% through a shift from conventional transport to metro services.
- High-efficiency HVAC systems have been installed, reducing energy consumption by 25% compared to baseline standards.

WATER MANAGEMENT

- Ultra-low flow fixtures have reduced potable water consumption by 44.65% across all three elevated stations.
- Rainwater harvesting systems have been installed, capturing 100% of stormwater runoff from roofs and non-roof areas.
- Borewells and recharge pits ensure efficient percolation and storage of harvested rainwater.
- A comprehensive O&M plan is in place for regular water audits and maintenance of rainwater harvesting structures.

MATERIAL CONSERVATION

- Over 100% of construction waste was diverted from landfills through on-site reuse and recycling.
- 23% of civil materials used in the metro's construction contained recycled content.
- More than 21% of construction materials were sourced locally, reducing environmental impact.

INDOOR ENVIRONMENT & COMFORT

- Over 75% of regularly occupied spaces in stations have access to daylight, reducing artificial lighting needs.
- Well-ventilated platforms and concourses ensure fresh air circulation for passenger comfort.
- Eco-friendly and green-certified products are used for housekeeping and maintenance.

Agra Metro is a sustainable urban transit system designed for eco-friendly mobility. With IGBC Platinum-rated stations, it features energy-efficient lighting, regenerative braking, solar power, and advanced water conservation. Seamless connectivity and green initiatives make it a model for sustainable urban transport

UTTAR PRADESH METRO LUCKNOW METRO RAIL

Lucknow

KEY GREEN FEATURES OF METRO PROJECT

SITE PLANNING & STATION MANAGEMENT

- Continuous air quality and noise level assessments during construction phase.
- Basic facilities for construction workforce.
- Integration of metro network with all modes of public transport.
- Universal accessibility measures for elderly and differently abled.
- Plantation of 4,060 saplings across the city (20 saplings for every uprooted tree)
- Common / Unified ticketing system that will support inter-operability with different operators using a common card for multiple operators.
- 100% of the median area below viaduct with native species.

ENERGY MANAGEMENT

- Over 38% of energy savings through regenerative braking system.
- 60% reduction in lighting power density (LPD) – 0.30 Watt / Sq.ft. as compared to ASHRAE baseline of 0.77 Watt / Sq.ft. (100% LED fixtures in station).
- 1 MWp of solar PV panels amounting to 31% of average annual consumption – Implementation under progress.
- 62% GHG emission reduction through modal shift from conventional modes of transport

WATER MANAGEMENT

- 43% reduction in water usage through ultra-low flow fixtures.
- More than 80% of storm water runoff from stations and viaducts is harvested

MATERIAL CONSERVATION

- 100% of construction waste generated is diverted from going to landfills.
- 23% of civil material used in the project has recycled content.
- 44% of civil material used in the project is sourced locally, within 400 kms of the project sites.

INDOOR ENVIRONMENT & COMFORT

- More than 75% of regularly occupied spaces with adequate daylight
- Use of low VOC paints, sealants and adhesives for healthy indoor environment
- Eco-friendly & green products used for housekeeping applications

Lucknow Metro since its inception has carried forward the vision of "Clean Metro Green Metro". A continuous and rigorous air quality and noise level assessments were done regularly in addition to plantation of more than 4060 saplings across the city during the construction phase. We at Lucknow Metro have adopted various eco-friendly, energy efficient and environmentally sustainable measures thereby ensuring IGBC platinum rating for all the metro stations.

MAHARASHTRA METRO RAIL NAGPUR METRO RAIL PROJECT

Nagpur

KEY GREEN FEATURES OF METRO PROJECT

SITE PLANNING

- Maha Metro MRTS network is well integrated with bus terminus (intercity/ intra city), railway station and airport
- Stations are located within 100m walkable distance from a bus stop, dedicated drop-off zones, secured bicycled parking and motorcycle parking facility
- All feeder buses and autos shall operate on Eco-friendly fuel
- Provision of Electric charging stations for vehicles at stations
- Universal Access Measures for wheelchair bound commuters, visually impaired commuters and hearing impaired commuters at all the stations and train
- 17 new saplings planted for every uprooted tree
- Waster water generated at stations during operational phase is treated onsite using DRDO patented Bio-digester technology
  This will help reducing the environmental impact of the station's urban infrastructure

ENERGY MANAGEMENT

- 40% energy savings through regenerative braking system
- LED Fixtures for 100% general lighting and display panels inside the train and the station
- VRF air conditioners, thus able to achieve 35% energy improvement vis-à-vis energy efficiency requirement as per ASHRAE 90.1-2010
- Upto 65% of total energy including traction and non-traction will be met through solar energy
- GHG emission reduction(in tCO2e) is projected to be 36%.

WATER MANAGEMENT

- 52% reduction in water usage over UPC baseline criteria through use of low flow faucets, water closets, health faucets and urinals.
- Rain Water Harvesting system to harvest more than 90% of the run-off generated at viaduct and station roof and non-roof areas to percolation pits.

MATERIAL CONSERVATION

- Local materials sourced for the project is more than 40%.
- 21% of civil material used in the project is sourced locally, within 400 kms of the project sites.
- 92% of total construction waste diverted from landfills

INDOOR ENVIRONMENT & COMFORT

- More than 90% of regularly occupied spaces with adequate daylight
- Use of low VOC paints, sealants and adhesives for healthy indoor environment
- Eco-friendly & green products used for housekeeping applications

Our vision is to create a sustainable mass rapid transit system of international standards which will enhance the quality of life of the citizens of Nagpur. IGBC's guidelines are incorporated in design to make the project environmentally sustainable. It is expected that this project shall be instrumental in the overall development of the city by making it more vibrant & attractive

MAHARASHTRA METRO RAIL PUNE METRO RAIL PROJECT

Pune

KEY GREEN FEATURES OF METRO PROJECT

SITE PLANNING & STATION MANAGEMENT

- Environmental & Social Management Plans (ESMP) were implemented to mitigate construction impacts.
- Measures like wheel washing, site barricading, and dust suppression through water sprinkling were adopted.
- Over 4,425 cubic meters of topsoil were preserved and reused for landscaping along the metro corridor.
- Construction workforce received PPE, sanitation, first-aid, and drinking water facilities.
- Traffic diversions were optimized to minimize disruption, with a comprehensive traffic management plan in place.
- Metro stations are well integrated with bus terminals and railway stations, improving multimodal connectivity.
- Universal accessibility features include tactile paths, ramps, designated wheelchair spaces, and audio-visual wayfinding.

ENERGY MANAGEMENT

- More than 40% energy savings achieved through regenerative braking systems.
- High-efficiency HVAC systems reduce energy consumption by up to 21.4%.
- All stations are equipped with LED lighting for 100% general lighting and signage.
- Building envelope designed with energy-efficient materials, reducing heat ingress.
- Energy monitoring systems track HVAC, lighting, escalators, and renewable energy performance.
- GHG emissions reduced by 64.35% through modal shift from conventional transport to metro.

WATER MANAGEMENT

- Ultra-low flow water fixtures provide 24.03% savings in potable water consumption.
- Rainwater harvesting systems capture over 100% runoff from station roofs and 63.3% from viaducts.
- O&M plans ensure long-term sustainability of rainwater harvesting structures.
- Sub-metering installed for municipal water supply, borewells, and specific station functions.

MATERIAL CONSERVATION

- 100% of construction waste diverted from landfills through recycling and reuse.
- 20.35% of civil materials used contained recycled content.
- 61.76% of materials were locally sourced, reducing environmental impact.
- Metro stations feature dedicated waste segregation areas, with waste collected and treated by the Pune Municipal Corporation.

INDOOR ENVIRONMENT & COMFORT

- 100% of mechanically ventilated spaces meet fresh air requirements.
- Stations have high natural ventilation, with openable areas exceeding 10% of total floor space.
- Low-VOC materials used in paints, adhesives, and sealants to maintain indoor air quality.
- Janitor rooms and storage areas are equipped with independent ventilation systems.

Pune Metro is a sustainable urban transit system designed for energy efficiency, water conservation, and eco-friendly mobility. It features LED lighting, regenerative braking, rainwater harvesting, and seamless integration with bus and cycling networks. With over 95% construction waste diverted and a focus on recycled materials, Pune Metro, an IGBC Platinum-rated project, sets a benchmark for green urban transport.

NATIONAL CAPITAL REGION TRANSPORT CORPORATION

Delhi – Meerut Namo Bharat

KEY GREEN FEATURES OF METRO PROJECT

SITE PLANNING

- The project followed an Environmental & Social Management Plan (ESMP) to minimize the impact of construction activities.
- Safety, Health, and Environment (SHE) measures were integrated into all contract agreements.
- Dust and noise control strategies, including wheel washing, water sprinkling, and site barricading, were implemented.
- Topsoil preservation strategies ensured reuse for landscaping after construction.
- Traffic management plans were designed to minimize disruptions, with dedicated pedestrian walkways and traffic diversions.
- The station is seamlessly integrated with Indian Railways, ISBTs, and Delhi Metro, ensuring last-mile connectivity.
- Universal accessibility features include ramps, tactile pathways, specially designed AFC gates, and designated wheelchair spaces inside trains.

ENERGY MANAGEMENT

- 30% energy savings achieved through regenerative braking in traction power.
- 100% of general lighting and signage use LED fixtures, ensuring high energy efficiency.
- The HVAC system operates with a high COP of 4.09, providing 27% better efficiency than standard benchmarks.
- Escalators and elevators incorporate Variable Voltage Variable Frequency (VVVF) technology, reducing energy consumption by up to 30%.
- Building Management Systems (BMS) have been deployed for energy monitoring and optimization.
- On-site renewable energy systems (965.7 kWp rooftop solar PV) provide 42% of the station's non-traction power needs.
- GHG emissions are projected to be reduced by over 40% through modal shift to Namo Bharat.

WATER MANAGEMENT

- Ultra-low flow fixtures ensure 30% water savings over baseline consumption.
- Rainwater harvesting systems at the station capture 100% runoff from roofs and non-roof areas.
- The viaduct corridor from Sahibabad to Duhai has 124 rainwater recharge pits, each with a capacity of 22 cubic meters.
- Water sub-meters installed to monitor consumption from municipal and borewell sources.
- Periodic water audits will be conducted every 3 years to optimize conservation strategies.

MATERIAL CONSERVATION

- 95% of construction waste was diverted from landfills, with materials sent to a dedicated C&D waste recycling plant.
- 30% of materials used in construction contained recycled content, including PPC cement and AAC blocks.
- 41% of materials were sourced locally, reducing the environmental footprint.
- A two-bin system ensures segregation of dry and wet waste, with daily collection by NCRTC's waste management services.

INDOOR ENVIRONMENT & COMFORT

- Natural ventilation covers more than 10% of total floor space, ensuring fresh air circulation.
- IAQ management strategies during construction included anti-smog guns, site barricading, and covered material transport.
- Eco-friendly fire suppression systems and refrigerants (R-410a) are used, ensuring zero ozone depletion potential.

The NCRTC Delhi-Meerut Namo Bharat is India's first high-speed regional transit system, cutting travel time between Delhi and Meerut to under 60 minutes. With IGBC Platinum-certified stations, it integrates solar energy, regenerative braking, and rainwater harvesting, reducing GHG emissions by 40%. Seamlessly connected to railways, metros, and ISBTs, it ensures efficient, sustainable urban transport in the NCR

Shri Shalabh Goel,
MD, NCRTC

SUSTAINABILITY, INNOVATION AND TECHNOLOGY : STRATEGY FOR RAIL OPERATORS AND THEIR PARTNERS

In 2019, the Intergovernmental Panel on Climate Change (IPCC) reported that the transport sector accounts for about one-quarter of global greenhouse gas emissions. Of this, road transport is the largest contributor, accounting for 70 percent of all transportation emissions, meanwhile only 1 percent came from rail.

Rail and metro transportation play a vital role in sustainability by offering energy-efficient, low-emission alternatives that help reduce traffic congestion and air pollution, aligning with global climate goals. To reach their full potential and ultimately set the standard in carbon management in transportation, these systems must decarbonize. Decarbonization involves minimizing the carbon footprint at every stage of a metro system's life cycle.

International Conference on Green Metro Systems was created to bring the world's urban rail community together to share best practice and address industry challenges and future innovations, thus strengthening India's Green Metro Rail movement which started in 2013.

The conference has grown bigger and better with every year, involving diverse stakeholders from the Transit Industry, providing cutting-edge discussions and unparalleled networking opportunities. This allows all rail operators and supplier to examine emerging technologies such IoT, Predictive Maintenance, Intelligent Systems and Smart Asset Management.

What Green Metro Conference Offers You?

IGBC

- New Business Opportunities
- One-On-One Networking
- Target Audience
- Platform to Showcase your Products
- Brand Visibility
- Global Reach
- International & Govt Tie-ups

IGBC CONFERENCE ON GREEN METRO SYSTEMS A RETROSPECTIVE

4
EDITIONS
Since 2015

1200+
ATTENDEE

100+
SPEAKERS

350+
COMPANIES/ ORGANIZATIONS

EVENT TOPICS

To reflect on the ongoing innovation and challenges in making urban rail systems more efficient, sustainable, and passenger-friendly

- Decarbonization and Green Transit Solutions
- Make in India: Make for World
- Smart Rail Infrastructure and Digitalization
- Autonomous and Driverless Trains
- Sustainable Construction & Green Certified Products
- Integration with Multimodal Transport Systems
- Passenger Experience and Accessibility
- Resilience and Adaptation to Climate Change
- Energy Storage and Regenerative Braking
- Financing and Public-Private Partnerships (PPP)
- Cost Optimization in Metro Rail Construction
- Real-Time Monitoring and Predictive Maintenance
- Environmental Impact of Operations
- Improving Passenger Experience on 'Moving wheels'
- MaaS-Increasing the sustainability of Transport System
- Reduction in Green House Gas Emissions
- Case Studies – Metro Systems leading the way

WHY SPEAK AT GREEN METRO CONFERENCE 2025?

Panel Discussions | Goal Oriented Sessions
New Ideas & Innovations Futuristic Topics
Active Audience | Interactive Q & A Sessions

AUDIENCE PROFILE

Organisation

- Central and State Government Authorities
- Key Ministries i.e., Ministry of Railways, Ministry of Housing & Urban Affairs
- Metro Rail Operators, Indian Railways, Rail Coach Factories
- Contractors & Builders
- Architecture and Consulting Firms
- Smart Cities Development Authorities
- Research and Development Organizations
- End Users Private and Public Companies
- Legal Firms
- Solution Providers, OEM's Contractors & Suppliers
- Engineering & Construction Firms
- Public Sector Undertakings
- Banking and Funding Institutions
- Urban Planners and Consultants
- Technical Institutes and Universities
- Like-minded Citizens and Urban Mobility Experts

Designation

- Presidents, VP's, MD's & CEO
- Ministers, Secretaries, General Manager, Planners, Project Director
- MD, Directors, GM, Heads & Chiefs
- CEO, Procurement Manager
- MD, VP, Directors, Chief Signal Expert, Senior ArchitectsManager, Heads & Chiefs
- Manager, Heads & Chiefs
- Directories, Dy. Directors, Research & Development Heads
- Founders, Co-Founder, Project Managers
- Associates, Managing Partners, Partners
- Advisors and Project Directors
- Chief Mechanical Engineer
- Managing Director, CEO & Executive Director
- Chairman, Vice-Chairman
- Maintenance Heads & Managers
- Chancellor, Vice-Chancellor, Professors
- Specialists, Transport Expert, Consultants

Conference on Green Metro Systems 2019 : Key Messages

"Indian cities through their multi-pronged approaches are adeptly dealing with environmental challenges. She further added that Sustainable urban transportation is one of the focus areas and greening of metro rail systems will augur well for sustainable urbanisation in the Country."

MS PREETI SONI
Chief - Climate Change, Resilience and Energy, UNDP

"Conference has consolidated itself as one of the sought-after events for various stakeholders of metro rail. The goal is to collectively work together in creating a better and greener metro systems.

DMRC will continue to work more closely with IGBC in greening its various forms of built- environment."

MR O H PANDE
Chairman, Conference on Green Metro Systems 2019 &
Director (Electrical), DMRC Ltd

"Greening of MRTS across the Country will complement with various path-breaking initiatives of the Government in addressing concerns related to emissions, urban transportation, fuel consumption, etc.,

DMRC has carved a niche in inspiring other metro rails go the green way. Today, India is one of the top 3 countries in the world in terms of largest registered green building footprint and is well poised to lead the global green building movement."

MR V SURESH
Chairman
Indian Green Building Council (IGBC)

OVER 100 SUBJECT MATTER EXPERTS

Presented in Earlier Editions

Mr Abhay Bakre,
Railway Board

Dr Mangu Singh
DMRC

Mr Alkesh Kumar Sharma, IAS
Kochi Metro Rail Corporation

Shri O. H. Pande
Director (Electrical), DMRC Ltd

Mr Pankaj Kumar Bansal, IAS
Chennai Metro Rail Ltd

Mr Jitendra Tyagi
Uttarakhand Metro Rail Corporation Ltd

Mr Abhay Mishra
Mumbai Metro One Pvt Ltd

Mr Arun Bhatia
UTC - Climate, Controls & Security

Mr Venkatraman S
Schneider Electric IT India

Mr Daniel Dunoye
Alstom Hong Kong

Mr A K Garg
DMRC

Mr Bruno Vantu
Egis Rail India

Mr Harshul Khanna
Johnson Controls India

Mr Sudeept Maiti
WRI India

Mr Shailesh Tokekar
Wipro Enterprises Pvt Ltd

Mr Animesh Sharma
Hero Future Energies

Mr Madhuresh Kumar, IRSE
East Central Railway

Mr V.B. Gadgil
L&T Metro Rail (Hyderabad) Ltd

Mr Vir S Advani
Blue Star Ltd

Mr Yoshiyuki Mabuchi
Toshiba Johnson Elevators (India)

Mr Jayesh Deshpande
Daikin Air Conditioning India Pvt Ltd

Mr Vijay Kumar Mishra
Contravolts Infotech Pvt. Ltd

Mr V Suresh
Chairman, IGBC Policy Advocacy & Govt. Relations

Mr Scott Moorhouse
Danfoss Turbocor Compressors Asia

Mr Dinesh Semwal
Ensavior Technologies Pvt Ltd

Mr Sharad Jhingan
AceUrban, Greenko Group

Mr Ankit Magan
Retas Enviro Solutions

Mr S A Verma
DMRC

Confederation of Indian Industry

INDIAN METRO RAIL ORGANIZATIONS' SOCIETY

दिल्ली मेट्रो रेल कॉरपोरेशन लिमिटेड
Delhi Metro Rail Corporation Limited

IGBC

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Schneider Electric

Silver Supporters

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BUILT ON TRUST

ENGINEERING TOMORROW
Danfoss

Diversey
A SOLENIS COMPANY

Lunch Host

INDIAN METRO RAIL ORGANIZATIONS' SOCIETY

cii.in igbc.in

Glimpses of
Conference on Green Metro Systems

Over the next 30 years, India's urban boom is expected to add hundreds of millions of new urban residents to the already increasing massive population in the cities. In spite of all the benefits, rapid sprawl also presents massive challenges like handling congestion and pollution in order to ensure an inclusive and equitable growth. As a result, cities are experiencing tremendous increase in vehicular numbers and the share of private modes of transport such as two-wheelers and four-wheelers is increasing exponentially.

The transport sector in the country has a very crucial role to play to ensure the execution and advancement of an environmentally friendly and sustainable growth.

Conference on Green Metro Systems 2015 FIRST EDITION

Dr Mangu Singh, Managing Director, Delhi Metro Rail Corporation (DMRC) addressing at the Conference

Dr Prem C Jain, Chairman, Indian Green Building Council addressing at the Conference

Mr A K Gupta, Chairman – Conference on Green Metro Systems 2015 & Directtor (Elec.), DMRC Ltd. addressing at the Conference

Conference on Green Metro Systems is an exclusive Green Conference conceptualized to emphasize on Sustainability as a key driver in the further development of Metro rail in India, thus strengthening India's Green Metro Rail movement which started in 2013. The conference has grown bigger and better with every year, involving diverse stakeholders from the Transit Industry, providing cutting-edge discussions and unparalleled networking opportunities.

Panelists sharing their views on 'Importance of Green MRTS Systems in Green Smart Cities at the Conference'

Conference on Green Metro System 2016 SECOND EDITION

Conference on Green Metro Systems

The rating has received tremendous response from metro rail authorities across the country and has put India in the forefront of Green Metro Systems in the world. Today, over 470 metro stations of Delhi, Chennai, Kochi, Hyderabad, Lucknow, Noida, Bangalore, Mumbai, Kolkata, and Nagpur metro systems amounting to a built-up area of 52.38 million sq.ft and covering over 570 kms, are going green with IGBC Green MRTS Rating. The benefits envisaged include maximizing resource efficiency, incorporating environment management practices, segregation of construction and demolition waste at source to encourage reuse or recycling of materials, avoiding waste being sent to landfills and increased environmental awareness among the commuters, thereby developing world-class Green Metro Systems in India.

Conference on Green Metro Systems 2017 THIRD EDITION

Special recognition for DMRC on being World's 1st Metro Rail Corporation with a complete sustainable built environment involving IGBC-rated Green Metro Stations, Depots, Offices, Residences & Landscapes

53 DMRC officials qualified IGBC Accredited Professional Exam

HIGHLIGHTS - Conference on Green Metro Systems 2019 FOURTH EDITION

- 250+ delegates participated
- Participation from metro rail authorities, contractors, architects, consultants, leading rolling stock manufacturers, major HVAC manufacturers and key people-mover system providers.
- Special recognition awards to DMRC Ltd for being the Leader in the Green Transit Movement in the country.
- Launch of a special short film highlighting the journey of last six years of India's green Metros
- Release of a Dossier on IGBC's journey with Metro Rail Authorities in the country.

Conference on Green Metro System 2019 FOURTH EDITION

Keynote Address

Conference on Green Metro System 2019

The 4th edition of the Conference has evoked an overwhelming response amongst the metro rail authorities, general consultants, rolling stock manufacturers, architects, green building consultants, and technology providers. The 4th edition included a High-powered Panel Discussion and three Technical Sessions on Energy, Water and Waste Management with over 20 speakers (covering success stories & innovative green technologies).

More than 250 professionals including government officials, decision-makers, planners, technology experts dedicated their valuable time for the one-day event to engage, share, learn, and build a long-lasting partnership with metro authorities, thereby scaling of research and innovation in the urban transit sector.

"Urban transportation system like metro rails are the most efficient and environment- friendly modes of transportation. Reduction in fossil fuel consumption, reduction in air-pollution, decline in accidents and saving in time are some of the key benefits of metro rail systems.

Greening our metro stations and various other forms of DMRCs built environment is one of our focus areas. All the new stations of DMRC will be designed and constructed as green."

DR MANGU SINGH
Managing Director,
DMRC Ltd

The conference aimed to achieve sustainability and resilience of urban transit for a greener city as they are the key challenges of our time. This conference was a way to deal with the need for adaptation to the effects of a changing climate and urban environments as they are increasingly questioning the sustainability and resilience of urban environments and infrastructure systems.

Green Metro Rail Movement in the country over the years

IGBC Green MRTS Rating Expert Committee Meeting held in 2014 at DMRC Metro Bhawan, New Delhi

L&T Metro Rail (Hyderabad) Ltd and Hyderabad Metro Rail Limited receiving award for Green Stations at Green Building Congress 2018, Hyderabad

Hon'ble Prime Minister Shri Narendra Modi flagging off DMRC's IGBC Platinum rated Badarpur-Faridabad Metro Station

"It is heartening to note that all stations of Kochi Metro have achieved Platinum rating which is the highest certification level given by the Indian Green Building Council"

Hon'ble Prime Minister of India, Shri Narendra Modi at the inaugural of Kochi Metro, 17 June 2017

Mr B Thiagarajan Vice Chairman-IGBC presenting Green Metro Platinum Plaque for DMRC Line 7 stations to Shri Vikas Kumar, MD, DMRC on 20 Oct 2022 at Hyderabad

IGBC Green MRTS Plaque presented to Shri Kumar Keshav, Managing Director, Uttar Pradesh Metro Rail Corporation Ltd

Mr Kumar Keshav, MD, LMRC receiving IGBC Founding Membership Plaque

Dr Mangu Singh, MD, DMRC receiving the WorldGBC's-Asia Pacific Leadership in Green Building Awards 2016 from Ar. Tai Lee Siang, Chair, World Green Building Council

Exchange of MoU between Mr A K Gupta, Director (Electrical), DMRC Ltd. and Dr Prem C Jain, Chairman, IGBC

Award of IGBC Senior fellow to Dr. Vikas Kumar, M.D., DMRC Limited at Green Building Congress 2024

Dr. Brijesh Dixit, Managing Director - Maha Metro - Nagpur Metro Rail Corporation Limited receiving IGBC Green MRTS Plaques from Ar Ashok Mokha Chairman, IGBC Nagpur Chapter

Mumbai Metropolitan Region Development Authority (MMRDA) and IGBC Green Metro Rail Movement

Awareness Programme on Green MRTS for Bangalore Metro Rail Corporation Limited (BMRCL)

One day Training Programme on Green MRTS for Maha Metro- Nagpur Metro Rail Corporation Limited (NMRCL) officials

Thiru Pankaj Kumar Bansal, IAS., Managing Director, Chennai Metro Rail Limited receiving IGBC MRTS plaques from Ar C N Raghavendran, Chairman IGBC Chennai Chapter

Mr Elias George, MD, KMRL Plantation on World Environment Day 2016

India leading the Green Metro Rail Movement

720+ Metro Stations of 17 Metro Rail Authorities going GREEN with IGBC

URBAN RAIL AUTHORITIES DRIVING INDIA'S GREEN MOBILITY TRANSITION

IGBC GREEN MRTS RATING : WORLD'S FIRST COMPREHENSIVE RATING FOR METRO RAIL PROJECTS

M Anand
Deputy Executive Director
CII - Indian Green Building Council

India is experiencing phenomenal growth in urban population in the last few decades. The percentage of urban population has increased from 27.81 percent in 2001 to 31.16 % in 2011.

As a result, India is witnessing tremendous growth in transportation sector and the share of personalised modes of transport such as two-wheelers and four-wheelers is increasing exponentially. This in turn is resulting in increased GHG emissions and poor air quality in Indian cities.

The transport sector is the second largest contributor to carbon dioxide (CO_2) emissions in India. Besides CO_2 emissions, the sector also gives rise to negative impacts such as road congestion, local air pollution, noise and accidents

The need of the hour is to promote lowcarbon Transport in India. Opportunities exist to make India's transport growth more sustainable by aligning development and climate agenda.

India's National Action Plan on Climate Change (NAPCC) recognizes that GHG emissions from transport can be reduced by adopting a sustainability approach through a combination of measures like increased use of public transport, higher penetration of biofuels, enhanced energy efficiency of transport vehicles, etc.

Building on this imperative, cities across the country are developing metro rail systems to make travel easier & comfortable for commuters across cities. This at the same time is going a long way in bringing down GHG emissions and facilitating a Greener India.

Against this background, CII's Indian Green Building Council (IGBC) has launched IGBC Green Mass Rapid Transit System (MRTS) Rating. This rating system is a tool to enable new rail-based MRTS to apply green concepts during design & construction, so as to further reduce environmental impacts that are measurable.

IGBC GREEN MASS RAPID TRANSIT SYSTEM (MRTS) RATING

IGBC Green MRTS Rating has been developed with the support of key stakeholders from Ministry of Urban Development, Metro Rail Authorities, General Consultants, Contractors, Technology Providers, Metro Rail Operators and Green Building Consultants. Essentially, IGBC Green Building Rating System enables the designer to apply integrated green concepts and reduce environmental impacts that are measurable.

The Rating System addresses the most important national priorities which include - water conservation, waste management, energy efficiency, reduced use of fossil fuels and lesser dependence on usage of virgin materials. The overarching principle of IGBC Green MRTS Rating is to enhance commuter experience.

SOME OF THE KEY ASPECTS ADDRESSED IN IGBCMRTS RATING INCLUDE:

Site Environment Management–Aims to minimise negative impacts of construction activities on surroundings.

Integration with other Modes of Transport-Encourages integration of MRTS network with other modes of transport thereby improving connectivity

Intermodal Commuter Transport - Facilitates accessibility to station, thereby improving the first and the last mile connectivity.

Rain Water Harvesting, Station & Viaduct - Encourages effectiverain water management, thereby enhancing ground water table.

Water Monitoring - Encourage continuous monitoring to improve water performance of the station, thereby reducing the usage of potable water.

Minimum Energy Efficiency, Traction & Nontraction - Enhances energy efficiency of the project to reduce dependency on fossil fuels, thereby minimising environmental impacts.

On-site Renewable Energy - Encourage the use of on-site renewable energy systems, to minimise the environmental impacts associated with use of fossil fuels.

Green House Gas Mitigation - Facilitate reduction in Green House Gas (GHG) emissions through use of MRTS, thereby mitigating global warming.

Segregation of Waste, during Operation - Facilitate segregation of waste at source to encourage reuse or recycling of materials, thereby avoiding waste being sent to landfills.

Indoor Air Quality (IAQ) Monitoring - Periodically monitor and control IAQ in the station to provide a healthy indoor environment to commuters in underground stations.

Station Flush-out - Facilitates in avoiding occupants exposure to indoor airborne contaminants before occupying the premises, so as to reduce adverse health impacts.

Commuter facilities - Provides basic facilities in station to enhance commuter experience.

IGBC Certified Green Metro Rail Projects: As on Jan 2025, over 730 Metro rail stations of Delhi Metro, Chennai Metro, L&T Hyderabad Metro, Lucknow Metro, Kochi Metro, Noida Metro, Maha Metro, Bangalore Metro, Kolkata Metro, MMRDA and MMRCL have adopted IGBC Green MRTS Rating programme. Presently, more than 250 metro stations are green-rated, demonstrating operational performance and enhancing commuter experience.

CONCLUSION

Green metro network offers commuters a memorable, healthier, and eco-friendly travel experience, reinforcing India's leadership in sustainable urban infrastructure. This in turn would further consolidate India's leadership position as one of the global leaders in sustainable built- environment. India's metro network has achieved a significant milestone, expanding to over 1,000 kilometers across 23 cities, making it the third-largest in the world. Additionally, ongoing projects aim to add over 1,000 kilometers of metro lines in 27 cities, further enhancing urban connectivity and promoting environmentally friendly transportation solutions.

Launch of IGBC MRTS Rating System at Green Building Congress 2014, Hyderabad

Delhi Metro Rail Corporation Limited

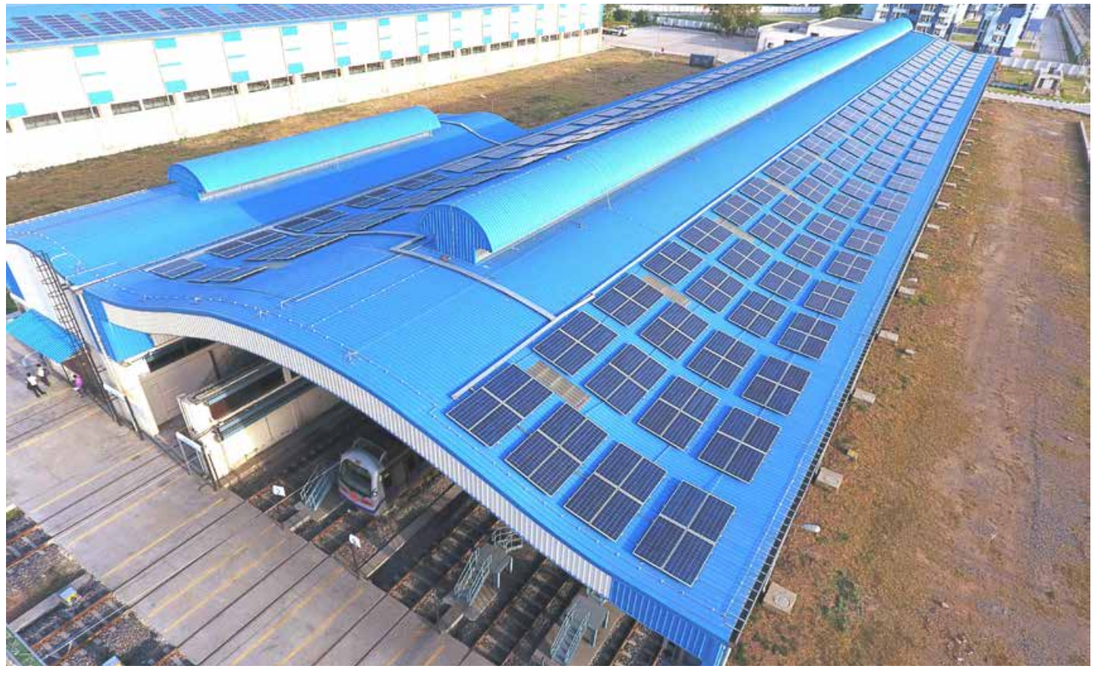
दिल्ली मेट्रो रेल कॉरपोरेशन लिमिटेड
Delhi Metro Rail Corporation Limited

DMRC and its Renewable Journey towards Sustainability

The Delhi Metro Rail Corporation (DMRC) has been a pioneer in sustainable urban transport in India, with a strong focus on incorporating renewable energy into its operations. Its journey in the field of solar energy and renewable power is a testament to its commitment to reduce its carbon footprint and enhancing energy efficiency.

The Solar Journey of DMRC was started in October 2012 when DMRC in association with Ministry of New and Renewable Energy and GIZ, Germany, commissioned the first roof-top Solar Plant on a Metro station in June 2014.

Since then, DMRC has successfully commissioned 50 Mega Watt of Onsite Solar power plants at its various establishments such as Metro Stations, Depots, Parking area, Saff Quarters and other buildings by the end of year 2022. Now DMRC has upgraded its target to implement 60 MWp of Solar PV Plants, by installing additional 10 Mega Watt solar power plants at DMRC's upcoming Phase-IV Network. For meeting the same, DMRC has already achieved a significant milestone by installing 1 Mega Watt solar capacity at Khyber Pass Depot Stabling Shed, as part of its new target, thus reaching 51 Mega Watt Solar Power Plant capacity in DMRC.



This ambitious roadmap not only sets an example for other urban transport systems but also supports India's broader renewable energy goals. With consistent progress, DMRC is well on its way to become a model of green public transport in the world.

All these Solar Power Plants are based on RESCO Model, with Power Purchase Agreement for 25 years, wherein DMRC only pays the Energy charges for the actual energy generated as per mutually agreed tariff.

In view of success of Solar Power Projects in DMRC, similar projects have been taken up by Indian Railways and other Metros like Kochi Metro, Chennai Metro, Lucknow Metro, NOIDA Metro.

Besides its on-site solar installations, DMRC's off-site solar energy journey stands as a significant milestone in its sustainability initiatives. By integrating off-site solar power into its energy mix, DMRC has set up new benchmarks for urban transport systems globally.

DMRC's off-site solar energy journey began in 2017 with a landmark agreement to procure 345 million units of Solar Energy annually from Rewa Ultra Mega Solar Power Project situated in Madhya Pradesh and thus becoming the first metro system in the world to adopt off-site solar energy for its operations.

The Rewa Solar power Project is one of the largest solar parks in India, with a total capacity of 750 MW, out of which DMRC's share is 99 MW, duly ensuring a steady supply of clean energy for its network. Approximately 60% of DMRC's daytime energy requirements and 30% of total energy requirement of DMRC, are being met using off-site solar power from the Rewa plant. This energy is being used for traction purposes, powering the metro trains across the network and Auxiliary services of Stations, Depot etc.

The off-site model allows DMRC to scale its solar energy procurement without the constraints of limited urban space. It offers flexibility to procure power from other renewable energy projects in the near future. DMRC's adoption of off-site solar power has been widely recognized as a pioneering initiative in the global public transport sector. This initiative has strengthened DMRC's credentials, helping it achieve platinum ratings for sustainability from the Indian Green Building Council (IGBC).

DMRC is continuously shifting its energy requirement from conventional fossil fuel based energy sources to Renewable energy. In this direction, DMRC is now carrying out a New and Innovative Application of vertical Bi-Facial Solar Modules by installing them vertically on metro viaduct. As the name suggests, Vertical Bi-facial Solar modules produce solar power from both sides of the panel thus optimizing the solar radiation with change in Sun's direction. These Vertical bifacial Solar modules are provided with solar cells on both the sides. By capturing solar energy on both sides, the use of these panels increases the performance of the solar plant by generating more energy than mono-facial solar panels.

A pilot project of Installation of 50 Kilo Watt Vertical Bi-facial Solar panels on the viaduct at Okhla Vihar Station of Line-8 has been successfully completed. This is the first project of its kind in the world in which the Metro viaduct will be used for solar energy generation by replacing its hand railings with Vertical Bifacial Solar Modules. This pilot project has been executed in association of Ministry of New and Renewable Energy and GIZ, a non-profit group from Germany. The vertical installation of solar panels in the metro corridor will also help in reducing the noise to the surrounding areas of Metro corridors, caused due to running of trains

As the project is installed in the empty spaces on viaduct of metro rail, it doesn't require any land or rooftop space. The success of this pilot project would open the opportunity to install solar panels on entire via-duct running along the metro corridor and also along Expressways, Highways, roads, railways, boundary fences and/or other linear Projects. The space used by the vertical solar is very minimal in comparison to normal ground mounted or rooftop systems.

The Delhi Metro Rail Corporation's solar journey exemplifies how urban transportation systems can integrate renewable energy to promote environmental sustainability. With consistent efforts, innovative collaborations, and ambitious goals, DMRC has set a benchmark for other metro systems worldwide. As it continues to expand its network, DMRC's dedication to renewable energy ensures a greener, cleaner future for urban mobility in India.

National Capital Region Transport Corporation

Namo Bharat is a rail-based, high-speed and high-frequency transit system with a design speed of 180 Kmph and an operational speed of 160 Kmph aimed at bringing people and places closer in the National Capital Region.

It is a long-term strategic initiative of the Government aimed at decongesting the National Capital Region (NCR), reducing vehicular congestion and air pollution, and fostering balanced urban development. It forms a crucial part of the Comprehensive Action Plan (CAP) for Air Pollution Control in Delhi & NCR and aligns with recommendations from the High-Powered Committee on Decongesting Traffic in Delhi.

India's first Namo Bharat corridor is being implemented on an 82 km long stretch between Delhi, Ghaziabad and Meerut. It will provide fast, reliable, safe, comfortable, efficient and sustainable transport solution and connect Delhi to the urban centres of Ghaziabad, Muradnagar, Modinagar, and Meerut. By linking major townships and business hubs, it will significantly improve connectivity and boost economic growth. The corridor will encourage polycentric development in NCR and improve the quality of life of the people.

At present a 55 km long section of the corridor, between New Ashok Nagar and Meerut South with 11 stations is already operational for the people. Construction of the remaining stretch is progressing at a rapid pace and the entire corridor will be operationalised as per the scheduled timeline.

Environmental & Mobility Impact

The implementation of the Delhi-Meerut Namo Bharat corridor is estimated to increase the share of public transportation usage along the corridor from 37% to 63%. Once fully operational, the first Namo Bharat corridor is expected to take more than one lakh private vehicles off the roads, thereby cutting ~2,50,000 tonnes of carbon dioxide in vehicular emissions per year. This shift will substantially reduce traffic congestion and dependence on private vehicles, leading to cleaner air and improved urban mobility.

Green Energy Initiatives

Sustainability is central to NCRTC's mission, with a strong commitment to promoting clean and sustainable energy sources. Aligned with the National Solar Mission and

NCRTC's own Solar Policy adopted in March 2021, NCRTC is steadfast on increasing the share of renewable energy by generating about 11 MW peak in-house solar power. To achieve this, the corporation is installing solar power plants on the rooftop of stations, depots, and other buildings and 4 MW capacity has already been commissioned. Upon full implementation, these initiatives will save approximately 11,500 tonnes of CO2 emissions annually, significantly contributing to the fight against climate change.

NCRTC has ensured its stations lead in clean solar energy adoption. Sahibabad and Guldhar Namo Bharat stations are the first in India to achieve the IGBC Net-Zero Energy (Operations) rating. Each station has a 729 kWp solar capacity, reducing 750 tonnes of CO2 emissions annually.

The Duhai Depot and Duhai Depot station with capacities of 585 kWp and 108 kWp as well as the Murad Nagar Receiving Sub Station (RSS) with a capacity of 43 kWp and the Ghaziabad RSS with a capacity of 20 kWp also generate solar power. Further installations at other stations are in progress.

To advance its renewable energy goals, NCRTC has also partnered with Power Trading Corporation (PTC) India for cost-effective green energy procurement.

Enhancing the green footprint

NCRTC is actively enhancing the corridor's green footprint by planting 250,000 trees along the Sahibabad–Shatabdi Nagar stretch, transforming station areas, medians, and depots into sustainable green zones.

To promote water conservation, over 950 rainwater harvesting pits have been installed along the corridor, strategically placed near stations and under elevated sections to maximize groundwater recharge. At Duhai Depot, two large ponds with a combined capacity of 66 lakh liters have been created to efficiently store the rainwater and release the excess water to replenish the ground water table.

Namo Bharat is a transformative step toward sustainable urban mobility, integrating green energy, innovative transit solutions, and environmental conservation. With a strong focus on renewable energy, carbon footprint reduction, and water conservation, NCRTC is setting new benchmarks for eco-friendly public transportation in India.

Chennai Metro Rail Limited

(A Joint Venture of Govt. of India and Govt. of Tamil Nadu)

CHENNAI METRO RAIL LIMITED

Introduction

Chennai is the fourth-largest city in India and the City with its present population of about 8 million commuting generates about 11 million trips in a day, with about 6 million vehicular trips. Chennai Metro Rail Project which aims at providing the people of Chennai with a fast, reliable, convenient, efficient, modern and economical mode of public transport, which is properly integrated with other forms of public and private transport including buses, sub-urban trains and MRTS.

Project Details

	Corridor	Length
Phase 1	Washermenpet to airport	23.1 kms.
	Chennai Central to St. Thomas Mount	22.0 kms.
	Total	45.1 kms.
	Depot, Admin bldg.	
Phase 2 Extension	Washermenpet to Wimco Nagar	9.2

CMRL is proud to say that through this initiative, they are the first Special Purpose

Vehicle (SPV) to register their 13 elevated and 19 under ground stations under the Indian Green Building Council's Green Mass Rapid Transit System (MRTS) Rating. All Phase-1 and Phase-1 extension stations are Platinum Rated. Depot and Admin building Green Certification is under process. CMRL Phase-2 development include 118.9 kms under construction metro network with 128 stations, which are 48 Under ground stations (42.6km) and 80 elevated stations (76.3 km

CMRL has achieved IGBC "Platinum" rating for all its Phase I and Phase I extension stations and aims to achieve the same in all Phase 2 stations.

Policies with regard to sustainable site management, energy management & environment balance, waste wanagement, indoor air comfort and water savings have been incorporated in line with IGBC MRTS rating to achieve the best standards in green sustainability. The EIRR works out to 17.78% for the metro project.

Project highlights: At project inception itself, environmental measures to mitigate air, water, noise & soil pollution by top soil preservation, traffic management & safe disposal of waste have been adopted. The Building Owner & Construction workers Act 1996 & Rules 1998 (BOCWA) has been followed strictly for the health & safety of the construction workforce. Comprehensive signage programmes on green education & regular workshops/training programmes for the staff during World Environmental Day are being practiced. All elevated & underground stations are designed to be commuter friendly with universal access, in line with the Harmonised Guidelines and Standards for Universal Accessibility in India 2021.

Preservation, restoration & promotion of biodiversity adopted through planting 1,41,842 saplings around various parts of Chennai like Puzhal Jail, T.N. Sports University, Govt. schools & educational institutions, Govt. hospitals, post offices, etc.,.

The project area sampling works out to 1:19 ratio. Moreover 1455 huge trees have been transplanted in the project area. Water efficiency is maintained by minimizing the use of potable water through use of low flow fixtures & Rain water harvesting at all stations & viaducts (under elevated stretch). Monitoring is ensured through internal Operation & Maintenance (O&M) & periodical comprehensive auditinsg.

Energy saving measures: Traction power

Energy charges of any metro system constitute a substantial portion of its Operation & Maintenance (O & M) costs. Therefore, it is imperative to incorporate energy saving measures in the system design itself. The auxiliary power consumption of metros is generally more than the traction energy consumed by train movement during initial years of operation. Subsequently, traction power consumption increases with increase in train frequency/composition in order to cater to more traffic. Following energy saving measures are followed:

Modern, lightweight and paint-less rolling stock with 3-phase VVVF drive

- Advanced load proportional regenerative braking with regenerative capacity >30%.
- Saloon air conditioning proportional to passenger load.
- Variable saloon lighting for different external environments.
- Automatic Train Operation (ATO) for efficient use of energy.
- Ballast less track

CMRL ensures maintaining the principles of construction waste segregation and collection by reusing, recycling & diverting more than 95% of the civil & interior wastes. Further, use of local materials with recycled content is strongly implemented.

At the site, all aspects of scheduling, protection of electrical mechanical equipment & systems, isolation of clean areas by physical separation, provision of first aid, drinking water and other facilities to safeguard health &

well-being of construction workforce are followed as per stringent guidelines. Pre - occupancy flush out of air borne contaminants are being carried out to reduce adverse health impacts. Indoor Air Quality – Fresh air supply of 5 litre/sec/person is taken in design consideration as per ASHRAE standards in concourse and platform. In the elevated stretch, the regularly occupied spaces are meeting > 10% of the fresh air requirement. Isolation of polluting equipment & systems in entryways and all AHU'S have been designed with installation of Ultraviolet Germicidal Irradiation (UVGI) lamps. Eco friendly materials are being used for housekeeping. CMRL has provided all basic amenities like ATM's, drinking water facilities, washrooms, first aid medical facilities, etc. in all the stations.

Energy saving measures : Non-traction power

- Effective use of Natural Daylight for luminance at stations and sectioning of load
- MRL gearless lifts with Permanent Magnet Synchronous (PMS) motor with VVVF gearless drive with LED lighting.
- Passenger detection sensor with VVVF drive escalators.
- Energy Efficient electrical equipment (e.g. motors, LED light fittings, VRV AC units, Hydro Pneumatic pumps, etc.,)
- Platform screen doors in underground stations to instill passenger safety, energy savings & efficient tunnel ventilation.
- In addition to the Platform screen doors (PSD)in underground stations, it is proposed to have half PSD in the elevated stations.
- Reduced lighting power : 35 – 40% at public areas of concourse, platform and entry structures, efficient building envelope, improved efficiency in HVAC equipment & systems above ASHRAE 90.1-2010.
- Variable Speed Drives in Chillers and Pumps.
- Variable frequency drive pumps for water supply and drainage system
- CFC free eco-friendly refrigerants- R134a & Halon-free fire suppression systems
- Commissioning, Monitoring,Measurement & Verification plan. Comprehensive energy auditing for all HVAC, lighting, power backup systems, elevators & escalators.

Contact :
METROS
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Email : chennaimetrorail@cmrl.in
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Uttar Pradesh Metro Rail Corporation Limited

Agra Metro Rail Project

Agra Metro: City's very own Environment friendly travel companion!

Various Measures undertaken to conserve and preserve environment; Agra Metro providing an environment friendly means of transport in the city

Agra: Agra Metro is dedicated to preserve the environment and surroundings of the city and it has taken every possible step towards environment conservation.

Agra is the fourth most populous city in the state and is famous for the historical monuments across the globe.

With the availability of metro operations along the heritage corridor which covers ancient monuments like the Taj Mahal, Agra Fort and Mankameshwar Temple, the transportation along the route has become seamless and easy and has not only helped in reducing the carbon footprint caused by plying vehicles, but is also a safe, efficient and aesthetically pleasing urban transport which adds to the natural beauty of Agra.

The stations of Agra Metro Rail Project have been awarded with IGBC (Indian Green Building Council) Platinum Rating under the Green Mass Rapid Transit Systems (MRTS) category.

Expressing pride in this achievement, Mr. Sushil Kumar, Managing Director, UP Metro Rail, stated, "Receiving the IGBC Platinum Rating reaffirms our commitment to creating environmentally friendly and energy-efficient transit hubs in Agra. The Agra Metro stations set a new standard for sustainable urban development."

Agra Metro Rail Project has been already awarded with ISO 14001(for Environment Management) and ISO 45001(Safety Management). United Registrar of Systems, Noida; affiliated with UKAS, United Kingdom recommends Agra metro rail project for full- filling all the standard requirements with respect to ISO 14001 and ISO 45001.

The Agra Metro stations have implemented several sustainable features and initiatives, including:

* Saving water and rainwater harvesting : Around 5 lakh litres of water shall likely be conserved by recharge pits installed along the Agra Metro viaduct and depot area.

Once the project is complete, the water conservation capacity by recharge pits are likely to go upto 20 lakh litres.

- Solar Power Installation: Installation of 1,000 kWp of solar PV to reduce dependence on conventional energy sources and promote renewable energy generation is being implemented soon.
- Green Landscaping: Planting of over 250 trees in the surrounding areas of the stations to enhance biodiversity and contribute to the city's green cover.
- Energy-Efficient Lighting: Installation of 100% LED lights to reduce energy consumption and promote sustainability.
- Water Conservation Measures: Saving more than 40% of water through ultra-efficient water fixtures, rainwater harvesting systems, and viaduct-level rainwater capture.
- Regenerative Braking System: Aiming for over 42.8% energy savings through the implementation of a regenerative braking system.
- Efficient HVAC Systems: Achieving over 15% improvement in efficiency in HVAC equipment and systems.
- Environmentally Friendly Fire Suppression Systems: Utilizing fire suppression systems free from Halons and ozone-depleting substances, with refrigerants having low or no Ozone Depleting Potential (ODP) and Global Warming Potential (GWP).

By incorporating green principles into its infrastructure, Agra Metro sets a precedent for future transit projects, contributing to a cleaner, greener, and more sustainable urban environment.

Maharashtra Metro Rail Corporation Limited

Nagpur Metro Rail Project

Nagpur is the winter capital of the state of Maharashtra, a fast-growing metropolis and third largest city in Maharashtra after Mumbai and Pune. With a population of about 46.5 lakh (2011) Nagpur Metropolitan Area is the 13th largest urban conglomeration in India. Nagpur lies precisely at the center of the country with the Zero Mile Marker indicating the geographical center of India. In addition to being the seat of annual winter session of Maharashtra state assembly "Vidhan Sabha", Nagpur is also a major commercial and political center of the Vidarbha region. It is also known as "Orange City" for being a major trade center of oranges that are cultivated in the region. Nagpur is also called, "Tiger Capital of India" as it connects many Tiger Reserves in India to the world. It is among the important cities for IT sector in Maharashtra after Pune.

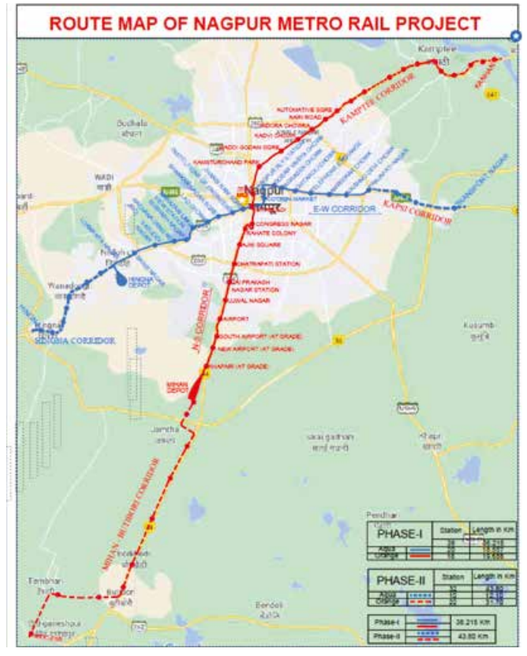
Maharashtra Metro Rail Corporation Limited is formed with an aim "To provide a safe, reliable, efficient, affordable, commuter friendly and environmentally sustainable rapid public transport system for the Nagpur Metro Region."

Nagpur Metro Rail Project consists of 38.215 Km metro corridor, 38 stations and 2 Depots. The entire stretch has been divided into 2 alignments or corridors as follows:

Alignment	Corridor	Rail Length	No of Stations
1	North – South	19.658 Km	18
2	East – West	18.557 Km	20

IGBC's Platinum Rating for Nagpur Metro Rail Project Green MRTS

Nagpur Metro Rail Project from its inception has been committed for sustainable development. At Nagpur Metro Rail Project, sustainability has been core value and guiding factor while finalizing any policy or taking any decision for



the project. This was the conscious decision from Nagpur Metro's vastly experienced leadership. This resulted in synchronized efforts from all stakeholders of Nagpur Metro during design and construction phases. These efforts resulted in many green initiatives like massive afforestation, solar energy installation, adoption of DRDO's bio-digester technology for sewage treatment and IGBC's Platinum rating for Metro Rail System etc.

Many of us are aware of the benefits which the society at large shall get from green initiatives like afforestation, solar energy, multimodal integration/EV feeder services and onsite sewage treatment. However, considering the long-term operational lifespan of the project; Nagpur Metro's achievement of IGBC's Platinum is a significant achievement with regards to sustainability aspect of the project. Nagpur Metro Rail Project has been planned, developed and now operated as per the principles of Indian Green Building Council's Green MRTS Rating system.

Nagpur Metro's Achievement under Green MRTS Rating System

Nagpur Metro during its design phase was determined to achieve the highest possible rating under Green MRTS rating system of IGBC. The designs were confirmed by the experts to incorporate the IGBC sustainability measures in the design documents. The project execution teams which comprised of General Consultants, Contractors and Maha-metro were helped by experts to ensure the implementation of designs in line with IGBC. This has resulted in smooth implementation of Green MRTS features which resulted in achievement of highest possible rating ie; PLATINUM Rating for 21 stations of Nagpur Metro Rail Project till date along with Metro Bhavan (Administrative Building).

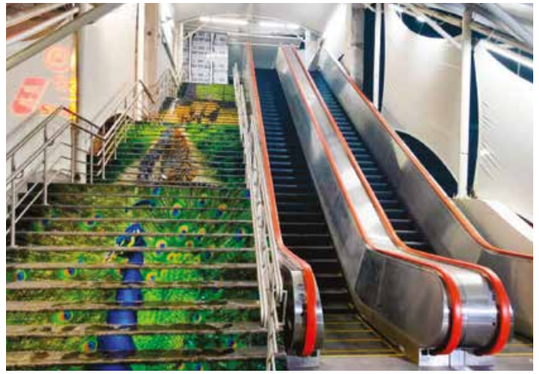
By law of nature; for anything which has to be sustainable, has to be efficient. Naturally un-efficient processes/ operations get discarded more easily than otherwise. IGBC Rating ensures that Nagpur Metro Rail System is efficient by design and hence sustainable. Considering that operational lifespan of NMRP is 120 years, even the smallest of efficiency measure shall yield huge benefits for society at large. The sustainability & efficiency measures which are certified by IGBC for the project are noted below. These measures shall yield huge benefits for the project which eventually shall lead to sustainability of the project.

Recognized Sustainability Measures for Nagpur Metro Rail Project

Design Category	Achieved Efficiency/sustainability measure for the project
Energy Efficiency	More than 30 % Efficient in traction power requirements More than 15 % Efficient in non-traction power requirements
Water Efficiency	More than 15 % Efficient in end use water requirement 100 % efficient in water re-use RWH provision for more than 90% run-off generated for roof and non-roof areas of metro stations
Indoor Environmental Comfort	Better experience for commuters; Better outdoor views and ventilation No impact on public infrastructure due to maintenance
Material Conservation	More than 90% of construction waste re-used at site, no additional burden on landfill sites. 100 % disposal domestic & hazardous waste with authorized agencies In station construction: less use of virgin material, more use of recycled content material
Sustainable Sites	More comfortable & safe for passengers. Convenient for women & differently abled passengers 100 % transportation of excavated soil in more controlled manner Worksite monitoring for Air, Noise, GW and Soil Quality Minimal impact on nocturnal environment Provision for alternative fuel-based transport facility for commuters Comprehensive multimodal integration plan Effective integration with other modes of transport such as Airport, railway station, bus stand etc.

Compensatory Afforestation

Maha-Metro has considered Bio-diversity as one of the core principles in planning the Environmental Management for the Nagpur Metro Rail Project. Maha-Metro has developed Urban Forest at Little wood (24 Hectare) & little wood Extension (52.60 Hectare), are the two major initiatives for addressing all important issue of bio-diversity in urban areas. Now, these Urban Forest are the home to not just a range of trees, but also a variety of bird species. Little Wood is a creation of Maha Metro – perfectly planned and executed venture. As many as 15,300 trees have been planted here – preserving both the natural beauty and the existing plants. All the planted trees are well grown up and now the planted areas are looking like natural forests.



In addition to above, Maha-Metro has taken various initiatives in developing the visually appealing landscape development at Metro stations, median under viaduct and at metro pillars. This will help in reducing Carbon Footprint in the city. The water requirement for the landscaping is meeting through STP treated water.

ISO 14001 Certification- Environment Management System

ISO 14001 Certification for Maha-Metro's Nagpur Metro Rail Project is also an important achievement. This personifies that, an organization has effective environmental management system (EMS) and organizational commitment for environment protection. It provides a sustainable environmental framework that an organization can follow. The system also tracks the sustainability objective for continual improvement.

Re-use of construction materials

Waste construction materials are re-used at sites for backfilling and other purposes. More than 80% of construction waste materials were re-used in backfilling and other purposes. The waste materials first segregated and then crushed at designated sites.

Re-use of wastewater

Maha-Metro has been installing Defence Research and Development Establishment (DRDE) developed Bio-digester technology at all Metro stations, depots and headquarter (Metro Bhavan) for on-site human waste disposal. The proposed technology is natural method for treating sewage with minimal energy use and low sludge formation. Maha-Metro hence ensure that 100 % of sewage generated during operations is treated at station locations and re-used for flushing and gardening purposes. Advantages of DRDE technology are:

- Disposes Human Waste in Eco-friendly manner
- Resulted in minimum sludge formation
- Minimal energy requirements & maintenance
- Generates effluent that is safe for environmental discharge
- No ground water pollution
- Zero pollution load on public infrastructure.

Maharashtra Metro Rail Corporation Limited

Pune Metro Rail Project

Introduction:

Pune Metro project has been undertaken by MAHA Metro, a SPV (Special Purpose Vehicle) of Government of India and Government of Maharashtra. The project intends to develop world class metro stations and surrounding areas featuring the rich cultural heritage. Modern, Safe, Secured, Comfortable and an integrated public transport system for the city of Pune and Pimpri Chinchwad enhancing the lifestyle of the citizens.

From the project's conceptualisation to its implementation, Maha Metro has consistently embraced environmentally friendly practices. beginning at the pre-design stage, adopting low-carbon concepts has been integral to every construction phase. Initiatives such as using fly ash bricks, adequate disposal of construction and demolition waste, creating airy and comfortable interiors, energy-efficient designs, implementation of rainwater harvesting systems, and extensive solar energy utilisation exemplify Maha Metro commitment to sustainability. Pune Metro viaduct further contribute to a holistic approach that significantly reduces energy consumption and carbon footprint throughout the project's construction and operational phases.

Pune Metro remains committed in its vision to revolutionise urban transportation in India, emphasising sustainability and innovation as key pillars of its transformative journey.

The Pune Metro Rail Project has achieved a significant milestone by securing the prestigious 'Project Award for IGBC' Platinum Rating for 22 elevated stations. The Platinum certification, bestowed by the Indian Green Building Council (IGBC), marks the highest recognition for environmental excellence in the MRTS Elevated Stations category.

KEY GREEN FEATURES OF PUNE METRO PROJECT:

Site Planning

- Pune Metro MRTS network is well integrated with bus terminus (intercity/ intra city) and railway station.
- Stations are located within 100 m walkable distance from a bus stop, dedicated drop-off zone, secured bicycled parking and motorcycle parking facility.
- All feeder buses and autos operate on Eco- friendly fuel.
- Provision of Electric charging stations for vehicles at stations.
- Universal access measures for wheelchair bound commuters, visually impaired commuters and hearing-impaired commuters at all the stations and train
- Transplantation of affected trees instead of cutting it.
- Waste water generated at stations during operational phase is being treated onsite using various modes of treatment i.e. Bio-digester + Reed Bed, Root zone, MBBR etc.
- The project aims to achieve Economic Internal Rate of Return (EIRR) of 16.32%.

This will help reducing the environmental impact of the urban infrastructure.

Secured Bicycle Parking

Energy Management

- 30% energy saving through regenerative braking system.
- LED Fixtures for 100% general lighting and display panels inside the train and station.
- LPD reduction of 49% to 52% over minimum LPD requirement of ASHRAE 90.1-2010.
- VRF air conditioners, able to achieve 13.7% energy improvement vis-a-vis energy efficiency requirement as per ASHRAE 90.1- 2010
- On-site renewable energy generation is being used for offsetting an average of 40% of total annual non-traction energy consumption.
- GHG emission reduction (in tCO2e) is projected to 62%.
- Fire Suppression Systems which are free from Halons & Ozone depleting substances and refrigerants (R-410A) used in the station are eco-friendly and have low or no Ozone Depleting Potential (ODP) and Global Warming Potential (GWP).
- Variable Voltage Variable Frequency (VVVF) technology for all the escalators and elevators.
- Building Management System (BMS) installed at each station.

Water Management

- 43.75% reduction in water usage over baseline criteria through use of low flow faucets, water closets, health faucets and urinals.
- Rain Water Harvesting system to harvest more than 95% of the run-off generated at viaduct and station roof and non-roof.
- 100% reuse of treated water from STPs in flushing of toilets.

Material Conservation

- Materials with recycle content sourced for the project is more than 30%.
- 70% of civil material used in the project is sourced locally, within 400 kms of the project sites.

EV Charging At Stations

Transplanted Trees

Compensatory Plantation

Feeder Bus Facility

Roof Top Solar Plant

Provision of Daylight

- 100% of total construction waste diverted from landfills.

Indoor Environment & Comfort

- More than 75% of regularly occupied spaces with adequate daylight.
- Use of low VOC paints, sealants and adhesives for healthy indoor environment.
- Eco-friendly & green chemicals used for housekeeping applications

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Director (Works), Pune Metro Project
MAHARASHTRA METRO RAIL CORPORATION LIMITED (MAHA-METRO)

SR.DGM (ENV), Pune Metro Project
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Uttat Pradesh Metro Rail Corporation Limited
Kanpur Metro Rail Project

In order to strengthen the public transport system of Kanpur, the second most densely populated city of Uttar Pradesh, on May 2019, the Government approved the Kanpur Metro Rail Project. Under this Project, two metro corridors are planned for Kanpur wherein the Corridor-1 is planned from IIT-Kanpur to Naubasta and it is 23.78 km long. The Corridor-2 will be from Agriculture University to Barra-8 and it is 8.60 km long.

The construction work of the Kanpur Metro's Priority Section from IIT Kanpur to Motijheel were inaugurated by Hon'ble Chief Minister of Uttar Pradesh, Yogi Adityanath on 15th November 2019 and the work progressed in full swing paving way for a new record. Within a period of 2 years and 1.5 months, Metro train operations on Priority Section from IIT-Kanpur to Motijheel were inaugurated by Hon'ble Prime Minister Shri Narendra Modi on 28.12.2021 and the people of Kanpur received the gift of a world class mass transit system.

Proposed Metro Corridors

The DPR envisages the following two corridors:

1. Corridor-1 (IIT-Naubasta)

2. Corridor-2 (CSA-Barra-8)

The construction work on the Balance Section of Kanpur Metro from Chunniganj to Naubasta under Corridor-1 and entire section of Corridor-2 is progressing at a very fast pace. The project is moving ahead at a very rapid rate to extend its commercial service from Motijheel to Kanpur Central covering 5 new underground stations namely; Chunniganj, Naveen Market, Bada Chauraha, Nayaganj and Kanpur Central under Corridor-1.

The design of Metro stations and viaduct of Kanpur Metro has been prepared by reputed French company 'M/S Systra' and the construction work is being executed by reputed civil construction companies.

Environmental stewardship

UPMRC has been ensuring from day one of its constructing activity that its every endeavor is eco-friendly so as to keep the city green and lively. UPMRC has planned to provide an environmental friendly mass rapid transport for the public from the first day of its inception. The project will provide the residents and visitors of Kanpur a state-of- the-art modern world class mass rapid transit system that will be convenient, safe, fast, reliable and cost effective. UPMRC, with a strong conviction to provide one stop mobility solution is committed towards the goal of balanced and sustainable development.

Renewable energy projects

- 1 MW rooftop solar project at Kanpur Metro Depot

Green building project

- Founding member to CII-Indian Green Building Council
- Platinum rating to all 9 Metro stations of Priority Corridor for Kanpur Metro project.
- 9 stations registered under IGBC Green MRTS rating system
- Two RSS buildings registered under IGBC New Building rating system
- Upcoming staff colony to be in accordance with Green building standards.
-

Name of Corridor	Length of Corridor (km)			Number of stations		
	Elevated	Underground	Total	Elevated	Underground	Total
IIT Kanpur to Naubasta	15.2	8.6	23.8	14	7	21
Agriculture University to Barra-8	4.2	4.4	8.6	5	3	8

Electrical efficiency

- Regenerative braking technology in rolling stocks
- Regenerative braking technology in Station lifts
- Variable volt a ge va riable frequency technology in escalators and elevators.
- LED fixtures for general lighting inside train
- LED for signages inside stations
- Occupancy sensors in public toilets
- Energy star rating or equivalent labeling for office equipment

Water Conservation and Harvesting

- Use of ultra water efficient water fixtures in upcoming stations and depot
- Rain water harvesting in present and upcoming stations, viaduct and in depot
- Enhanced water monitoring through installation of sub meters in present and upcoming stations along with Metro depot
- Waste water treatment plant in present upcoming depot.

ISO certifications

Project initiated

- ISO 14001 for environment management And ISO 45001 for safety management for 9KMs long Priority Corridor (IIT Kanpur - Motijheel)
- ISO 9001, ISO 14001 and OHSAS for operation and maintenance phase
- Project under consideration
- ISO 50001 (Energy Management Systems) for

UPMRC is doing every bit to ensure protection, preservation and conservation of environment. Detailed Environment management plan has been implemented for all stages of the project pre -construction, during construction and operation phase to ensure environment protection and preservation. 21 stations already registered for green building certification.

With all these concrete steps, Kanpur Metro Rail Project under Uttar Pradesh Metro Rail Corporation intends to become world class metro which would give world class commuter experience to each of its rider.

Kanpur Metro: A dream coming true.

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L&T Metro Rail (Hyderabad) Limited & Hyderabad Metro Rail Limited

L&T Metro Rail (Hyderabad) Limited (L&TMRHL), a subsidiary of Larsen & Toubro. Established in 2010 as a Special Purpose Vehicle (SPV), L&TMRHL is responsible for the Design, Build, Finance, Operate, and Transfer (DBFOT) of the Hyderabad Metro Rail project.

A testament to successful public-private partnerships, L&TMRHL signed a Concession Agreement with the then Government of Andhra Pradesh (now Government of Telangana) on September 4, 2010. This agreement grants L&TMRHL the exclusive right to develop and operate the Hyderabad Metro Rail (HMR) Project, an integrated initiative encompassing both the Metro Rail System and Transit Oriented Development (TOD). The initial 35-year concession period can be further extended by 25 years, solidifying L&TMRHL's long-term commitment to Hyderabad's growth.

L&TMRHL's vision extends beyond stations. They've successfully developed a 69.2-kilometer elevated network with 57 stations, including three interchange stations, across three key corridors: the Red Line (Miyapur to L. B. Nagar), the Green Line (Jubilee Bus Station to MG Bus Station), and the Blue Line (Nagole to Raidurg). This network provides efficient and convenient transportation for residents and commuters throughout Hyderabad.

Recognizing the potential for integrated development, L&TMRHL has spearheaded a TOD initiative. This segment offers approximately 18.5 million square feet of space dedicated to workspaces, shopping centres, leisure and entertainment facilities, healthcare centres, parking, and circulation areas around Metro stations. This fosters densification and walkable urban spaces, creating vibrant mixed-use communities. Notably, the TOD project includes four shopping malls strategically located at Punjagutta, Irrum Manzil, HITEC City, and Moosarambagh, a Grade A office block of 0.5 million square feet at Raidurg, and an innovative concept called "Office Bubble," offering corporates secured remote office spaces at stations in various configurations (bare shell, warm shell, and fully fitted out).

HYDERABAD METRO RAIL – A GREEN WAY OF COMMUTING

- World's Largest Fully Elevated Metro Rail Project Under PPP Model.
- 69.2 km network connecting Hyderabad through 3 lines, and 57 metro stations including 3 interchange metro stations.
- First Integrated Metro & Transit Oriented Development Project in India.
- In a significant achievement, L&TMRHL secured the Indian Green Building Council (IGBC) Green Existing Mass Rapid Transit System (MRTS) Platinum Certification for all 57 metro stations across the Red, Blue, and Green lines. This accomplishment makes Hyderabad Metro the first in India to receive such comprehensive recognition. The IGBC Platinum Certification is the highest level of acknowledgment in sustainable construction and operations, underscoring L&TMRHL dedication to energy efficiency, eco-friendly design, and resource conservation. (leading the way in green building practices).
- First in India to Utilize CBTC Technology (enabling smarter energy usage for operations).
- 10 MWp Captive Solar Capability (meeting over 10% of energy requirements).
- Regenerative Braking System (regenerating over 40% of energy).
- The organization has implemented rainwater harvesting systems at stations and depots, with a total of 150 + pits designed to recharge the groundwater table.
- A Zero-Discharge Project with almost Zero Direct Carbon Emissions (minimizing environmental impact).
- India's first metro to roll out fully digital payment enabled WhatsApp eTicketing Facility.
- Promoting smart travel with Smart Card, TSavaari App, and QR based ticketing through WhatsApp and other 3rd party apps.

Future Commitments:

Aligning with the broader sustainability goals of the L&T Group, L&TMRHL aims to achieve carbon neutrality by 2040 and water neutrality by 2035.

100% LED Lit Stations & Trains

Vegetation at medians below viaduct

Bicycle sharing service at station

Rain water harvesting of Run-off from stations & viaduct

Noida Metro Rail Corporation Limited

The Indian Green Building Council (IGBC) has provided the Green Mass Rapid Transit System (MRTS) rating system to encourage the sustainable practices in the design, construction, and operation of metro systems. Noida Metro Rail Corporation (NMRC) applied for the IGBC certification for the 21 elevated stations along the Aqua Line corridor from Noida Sec-51 to Depot Station (29.707 kms). This report presents the final review conducted by IGBC for these stations and assesses their compliance with sustainability criteria.

The review process of NMRC's 21 stations focused on Six Key Environmental categories:

- Site Selection & Planning
- Water Efficiency
- Energy Efficiency
- Material Conservation
- Indoor Environment & Comfort
- Innovation in Design & Construction

NMRC's Aqua line project successfully achieved a Platinum Rating, the highest possible under the IGBC Green MRTS framework. The project scored 74 out of 79 attempted points across different stations.

Site Selection & Planning
Site Environment Management

The project team implemented measures to preserve topsoil, prevent pollution, and manage waste effectively. Strategies included:

- A wheel washing facility at site exits to reduce dust and soil erosion.
- Regular air and noise monitoring to maintain compliance with CPCB standards.
- Bio-toilets and waste segregation for workforce sanitation.
- Traffic management plans for seamless integration with city traffic.

Basic Facilities for Construction Workforce

The project ensured the safety and well-being of construction workers by providing:

- Personal protective equipment (helmets, safety boots, high-visibility jackets).
- First-aid facilities and emergency response plans.
- Adequate sanitation facilities, including mobile toilets.
- Drinking water supply for all workers.

Integration with Other Transport Modes

- NMRC's Metro system was designed for seamless connectivity with bus terminals, railway stations, and airports.
- Metro feeder bus services were established within 100 meters of all stations.
- Bicycle and motorcycle parking spaces were provided to promote eco-friendly last-mile connectivity.

Alternative Fuel Vehicles

- The metro feeder buses use CNG as an alternative fuel.

Universal Access

- Wheelchair-friendly infrastructure including ramps, low-height ticket counters, and dedicated spaces inside trains.
- Tactile paths and braille buttons for visually impaired commuters.
- Dedicated assistance services for differently-abled and elderly passengers.

Tree Preservation & Vegetation Enhancement

- The project conducted a tree survey and transplanted or compensated for removed trees in a 1:10 ratio (4,280 saplings planted for 428 trees removed).

Heat Island Mitigation

- High Solar Reflectance Index (SRI) materials were used for pavements and roofs to minimize heat absorption.

Economic Internal Rate of Return (EIRR)

- The project aimed for an EIRR of 12.9%, but the IGBC requires a minimum of 15% for credit allocation.

Green Education

- Green signage, awareness campaigns, and environmental workshops were planned for commuter education.

Water Efficiency
Efficient Water Fixtures

- Installation of low-flow faucets and urinals, reducing water consumption by 30% compared to baseline standards.

Rainwater Harvesting

- Modular rainwater harvesting (RWH) systems were implemented at six stations, capturing more than 80% of run-off from roofs and non-roof areas.
- Viaduct rainwater harvesting covered more than 50% of run-off.

Water Monitoring

- Water meters were planned for tracking municipal supply, borewell water usage, and flushing/cleaning consumption.

Energy Efficiency
Commissioning of Equipment & Systems

- The metro stations ensured proper commissioning of HVAC, lighting, escalators, and fire suppression systems.

Traction & Non-Traction Energy Efficiency

- Regenerative braking technology was implemented, achieving 45.93% energy savings.
- Energy-efficient LED lighting was used.
- Efficient HVAC systems met IGBC's minimum efficiency standards.

Renewable Energy Integration

- 300 kW solar PV panels were planned at each of the 21 stations, covering 100% of non-traction energy demand.
- Comprehensive energy audits were planned every three years.

Greenhouse Gas (GHG) Mitigation

- The metro system contributes to an estimated 60% reduction in carbon emissions over baseline levels, equivalent to 26,651 tonnes of CO_2 per year.

Material Conservation
Construction Waste Management

- A waste management plan was implemented, including reuse and recycling strategies.
- Scrap materials were segregated and responsibly disposed of.

Use of Local Materials

- 20% of building materials were sourced from within a 400 km radius, reducing transportation emissions.

Indoor Environmental Quality
Ventilation & Air Quality

- Natural ventilation was maximized at concourse levels, ensuring 8%-15% openable areas.
- Low-VOC paints and materials were used to improve indoor air quality.

Indoor Comfort Measures

- Daylighting strategies ensured natural light penetration into concourse and platform areas.
- Eco-friendly cleaning chemicals were mandated for station maintenance.

Innovation in Design & Construction
Common Mobility Card

- A unified ticketing system was planned to allow passengers to use a single card for metro, buses, and parking payments.

Solar Energy & GHG Reduction

- Exceeding 100% solar power generation for non-traction use earned the project additional innovation points.
- The GHG reduction target of 60% exceeded IGBC's benchmark for emission reductions.

IGBC Accredited Professional

- The project team included IGBC-certified professionals, ensuring compliance with sustainability best practices.

Conclusion

NMRC's 21 elevated stations successfully met the Platinum Certification standards under the IGBC Green MRTS framework. The project demonstrated exceptional performance in energy efficiency, water conservation, indoor environmental quality, and innovation.

Key Achievements -

- 74/79 points achieved across all stations.
- 100% renewable energy goal through solar PVs.
- Significant carbon footprint reduction (26,651 tonnes of CO_2 annually).
- Enhanced commuter experience through accessibility and green infrastructure.

The project sets a benchmark for future mass transit systems in India, promoting sustainability while improving urban mobility. For continuous improvement, IGBC recommends ongoing documentation of energy, water, and waste management efforts to maintain compliance with green building standards.

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FUTURE CITIES : INNOVATION, COLLABORATION AND STRATEGIC ACTION

Saurav Choudhury
Counsellor - Green Built Environment
CII - Indian Green Building Council

Cities have become the world's dominant demographic and economic clusters, and we are seeing the rise of mega cities. Increased urbanisation, rising demand for resources and climate change will inhibit many cities' potential to be engines of progress and prosperity.

Cities are complex entities consisting of multiple urban systems. The various urban systems need to be coordinated with one another through an integrated urban plan to create liveable outcomes and to sustain quality of life for citizens.

We need to embrace the future through innovation and collaboration. The Eco-Vision need to be pulled together by government, research institutions, industries and the community.

Few questions that need in depth deliberations which have the potential to mould the city into a better place to live in.

HOW CAN LEGISLATIVE BODIES AND POLICY MAKERS HELP CREATE AWARENESS ABOUT SUSTAINABLE DEVELOPMENT?

- Provide Fast track Clearance & Incentivise Green Projects : Owners and Architects must be made aware on cost effectiveness and successful business case of Green Buildings
- Partner in adoption of Green Concepts with IPA, CREDAI, IAPMO, ISHRAE, IIA, BAI, ISOLA, IIID, etc Developers, Architects and Interior Designers must partner in the green movement to facilitate greater replication and penetration.
- Encourage Green Procurement : Suppliers must be fully involved in the design stage so as to evolve a green supply chain and thus green products.

Policy to encourage green buildings:
10% Additional FAR for Green Buildings

City's vision to have 100% Green Buildings,
Green City Infrastructure already in place

HOW CAN URBAN PLANNERS ADDRESS SUSTAINABLE DEVELOPMENT GOALS IN CITY PLANNING?

- Development of an Eco Vision with Measurable Goals : The City's vision shall incorporate principles of sustainability addressing Land Use, Public Green, Sustainable Mobility, Solid Waste, Water & Energy Efficiency.
- Development Control Regulations (DCR) and Urban Design Guidelines : The DCR which ensures an orderly development and the Urban Design Guidelines which define the minimum standards of the urban-scape (such as roads and streets, open spaces) shall be aligned with national & international benchmarks.
- National Policies on Sustainable Development: National priorities shall be focussed as part of overall framework of sustainable development in Cities – Encouraging walkability & public transport, EWS Policy, Transit Oriented Development (TOD), Parking Policy, Solid waste segregation, e-vehicle policy, Renewable Energy etc.

HOW HAVE COUNTRIES AND CITIES AROUND THE WORLD ALIGNED THEMSELVES TO BUILD SUSTAINABLE ECONOMIES?

- According to the 'Better Business, Better World' report 2017 by the Business & Sustainable Development Commission, opportunities in sustainability could contribute US$12 trillion to global GDP and create 380 million new jobs by 2030. These represent around 60 percent of the real economy and are critical to delivering the United Nations Sustainable Development Goals (SDGs).
- Singapore : At Ecosperity 2017 conference, Singapore's Deputy Prime Minister mentioned

  "With no natural resources, Singapore has had to be resourceful to make a living for ourselves. This has required integrated and long-term planning to optimise resources such as budget, land, manpower, energy, and more recently, carbon emissions, to ensure sustainable growth. Today, we are among the 20 most carbon efficient countries in the world."
- Sustainable Development Goals (SDG) Index and Dashboards - Global Report 2016 by Sustainable Development Solutions Network (SDSN).

  The report stresses that many high-income countries perform well in areas such as economic development but still fall short of achieving a good all-round SDG performance.

  This is because they face significant challenges in specific areas such as climate-change mitigation, income inequality, gender equality and education.

  The countries (Sweden, Denmark, Norway, Finland) can focus on high-carbon to low-carbon sources to fulfill the environmental sustainability goals.

HOW DO WE BALANCE THE NEED FOR OPEN SPACES AND BIODIVERSITY POCKETS WITH THE INFRASTRUCTURE NEEDS OF A GROWING POPULATION?

- In recent years, many buildings have added green roofs and living walls to their facades. These features create cleaner air, introduce new plants into the local ecosystem, and provide a habitat for other creatures.
- Every species has traits, such as a plant's nitrogen fixation rate, phytoremediation, etc: As cities move toward more green practices, knowing about species' traits can help planners choose plants for road sections, city level parks.
- Natural habitats and their biodiversity are increasingly seen as vital components of liveable cities as spaces for recreation thus helping in restoring physical and mental health. WHO recommends 9 sqm/ capita of public green in cities

- Cities need to have a check on lakes and green cover where today houses have been raised, which has led to reduced green cover for the country as a whole.

HOW CAN CITY PLANNERS ENCOURAGE GREEN URBAN ARCHITECTURE WITHOUT SUBSTANTIALLY INCREASING HOUSING COSTS?

- Encouraging 'Low Investment – Large Impact' Green Concepts like

  - Restoration of existing trees, Urban parks and forests to address well-being of citizens

  - Preservation of lakes to address water security for the citizens

  - Installation of Rooftop Solar PV to address power security

HOW CAN URBAN PLANNERS, OPTIMIZE WASTE DISPOSAL AND ENCOURAGE RECYCLING BY RESIDENTS?

- Segregation at Source is key to 'Zero Solid Waste City':

  The Biggest Challenge today in handling Municipal solid waste is Segregation & Recycling. Typology wise quantification of waste, city level awareness on segregation principles supported by city level waste management shall be the first step towards Waste Management.

- Recycle parks

  - Brownfield Mapping of the city and policy to allocate waste treatment projects (Waste to Energy)/ Recycle parks at such brownfield sites

  - Location of collection and recycling facilities for different material types throughout the city (eg., California – 50% waste handled by recyclers)

  - Indore City : 100 Acre landfill site converted to biodiversity park, Waste converted to resource

California (39.25 Million population)

- **50% handled through recyclers**
- **Location of collection and recycling facilities for 8 different material types throughout California**

HOW DO SUSTAINABLE DEVELOPMENT AND SUSTAINABLE ECONOMIES FOSTER HAPPINESS?

- Sustainable Development and Gross National Happiness in Bhutan

  The balance between economy and environment has emerged as a crucial concern before the environmentalists, academicians and the policy makers.

  Mankind generate their income and wealth from the natural environment, process natural resources for final goods and then dispose a large quantity of resulting wastes which are principal agents of environmental degradation.

  Bhutan's development philosophy is being guided by 'Gross National Happiness' instead of Gross National Product, encompassing economic, environmental, cultural and emotional dimensions of human lives.

HOW CAN WE ENCOURAGE WALKABILITY IN OUR CITIES AND USE ALTERNATIVE MEANS OF MOBILITY SUCH AS CYCLING, E-VEHICLES ?

- Easy accessibility to mass transit facilities can lead to tremendous reduction in greenhouse gas emissions

  - Encourage cities to increase the percentage of footpath kms out of total road kms, with special focus on universal access at road junctions, bus stops, metro stations, parks and public spaces

- First mile and last mile connectivity for Mass Transit

  - Having multiple modes of transport integration at metro stations – auto rickshaws, e-rickshaws, bus drop off zones, shuttle buses

- Discounted parking fee for e-vehicles and cycles

  - To sensitize citizens on issues related to vehicular emissions and also bring in a lifestyle change (Copenhagen has 60% trips & Amsterdam has 40% Trips made by cycle)

WHAT ARE THE MAJOR CHALLENGES FACED IN BUILDING A GREEN AND SUSTAINABLE CITY?

- Cities having a common Storm & Sewer Network

  -Diverting surface storm water runoff to lakes & reservoirs can address microclimate, water security and can contribute to health and wellbeing.

- Construction waste & Municipal Solid Waste Disposal at landfill sites

  - Restored landfill sites can be utilised to accommodate the urban infrastructure or can be converted into large green cover

- On-street parking and lack of footpaths effecting Accessibility and causing Traffic Congestion

  - Dedicated Hawker zones and Parking policies can make a difference

BLUE STAR
BUILT ON TRUST®

Engineering a Sustainable Future: Blue Star's Contribution to Urban Mobility

India's urban landscape is undergoing a rapid transformation, with a strong focus on sustainable and smart infrastructure. As the country intensifies efforts toward green urban mobility, Blue Star, a leading Air Conditioning, Commercial Refrigeration, and MEP (Mechanical, Electrical, Plumbing, and Fire-fighting) contracting company, is playing a pivotal role in driving this transition. With over 80 years of engineering excellence, Blue Star is at the forefront of integrating cutting-edge technology with sustainable solutions, paving the way for a greener, smarter future.

Blue Star's integrated business model, encompassing manufacturing, engineering, procurement, construction, and after-sales service, enables it to provide end-to-end solutions across residential, commercial, and infrastructure segments. Through its Electro Mechanical Projects Group, the Company seamlessly designs and executes integrated MEP systems, including air conditioning, electrical, plumbing, fire-fighting, and low-voltage systems.

With a strong presence in airports, metro stations, office spaces, malls, hospitals, and industrial facilities, Blue Star has built a reputation for delivering sustainable and energy-efficient infrastructure solutions. Its Engineering Facilities Management expertise ensures the smooth operation and maintenance of electro-mechanical utilities, optimising energy efficiency and reducing environmental impact.

A key area where Blue Star is making a significant impact is the field of railway electrification for Indian Railways. The Company has a dedicated division focused on delivering Engineering, Procurement, and Construction (EPC) and turnkey solutions for the Indian Railways network. By upgrading power supply infrastructure to 2x25 kV for Overhead Electrification and Power Supply Installations works, Blue Star is enhancing rail transport efficiency under the Government of India's 'Mission Raftaar' initiative. This initiative allows trains to operate at the speed of up to 160 kmph, reducing travel time and enhancing both passenger and freight movement efficiency while aligning with the nation's sustainability goals.

Beyond railways, Blue Star is actively involved in metro rail projects, delivering cooling, tunnel ventilation, and energy-efficient MEP solutions that support low-carbon urban transport. By contributing to metro infrastructure, the Company is helping cities develop efficient, safe, and inclusive transportation networks that enhance urban mobility and quality of life. Blue Star has played a crucial role in major metro projects, including Bangalore Metro Phase-2, Mumbai Metro MMRC Line-3, Bangalore Metro Phase-1, Delhi Airport Metro Express, and Delhi Metro Phase-2.

By leveraging its deep engineering expertise and embracing next-generation green technologies, Blue Star is committed to contribute to the transformation of India's urban and transportation infrastructure.

Metro systems world over choose Danfoss solutions for air conditioning, elevators, escalators and tunnel ventilation to provide commuters with uncompromising comfort and metro systems with unparalleled reliability and lowest cost of ownership.

By utilizing shared knowledge about Tunnel / Metro applications and technology integration, we deliver the most reliable Tunnel / Metro solutions and provide the lowest cost of ownership.

The major 3 products offered from Danfoss for this application are:

1. Turbocor Compressor

Turbocor is the Worlds first totally Oil-free compressor. It is Centrifugal Magnetic Bearing Compressor specifically designed for HVAC requirements. Today the chillers with Turbocor compressor are available from 90 to 450 Tr capacity in India. Some of the benefits of Turbocor are:

- Energy and cost savings - Outstanding part load and high full load energy efficiency providing the lowest total life cycle cost operation
- Oil-free operation - 100% oil-free operation with magnetic bearings eliminates oil management system
- Low sound and vibration - Low vibration and quiet operation eliminates the need for ear protection
- Less complexity - Only one major moving component delivers less mechanical complexity and reduces maintenance and warranty costs
- High Reliability - Proven & reliable compressors dedicated to specific applications to increase efficiency, improve margins and drive differentiation

- Variable Speed - Variable speed adjusts to changes in load and/or condensing temperature design No reduction in performance
- Soft Start - Soft start module significantly reduces high in-rush current at startup
- Compact and light weight design. Easy to install
- Refrigerant - R134a and environmentally progressive ultra-low GWP HFO1234ze(E)
- Digital electronics - On-board digital electronics control and manage the compressor operation proactively to optimize performance

2. Pressure Independent Balancing & Control Valve (PIBCV)

PIBCVs is the best possible balance and control in water based heating, cooling and hot water systems. Some of the benefits of using PIBCVs are:

- PIBCVs enable Balancing system and ensure adequate distribution
- Proper distribution with pressure balanced system reduce overflow and improve ΔT across chiller, particularly part load condition

- Improved system balance save pumping energy up to 35% especially at part load condition.
- Improved system ΔT increase chillers COP and save chiller energy
- Improved indoor comfort
- Pay back in less than 3 years

3. Drives for HVAC

The VLT® HVAC drive is a dedicated, globally supported drive that combines flexibility and efficiency to minimize total system and lifecycle costs in HVAC applications. The benefits of using VLT® HVAC are:

- Provides the highest efficiency solution with both asynchronous and permanent magnet motors
- Motor independent drive that can be installed in any fan or pump system for years of reliable, maintenance free operation

- User-friendly, distributed intelligence and reduced power consumption are beneficial for fan applications
- Basic AHU functions control a wide range of functions
- Pump-specific features developed in cooperation with OEMs, contractors and manufacturers around the world

Easy commissioning

Its Quick menu wizard makes normal set-up and operation easy.

Maintenance free

Due to its self-protecting and monitoring features, the drive is maintenance free, except for general cleaning. Replacement of internal fans or capacitors is normally not required during lifetime.

Save space

Due to its ultra compact design, its can be easily mounted inside a HVAC unit or panel, reducing overall enclosure costs.

Built-in mains filters

The standard integrated DC coils comply with EN 61000-3-12 reducing losses in mains and ensuring reliable operation in the whole grid. The DC coils increase the lifespan of the DC link capacitors and ensure that the drive can operate motors to their full performance. Integrated DC coils save the cost for adding external filters.

Reduced installation costs

- Built-in HVAC functions reducing need for other system components
- Ease of installation and set-up

Competitive performance

- Up to 98.5% efficiency
- Automatic Energy Optimisation
- System diagnostics

Hassle free operations up to 50° C ambient temperature without derating

The additional benefits of using the VLT® HVAC drive are:

Fire Override Mode

Fire Override Mode prevents the VLT® HVAC Basic Drive from stopping for self-protecting reasons. In this mode, it will continue vital fan operations regardless of control signals, warnings or alarms.

Belt Monitoring

The drive can, from the speed/current, detect when the motor has lost contact to the fan and set off an alarm if the belt is broken.

Flying start

The drive can detect speed and direction of a freely spinning fan or pump and catch it at the right speed. This feature prevents violent starts and tear on the equipment.

Sleep Mode

When sleep mode is enabled, the drive automatically detects a no or low-flow condition and stops the motor. The drive constantly monitors the situation in order to re-start the motor when the load demand increases. This secures no interruptions in the supply, maximizes the energy savings, reduces noise and extends the lifetime of the entire system.

Reference Metro Sites done with Danfoss Components:

- Washington DC Metro, North America
- New York Subway, Boston Subway & San Francisco USA
- Olympic Rail Tunnel, Sydney
- DMRC Bhavan & DMRC, India
- Railway Tunnel on Kashmir railway line, India

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Internationalization of
IGBC Green MRTS Rating Systems

IGBC's collaboration with HKGBC, GBCM and GBC Indonesia to design tomorrow's sustainable transit

The Indian Green Building Council's commitment to sustainable urban transit is embodied in its pioneering IGBC 'Green Mass Rapid Transit System (MRTS)' rating. This unique framework holistically addresses the design, construction, and operation of metro rail projects by setting rigorous benchmarks for energy and water efficiency, renewable energy integration, waste management, and commuter comfort. IGBC had the opportunity to internationalize this rating system by sharing its expertise, empowering transit authorities and cities abroad to adopt innovative green transit solutions that would significantly reduce carbon footprints and build resilient urban ecosystems.

IGBC's collaboration with the Green Building Council of Mauritius (GBCM) marks a key milestone in extending the reach of sustainable transit practices beyond IGBC's borders. During a visit to India, members of GBCM had the opportunity to explore the transformative impact of IGBC's Green MRTS rating firsthand at the Hyderabad Metro project. This exposure has laid the groundwork for a strong partnership aimed at integrating best practices in Mauritius' green transit, ensuring their metro projects incorporate state-of-the-art green measures that champion energy efficiency and resource conservation.

Equally significant is IGBC's engagement with the Hong Kong Green Building Council (HKGBC), which has further enriched IGBC's global dialogue on sustainable transit. At a discussion during World Sustainable Built Environment event in Hong Kong in June 2017, HKGBC shared insights from Hong Kong's MTR system, highlighting energy-efficient operations and advanced sustainability practices that align closely with IGBC's Green MRTS rating. This collaborative exchange validated IGBC's approach and helped pave the way for deeper knowledge sharing and joint innovation.

IGBC extended its support to Green Building Council Indonesia (GBCI) in close partnership with Indonesian consultant Narama Mandiri team. The discussion underscored the need for a comprehensive gap analysis between the design of Jakarta MRT and the integrated MRTS guidelines developed by IGBC and GBC Indonesia, marking a significant step in aligning international green standards with Indonesia's local transit infrastructure. The gap analysis process was initiated across critical elements of Jakarta MRT's operations, including its office, training centre, and transport hub. The analysis was centered on the adoption of GBC Indonesia Greenship ratings—a framework that promotes energy efficiency, resource conservation, and enhanced commuter experiences.

During the meeting, IGBC provided comprehensive technical support, clarifying key sustainability measures at the conceptual level to ensure the development of a robust Gap Analysis report. By embedding these green practices into Jakarta MRT's infrastructure, the project is poised to elevate operational efficiency and commuter comfort in line with Indonesia's national priorities.

Together, IGBC, HKGBC, GBCM and GBC Indonesia are laying down the tracks for a cleaner tomorrow by designing innovative, sustainable transit solutions that chart the course for a greener urban future.

Government and CII - IGBC

CII - IGBC is working very closely with the Central and State Governments across the country to promote the green building movement. Numerous Government projects have been certified by IGBC. Many Government agencies have also notified incentives for IGBC-rated green building projects. All this has led to mainstreaming green developments in the country.

Top image: **Shri. Narendra Modi, Hon'ble Prime Minister of India,** inaugurating the Surat Diamond Bourse (SDB) on 17 Dec 2023.

Below image: Mr. Nagjibhai Sakariya, President of SDB; Mr. Asheshbhai Doshi, Vice President of SDB; and Mr. Laljibhai Patel, Director of SDB, receiving the IGBC Platinum plaque under the IGBC Green New Buildings Rating System on 08 Dec 2023.

Shri. Rajesh Naik, Chief Town Planner, signed the MoU between the Town & Country Planning (TCP) Department of the Government of Goa and CII's Indian Green Building Council (IGBC) to promote sustainable development practices in the state. This signing took place in the presence of Shri. Vishwajit P. Rane, Hon'ble Minister for Health, TCP, Forest, Urban Development, Women & Child Development for the Government of Goa, and Mr. Gurmit Singh Arora, Chairman of IGBC.

Shri. Rajesh Kumar Singh, Secretary DPIIT, received the IGBC Project Plaque for Yashobhoomi in the presence of senior officials from CII, DPIIT, and the dedicated project team.

Shri. Shekhar Singh, IAS, Hon'ble PCMC Commissioner, receives the IGBC Platinum Plaque from Shri Aseem Kumar Gupta, IAS, Principal Secretary, Government of Maharashtra, during the Abhinandan event in Pune.

Dr. Vijay Prakash, Executive Director (SSEA and Environment Engineering), NTPC, and Shri K.S. Venkatagiri, Executive Director, CII GBC, signed the MoU in the presence of Shri Ravindra Kumar, Director (Operations), NTPC.

Shri. Dilip Dhole, Hon'ble Municipal Commissioner of Mira Bhaindar Municipal Corporation (MBMC), receives the IGBC plaque and certificate from the IGBC Mumbai Chapter for the certification of their Meditation Center.

Shri. Vikram Kumar, IAS, PMC, receives the plaque and certificates from Smt. Vandana Chauhan, Hon'ble Member of Parliament (Rajya Sabha), and Mr. S Choklingam, Hon'ble Director General, YASHADA.

Key Engagements over the past year

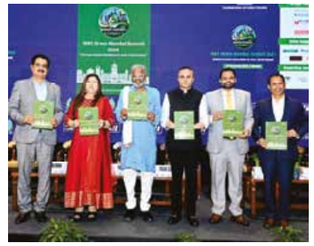
Shri. E.V. Velu, Hon'ble Minister for PWD, Government of Tamil Nadu, received the IGBC plaque for the Kalaignar Centenary Super Specialty Hospital, which achieved Gold rating under the IGBC Green Healthcare Rating System.

Shri. Piyush Goel, Hon'ble Minister of Commerce and Industry, received IGBC's Coffee Table Book from Mr. Mukundan, CII Vice President during launch of Empowering Mumbai's Youth CII Centre in Mumbai.

Top image: **Shri. Revanth Reddy, Chief Minister of Telangana,** launching the 2nd Edition of India's only IGBC Green Property Show on 21 Feb 2024.

Below image: **Shri. Mallu Bhatti Vikramarka,** Deputy Chief Minister of Telangana; **Shri. N Uttam Kumar Reddy,** Minister for Irrigation, Food & Civil Supplies, Government of Telangana; **Shri. Komatireddy Venkat Reddy,** Minister for Roads, Buildings and Cinematography, Government of Telangana; and **Shri. D. Sridhar Babu,** Minister for Information Technology, Electronics & Communications, Industries & Commerce and Legislative Affairs, Government of Telangana, delivering addresses at the 2nd edition of IGBC Green Property Show from May 17th to 19th, 2024, at the HITEX Exhibition Centre in Hyderabad.

Shri. C P Radhakrishnan, Hon'ble Governor of Maharashtra, received IGBC's Coffee Table Book during his interaction with the IGBC Mumbai Chapter Team.



Shri. Pravin Darade, Principal Secretary Environment, Government of Maharashtra, launching the Green Dossier during the Green Mumbai Summit.

Shri. Thennarasan, Municipal Commissioner of Ahmedabad Municipal Corporation, addressed industry stakeholders at the Green Gujarat Summit.

Shri. Bhupendra Patel, Hon'ble Chief Minister of Gujarat, received IGBC's Coffee Table Book during his interaction with the IGBC Ahmedabad Chapter Team.

Shri. Somnath Kekan, Assistant Director of Town Planning, Navi Mumbai Municipal Corporation addressed the attendees about upcoming developments during the IGBC Navi Mumbai Chapter launch.

Shri. Harsh Sanghvi, Hon'ble Home Minister of Gujarat, received the IGBC Coffee Table Book from Ms. Swati Salgaoncar, Chairperson of CII Western Region, during the CII Western Regional Council Meeting.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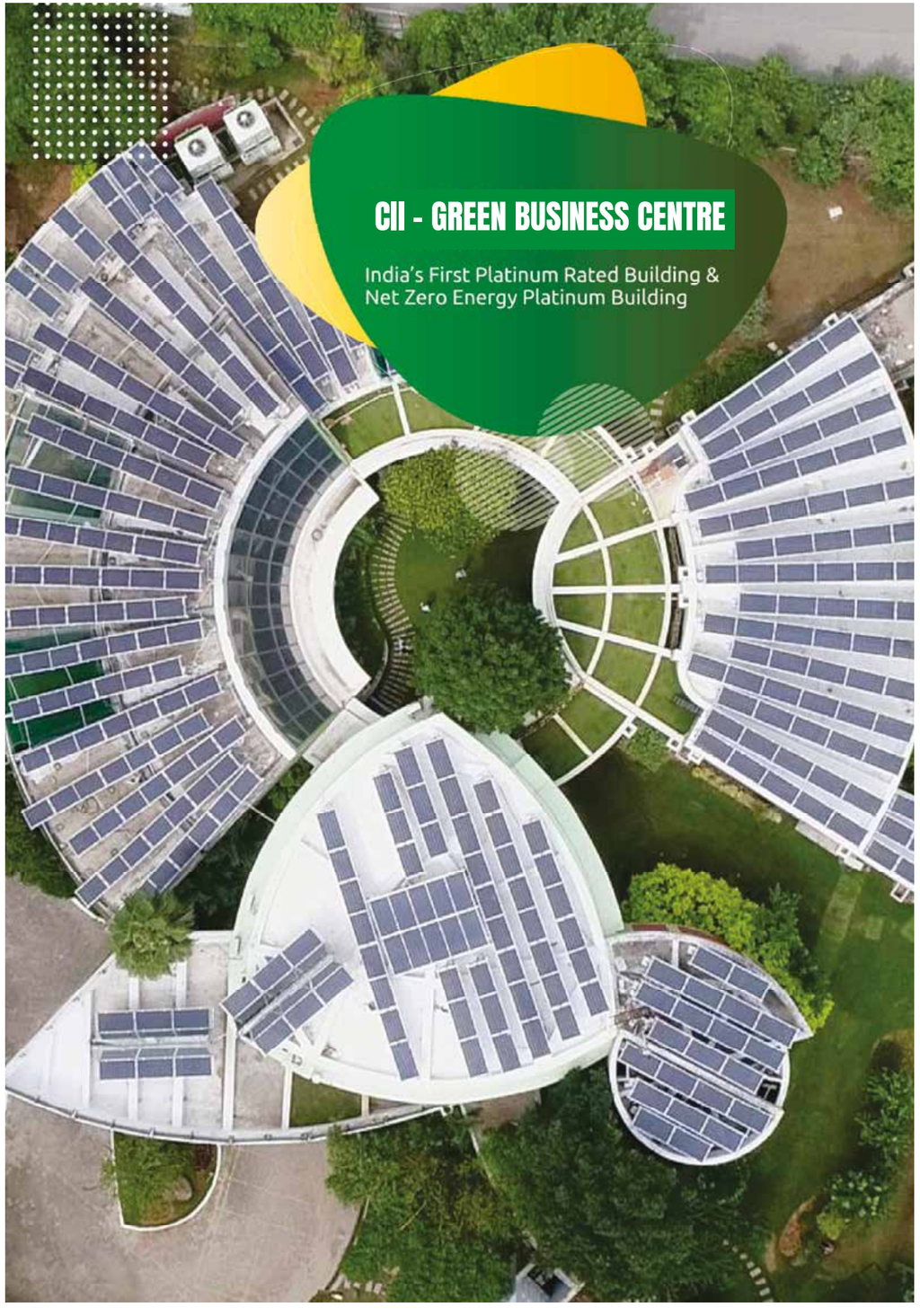
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CII - GBC's Contribution to **Green Growth in India**

55 million tons of CO_2 emissions reduced per year

*As on January, 2025

CII - GBC's Contribution to **Green Growth in India**

- CII-GBC - India's first platinum rated green building
- GreenCo rating system - first of its kind in the world
- Green Building footprint: India - No. 2 in the world
- Fostering world-class energy efficiency in cement, pulp & paper, power plants and sugar
- GreenPro recognised by Global Ecolabelling Network (GEN)
- Founding Member of World Green Building Council (WorldGBC)
- Recipient of Aspen Institute Energy and Environment Awards
- GreenCo story in UNIDOs 50th anniversary publication
- Signed an MoU with Indian Railways
- Listing of GreenCo in International Trade Center (ITC) - Sustainability Map
- Energy audit assignments in Australia, Japan, Korea, Philippines, Singapore, Nigeria
- Mention of - 'India-Sweden Innovations' Accelerator programme in the joint declaration issued by Hon'ble Prime Minister of Sweden and Hon'ble Prime Minister of India on 'Sweden- India Joint Action Plan

Aspen Award

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IGBC has trained over 30,000 students & professionals from India & abroad

IGBC in News

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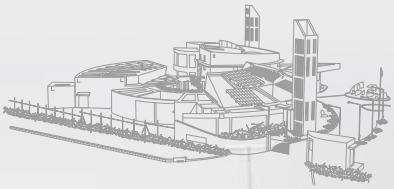
BENCHMARKING TOOL FOR GREENING OF TRANSIT PROJECTS

IGBC Green MRTS Rating
(For New Metro Rail Projects)
Green Rating addressing design & construction

IGBC Green Existing MRTS Rating
(For Operational Metro Rail Projects)
Green Rating addressing operational performance

IGBC Green Railway Stations Rating
(For New & Operational Railway Stations)
Green Rating addressing design, construction and operational performance

IGBC Green High Speed Rail Stations
Green Rating addressing design, construction and operational performance



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