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Municipalika, India's leading 360-degree event on city infrastructure development, opens in Bengaluru

The three-day exhibition and conference on Safe, Smart and Sustainable City solutions is being organised along with Government of Karnataka as Host State, with the support of Ministry of Housing and Urban Affairs, Government of India, as well as other Ministries.

Municipalika 2023, India's oldest and largest trade show and conference on Safe, Smart and Sustainable cities is here with its 17th edition and is gearing up to be a game changer for the housing and urban infrastructure development, and built environment sectors in India.

The event scheduled on 28th, 29th & 30th November, 2023 at Tripuravasini (near Mekhri Circle), Palace Grounds, Bengaluru, will be attended by 150+ exhibitors, 2,500 delegates and 5,000 industry visitors from all over India and abroad, from 5 countries, 20 states/UTs, and 300 cities and towns, ensuring a large audience of policy makers, city leaders and urban and housing stakeholders looking for technologies and solutions.

Municipalika 2023 is being organised with the support of Host State Karnataka, through the Urban Development Department, The Directorate of Municipal Administration, and all its subordinate departments, parastatals, and PSUs. Other relevant departments of Govt of Karnataka are also participating in a big way in the Conference and Exhibition. Bruhat Bengaluru Mahanagara Palike is the Host City for the event.

Ministry of Housing and Urban Affairs continues the support it has been providing right since the first Municipalika in 2003, along its urban transformation missions - Smart Cities Mission, Swachh Bharat Mission, AMRUT Mission, and Housing For All Mission.

Together, the three events engage holistically in the integrated development of the built environment, giving a 360-degree vision of Future Cities. The country is seeing a huge boost in urban infrastructure, creation of sustainable built environment and solutions for all challenges related to municipal and citizens services, all of which are covered in the Exhibition and Conference segments.

The attendees include ministers, mayors, municipal commissioners, urban local bodies, CEOs of Smart Cities and parastatals, builders, developers along with technology providers, professionals and all urban stakeholders. Faculty and students of architecture, engineering, technology and management institutions are also participating to get exposure to the latest trends.

Municipalika

Municipalika provides a mega-networking forum for governments, city managers, experts, entrepreneurs and service providers to collectively find solutions to urban challenges. It provides a platform to evolve, evaluate and share policies, strategies, cutting-edge technologies and innovations towards smart and sustainable living in cities.

With the ongoing Urban Transformation process for 100 Smart Cities, 3000 AMRUT cities (version 2.0), PMAY-Housing for All, Swachh Bharat Mission version 2.0, HRIDAY and Digital Cities, the event aims at discussing strategies, best practices and display of technologies, equipment and solutions for implementing these agendas across the country.

The three-day-long conference includes sessions on Smart Cities, Ease of Doing Business, Urban Reforms and Resource Mobilisation, Water and Wastewater, Sanitation, Solid Waste Management and Recycling, Urban Transportation and Traffic, Electric Mobility, Green Cities, Environment and Pollution Control, Urban Infrastructure Development, Urban Housing, Digital Cities, E-governance, Safe Secure and Resilient cities.

The River Cities Alliance is a joint initiative of Namami Gange, Department of Water Resources, River Development & Ganga Rejuvenation under the Ministry of Jal Shakti (MoJS) & National Institute of Urban Affairs (NIUA), the Ministry of Housing and Urban Affairs (MoHUA), with a vision to connect river cities and focus on sustainable river centric development.

RCA in partnership with Municipalika 2023 has curated a special River Cities Alliance Session on the Opening Day, 28th November, for creating wider awareness of the initiatives of RCA among national and international river cities.

A delegation of around 10 Australian companies representing capabilities in urban infrastructure, transport, water management, circular economy, and building and construction technologies, is attending Municipalika 2023, where Australia is the Innovation Partner. A special Australia country presentation and networking session has been planned for Day 2, 29th November.

CAPEx

CAPEx-Construction, Architecture, Planning and Engineering Expo is a platform for showcasing innovative building materials and technologies. Since the year 2019-2020 had been declared as the year of Construction Technology with the launch of the Global Housing Technology Challenge Initiative - India, CAPEx segment will showcase the technological options for infrastructure, building construction mechanical, electrical, plumbing and fire services (MEPF), green building products, building materials and technologies which are environment-friendly and energy-saving. The implementation of 6 Lighthouse projects for cost-effective speedy construction technologies and 3D construction will be demonstrated and projected.

Architecture in the Age of Millennials

Architecture in the Age of Millennials is a unique conference programme that addresses the changing landscape of architecture, the challenges and the scope of innovation it has to offer. It welcomes thought leaders to discuss sustainable urbanism, and all aspects of architecture and building materials for the Millennial generation, though exhibition displays and conference sessions on Sustainable Built Environment.

Innovation Partner

Australian Government

Australian Trade and Investment Commission

Australia as an Innovation and sustainable infrastructure partner

India is urbanising at a rapid pace. Given the demand and the scale of India's ambitious nation-building agenda, Australia and India can partner for success.

As a highly urbanised and liveable country, Australia has significant expertise in urban infrastructure design and development. Australian cities regularly feature at the top of world liveability indexes. Australian companies have capabilities to support India's urban expansion across architectural design services, building management solutions, construction technologies and sustainability services.

Australia has demonstrated capability and competitive advantages in areas like urban development; transport infrastructure; water management; circular economy; and building and construction technologies.

A delegation of around 10 Australian companies representing capabilities in the above areas are participating in Municipalika 2023. Their objectives are to engage with Indian industry experts and like-minded businesses for collaboration, and to explore potential commercial opportunities in India's urban infrastructure sector.

Engaging with the Australian delegation during Municipalika 2023 presents an excellent opportunity for Indian industry to learn Australian expertise in sustainable infrastructure, forge partnerships and leverage capabilities to deliver projects that are aligned with India's ambitious sustainability and 'Net Zero' goals.

Please look out for Austrade representatives at Municipalika 2023 for further information and engagement possibilities. You may also write to india@austrade.gov.au for any enquiries.

"There is no better time for business between Australia and India. Our bilateral relationship is at a historical high point, evidenced by implementation of theAustralia-India Economic Cooperation and Trade Agreement (AI-ECTA) in December 2022.

The benefits of our bilateral ties and the AI-ECTA are prominent in supporting Australia-India infrastructure collaboration. In line with the promise we share in the infrastructure sector, we are pleased to see the Australian Infrastructure industry strongly represented at Municipalika 2023. I look forward to sustained and productive engagement between Australian and Indian stakeholders during the event."

Ms. Catherine Gallagher, Minister Commercial,
Australian High Commission and Head of the Australian Trade & Investment Commission (Austrade) - South Asia

MUNICIPALIKA SMART & SUSTAINABLE CITIES

Good Governance India Foundation

urban News Digest

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Host State

Government of Karnataka

Strong Support from Government of India Ministries

Ministry of Housing and Urban Affairs
Government of India

Ministry of Home Affairs
Office of the Fire Adviser
Government of India

Ministry of New and Renewable Energy
Government of India

Ministry of Environment, Forest and Climate Change

Namami Gange

River Cities Alliance

Innovation Partner

Australian Government
Australian Trade and Investment Commission

Strong Support from Government

Smart City

Atal Mission for Rejuvenation and Urban Transformation

Pradhan Mantri Awas Yojana-Urban

Swachh Bharat

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Strong Support from Government

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Bruhat Bengaluru Mahanagara Palike

Featured Cities

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Directorate of Municipal Administration

Director of Town & Country Planning

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KUIDFC

namma metro

Government of Karnataka Organisations Support

BWSSB

BMRDA
Bangalore Metropolitan Region Development Authority

Rajiv Gandhi Housing Corporation Limited

Karnataka Housing Board

K RIDE

BESCOM

Industry Support

CREDAI

NAREDCO

Indian Green Building Council

GreenPro

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CASMB

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ASTRAL PIPES

Cosmos Pumps

PRINCE PIPING SYSTEMS

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biltech

TATA PROJECTS

capricot
AN ARKANCE COMPANY

HP COMPOSITES LLP

Dynamic Equipments Private Limited

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SHIVANG
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Innovations in CleanTech

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ACE UPDATE

BB PURCHASE
For Project Procurement

Construction Architecture Update

TYCOONS

Indian Infrastructure

In AWE

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FUTURE CITIES 2023 - AGENDA

www.municipalika.com

Day 1 | 28th November 2023

08:30 - 09:30 | Delegate Registration

10:00 - 11:00 | Conference Inaugural Session

11:15 - 11:30 | Inauguration of the Exhibition

11:30- 13:00 | Exhibition visit by VIPs and Delegates

13:00 - 14:00 | Networking Lunch

HALL A: MUNICIPALIKA	**HALL B:** MUNICIPALIKA	**HALL C:** CAPEX	**HALL D:** AAM
14:00 - 15:15	**14:00 - 15:15**	**14:00 - 15:15**	**14:00 - 15:15**
URBAN PLANNING REFORMS & EASE OF DOING BUSINESS • Urban Reforms • Single Window/Fast track Clearances • Promoting urban start-ups and SMEs • Building regulations and DCR • Electronic filing and approval	**FIRE & LIFE SAFETY** • Best practices for fire prevention, fire-fighting, and mitigation • Fire safety codes and standards • Prevention and protection strategies • Life safety and evacuation	**BUILDING MATERIALS AND TECHNOLOGIES: EMERGING TRENDS** • Innovations in the use of Cement, Concrete and Composites • Steel and allied technologies	**MILLENNIALS@WORK** How are millennial offices blurring the lines between work and play? • Channeling Uber: Co-Working in sharing economy • Building for Brands: Millennial preference to Experiential design • Flexible Workspaces and Offices • Natural elements in Millennial workspace designs • Clean Minimalistic look for workstations
15:30 - 17:00	**15:30 - 17:00**	**15:30 - 17:00**	**15:30 - 17:00**
SMART CITIES Looking back and looking forward on Smart Cities Mission Programme • Policy and planning • Smart-technologies • Human / Computer Interaction for design and management	**CITY RESILIENCE & SURVEILLANCE** Can cities reduce their risk from natural disasters? • Resilient infrastructure (Floods, Landslides, Earthquakes, Cyclones, Tsunami etc.) • Surveillance, Alarms and people security • Preventive and mitigation measures	**BUILDING MATERIALS AND TECHNOLOGIES** • Emerging Trends • Roofing, Walling, Masonry, Flooring • Finishing Materials	**RIVER CITIES ALLIANCE SPECIAL SESSION (WITH NMCG)** • River-sensitive Planning and Development • Restoration of Water Quality • SDG goals of equity in water distribution, access to safe drinking water, democratization of water etc
	17:00 - 17:15		
	PRAMA INDIA Presentation		
17:00 - 18:00	**17:00 - 18:00**	**17:00 - 18:00**	
LOCATION : EXHIBITION HALL Connect City Managers with technology and solution providers	**LOCATION : EXHIBITION HALL** Connect Fire and Safety Officials with technology and solution providers	**LOCATION : EXHIBITION HALL** Connect Architects and Developers with Building Technology and Solution Providers	
18:30 - 20:00			
Vision Address : Future Cities			

Day 2 | 29th November 2023

HALL A: MUNICIPALIKA	**HALL B:** MUNICIPALIKA	**HALL C:** CAPEX	**HALL D:** AAM
10:00 - 11:15	**10:00 - 11:15**	**10:00 - 11:15**	**10:00 - 11:15**
WATER (AMRUT) Providing equitable access to safe and clean water • Integrated water resource management • Alternative water sources • Improve quality of water • 24x7 Water Supply • Water conservation • Rivers and Water Bodies Protection & Management	**DIGITAL CITIES** What is the digital vision for city transformation? • Geo-spatial planning • Command control centres • Big Data • GIS/GPS • Digital Maps • Remote sensing applications • AI, IOT	**SUSTAINABLE AND GREEN BUILDING TECHNOLOGIES** • Buildings and Building services • Lighting • Electrical Installations • HVAC • Lifts and Escalators • ICT	**MILLENNIALS@HOME** How to minimise footprint and maximise utility? • Back to Basic Finishes • Flexibility vs. Permanence • Material for millennial age natural, sustainable, low maintenance • Outdoor spaces for the millennial age
11:15 - 11:30			
Product presentations over tea			
11:30 - 12:45	**11:30 - 12:45**	**11:30 - 12:45**	**11:30 - 12:45**
WASTE-WATER (AMRUT) Trends in waste-water management? • Filteration and treatment at city scale • Water recycling in buildings • Cost effective technologies • Septage treatment • Net zero water management	**E-GOVERNANCE** E-governance best practices for citizen interface • Building permission • Water supply portal • Waste management • Mobility management • Cyber safety • Property Tax and Utility Bill Payment	**CREDIBLE AND QUALITY REAL ESTATE DEVELOPMENT** • RERA's Experience and Best Practices • Response of Builder and Developers • Views of Consumers	**MILLENNIALS@CAMPUSES** What is the new built-environment for the millennial learners? • Break down Walls, Class outside rooms • Build the change we want to see : Closed-loop ecosystems • New Age Millennial Libraries • Inspiring Cross- disciplinarily and Experimentation • Campus-wide Internet of Things: Optimising resources

Contd. on next page

HALL A: MUNICIPALIKA	**HALL B:** MUNICIPALIKA	**HALL C:** CAPEX	**HALL D:** AAM
12:45 - 13:15	**12:45 - 13:15**	**12:45 - 13:15**	
LOCATION : EXHIBITION HALL Connect Water, Waste-Water Experts with solution providers in the exhibition	**LOCATION : EXHIBITION HALL** Connect with digital experts with technology providers in the exhibition	**LOCATION : EXHIBITION HALL** Connect with Building Experts with solution providers in the exhibition	
13:15 - 14:00			
Networking Lunch			
14:00 - 15:30	**14:00 - 15:30**	**14:00 - 15:30**	**14:00 - 15:30**
SANITATION AND INTEGRATED SOLID WASTE MANAGEMENT (SBM) What have we learnt from Swachh Bharat Mission? • Innovative sub/super-structure toilet technologies • Retrofits to existing toilets • Sanitation infrastructure for women and children	**HOUSING FOR ALL (PMAY)** Is Housing for All agenda getting the right impact? • Success stories • Road Blocks/Solutions for all resources of Land, Finance, Building Materials • Regulatory Regime and RERA	**GREEN BUILDINGS** What are the trends in green materials, products and technologies? • Green and recycled products • Climatic facades and fenestrations • HVAC and efficient lighting • Coatings, paints and waterproofing • GreenPro Products	**SPECIAL COUNTRY PRESENTATION BY AUSTRALIA**
15:30 - 15:45			
Product presentations over tea			
15:45 - 17:00	**15:45 - 17:00**	**15:45 - 17:00**	**15:45 - 17:00**
INTEGRATED SOLID WASTE MANAGEMENT (SBM) What are the best practices of net zero waste? • Circulary economy • Waste conversion technologies • Construction and demolition waste recycling • Waste-to-Energy • Net Zero waste • Recycling	**CITY DEVELOPMENT INVESTMENT CONCLAVE : HOUSING/ INFRASTRUCTURE FINANCE** • PMAY • Smart Cities • AMRUT Cities • Green Financing • Other city/Core Infra	**GREEN BUILDINGS** How to build green and energy efficient buildings? • Energy saving design • Passive design • Bioclimatic architecture • Street lighting	**MILLENNIALS@PUBLIC PLACES** How to re-design streets and parks the millennial way? • Millennials on the move • Fitness studios- New health designs for Millennials • Cooking up a hangout experience : Millennial cafes, restaurants, pubs • New trends in interactive and digital signage design • Outdoor furniture- Millennials influencing future landscapes
17:00 - 18:00	**17:00 - 18:00**	**17:00 - 18:00**	
LOCATION : EXHIBITION HALL Connect with Sanitation Experts with solution providers	**LOCATION : EXHIBITION HALL** Connect with Housing Experts with solution providers	**LOCATION : EXHIBITION HALL** Connect with Building Experts with solution providers	
18:00 - 19:45			
Participative Cities - Open House Citizen Interface: Special Session with Mayors and Municipal Commissioners			
20:00 - 21:00			
Networking Dinner			

Day 3 | 30th November 2023

HALL A: MUNICIPALIKA	**HALL B:** MUNICIPALIKA	**HALL C:** CAPEX	**HALL D:** AAM
10:00 - 11:15	**10:00 - 11:15**	**10:00 - 11:15**	**10:00 - 11:15**
PUBLIC - FRIENDLY MOBILITY • Sustainable and Smart Public transport: MRTS/BRT/LRT • Parking management • Traffic Management • Last-mile connectivity	**GREEN CITIES** How to integrate ecological-systems in planning and design? • Pollution-free cities • Passive Design • Landscape design • Carbon sequestration • Net Zero Mission (Water, Energy, Waste, Carbon)	**WHAT ARE THE FUTURE SCENARIOS FOR SPEEDY CONSTRUCTION AND SUSTAINABLE MANAGEMENT PRACTICES?** • Precast, Pre-Fab, Pre-Engineered • Scaffoldings and Formwork • Construction Machinery • Composite Construction • Sustainable construction management	**PROFESSIONAL CAPABILITIES FOR CITY DEVELOPMENT** • Capacity Building • Coordinated Approach • New Tools & Processes
11:15 - 11:30			
Product presentations over tea			
11:30 - 12:45	**11:30 - 12:45**	**11:30 - 12:45**	**11:30 - 12:45**
CLIMATE-FRIENDLY MOBILITY • Electric Vehicles, Energy Storage, and charging infrastructure (Pvt and Public) • NMT • Water Transport • Alternative Fuels	**RENEWABLE ENERGY** Clean energy for built environment • Solar and other renewable energy • Green services • Energy efficient design	**SMART CITIES CONCLAVE** • Smart Technologies • Policy and Planning • Human Computer Interaction for Design and Management • Command and Control Centres	**KARNATAKA ULB BEST PRACTICES PRESENTATION**
12:45 - 13:15	**12:45 - 13:15**	**12:45 - 13:15**	
LOCATION : EXHIBITION HALL Connect with Mobility Experts with solution providers	**LOCATION : EXHIBITION HALL** Connect with Environmental Experts with solution providers	**LOCATION : EXHIBITION HALL** Connect with Building Experts with solution providers	
14:00 - 15:30			
Networking Lunch			
13:15 - 14:00			
Integrated City Development • Brownfield and Greenfield township development • Vibrant Cities (HRIDAY) Heritage and Urban Conservation			
16:00 - 17:00			
Valedictory session			

Australian Government
Australian Trade and Investment Commission

Australian Trade Delegation to 'Municipalika 2023'
Delegate Profiles

Business	Details	Representatives
Praqua Pty Ltd	Praqua is a multi-national water technology company, with operations in Australia, India, and USA. Focused on the design, manufacture, and distribution of water security products, Praqua provides access to safe drinking water in a variety of situations. All Praqua products have been granted WHO approval, ensuring their standard and quality, and are being sold and utilized the world over including emergency relief and military. *Website:* www.praqua.com	 ***Simon Schmidt*** ***Director*** *Email:* hello@puribagwater.com
Hydro-dis International	Hydro-dis® technology is a unique Australian designed and developed water treatment and disinfection technique that uses electrolysis to break waterborne micro-organisms and micro-flora and oxidize metals on the source water making them easier to filter out, whilst simultaneously using the electro catalytic process to converting chloride ions into chlorine leaving a measured residual disinfection in the treated water. Hydro-dis® technology is most applicable to small settlements and villages, through to small towns. *Website*: hydro-dis.com.au	 ***Mark Carey*** ***CEO*** *Email:* mark@hydro-dis.com.au
Enviro Global Water	Enviro Global Water specialises in the design and supply of stormwater management systems which form an integral part of drainage infrastructure. The management of Stormwater run-off is critical to community health and long-term sustainability of built environment assets. Its' world first technology can separate and hold broad spectrum pollutants including oils for safe handling, disposal and re-cycling as required. *Website*: www.enviroaustralis.com.au	 ***Leo Crasti*** ***Director*** *Email*: info@enviroaustralis.com.au

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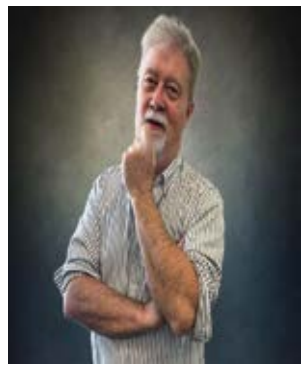
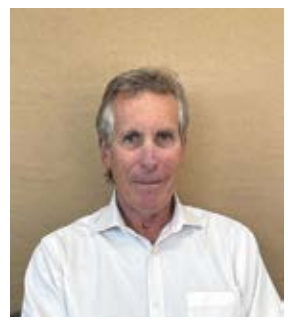
Australian Government
Australian Trade and Investment Commission

Australian Trade Delegation to 'Municipalika 2023'
Delegate Profiles

Business	Details	Representatives
Matter	Matter helps change behaviors and create efficiencies using a breakthrough combination of radar & AI level sensing technologies. Their capture system scans stormwater pits and provides 3-layer reporting as to debris, water level and blockage issues. The data can be combined with photo-realistic imaging to provide real-time visualizations and analytics for individual and grouped sites. This helps priorities workflows and, importantly, emergency response teams. Matter works with Australian state governments to convert this data into Digital Twin modelling that helps planners map the subsurface layers of a city. The data also provides predictive analytics that when combined by AI with weather forecasts can be a very powerful predictor of urban and regional flash flooding. *Website*: www.matter.city.au	 ***Len Luxford*** ***Director*** *Email*: len@matter.city
Osmoflow	Osmoflow is a water treatment company that provides tailored, turn-key water and water recycling/reuse solutions across the industrial, resources and municipal sectors globally. It's the largest Australia based designer and builder of desalination projects, with offices in the Middle East, South-East Asia, South America, and India. It has track record of providing successful, affordable high technology water solutions dating back to 1991. *Website:* www.osmoflo.com	 ***Milind Bendre*** ***Country Head, India*** *Email:* milind.bendre@osmoflo.com  ***Ashutosh Gopal*** ***Business Dev*** *Email:* ashutosh.gopal@osmoflo.com
Ortech Industries Pty Ltd.	Ortech Industries specializes in the manufacturing and marketing of sustainable building products and construction systems throughout Australia and overseas. Their Durra Panel and Durra Steel Sections use a unique dry extrusion process that converts a natural and renewable resource; wheat or rice straw fibers (biomass). Durra Panel roof, ceiling and wall systems have set the industry benchmark for safety, sustainability, cost	 ***Derek Layfield*** ***Managing Director*** *Email*: derek.layfield@ortech.com.au

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Australian Government

Australian Trade and Investment Commission

Australian Trade Delegation to 'Municipalika 2023'
Delegate Profiles

Business	Details	Representatives
	efficiency, high performance noise control and fire resistance. The building materials have been used in landmark projects across the world and are ideal for use in commercial, industrial, residential, and acoustic studio projects. *Website*: www.ortech.com.au	
Collaborative Cost Management CCM | Collaborative Cost Management	Collaborative Cost Management India (CCM India) provides customized and client-focused cost management solutions. It provides consulting services to leading real estate and infrastructure developers as well as multinational corporations establishing campuses across India. It's part of the CCM Group headquartered in Brisbane, Australia, offers a wealth of experience and a longstanding reputation for professional excellence. It's leadership team, collectively has more than 90 years of global experience. *Website:* www.collaborativecm.com.au	 ***Peter Cox*** ***MD, India*** *Email*: pcox@collaborativecm.com
$h_2$orizons $h_2$orizons	h2orizons supports transition to a global water future that enables productive and sustainable industries, resilient communities and thriving natural ecosystems. This is delivered through a range of services, bringing together necessary capability from across different elements of water. It provides consultancy with focus on supporting the development and growth of the Australian water industry through accelerated technology adoption and international collaboration. *Website*: h2orizons	 ***Steve Morton,*** ***Director*** *Email:* h2orizonsconsultancy@gmail.com

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28,29,30 NOVEMBER 2023

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www.municipalika.com

17TH INTERNATIONAL EXHIBITION & CONFERENCE ON
SAFE, SMART & SUSTAINABLE CITY SOLUTIONS

Union Budget 2023: Government focus on urban planning reforms, 'sustainable cities of tomorrow. This means efficient use of land resources, adequate resources for urban infrastructure, transit-oriented development, enhanced availability and affordability of urban land, and opportunities for all. Presenting the Union Budget 2023-24, Finance Minister Nirmala Sitharaman said that the states and cities will be encouraged to undertake actions to transform into 'sustainable cities of tomorrow'.

Under the Scheme for Special Assistance to States for Capital Investment 2022-23 (with an outlay of Rs. 6,000 crores) and in 2023-24 (15,000 crores) has been initiated which will be funded by Department of Expenditure, Ministry of Finance for implementing 'Urban Planning Reforms' Ministry of Housing and Urban Affairs shall monitor undertaking urban planning reforms to transform the cities to future readiness by the states.

It will be an outcome-based incentive scheme or reform linked to the transfer of funds in which states will get the funds after implementation of the schemes. The proposals received by the States will be considered by Department of Expenditure for release of funds as special assistance.

For 2023-24,following reforms have been identified to be taken up by the State Governments.

- Augmentation of human resources for strengthening urban planning ecosystem
- Implementation of town planning scheme/ land pooling scheme
- Modernization of building by laws
- Promoting affordable housing and In-situ slum rehabilitation
- Transit oriented development for densification and ease of mobility
- Transferrable development rights as a planning tool
- Strengthening natural ecosystems of urban areas through urban planning
- Integrating essential components in Master Plans

For the year 2022-23,following were the outcomes:

- 13 States adopted special provisions for affordable housing; rationalizing parking & green norms.
- 10 States with TOD policy and identified corridors.
- 11 States notified TDR policy & 7 States acquired land.
- 11 cities prepared for LAP.
- 11,208 water bodies surveyed; 1,570 under implementation for rejuvenation

An amount of Rs 4,598.22 crores were released to 13 States for implementing the reforms. As the special assistance has been enhanced to Rs 15,000 crore,it is expected that all the States shall avail the funding and accordingly implement the reforms .

The implementation of urban planning reforms will certainly pave the way for urban transformation. The cities will have the opportunity to leverage the resources for the urban infrastructure upgradation thereby enhancing the liveability in cities, encouraging the public transport and urban environmental conservation through integration of blue and green infrastructure. The Local Area Plans and Town Planning Scheme will facilitate planned development in both brownfield and greenfield areas.

MoHUA has also focussed on capacity building for town planners through conducting handholding workshops/ conferences/ training programmes for the capacity building of State Government officials/ULBs. In the recent past , 7 capacity building programme for Local Area Plans and Town Planning Scheme were organized in 2019 wherein 210 urban planners were trained. Further ,TCPO since 2015 till date conducted 77 capacity building programmes and trained 2900 Urban Planners and supporting staff on formulation of GIS based mapping.

Niti Ayog Report On Urban Planning Capacity Reforms.

NITI Ayog Report on Urban Planning Capacity Reforms,2019 has clearly stated that Human resource is indispensable to strengthen the urban planning capacity in the country. A study conducted by TCPO and NIUA for NITI Aayog indicated that over 12,000 posts for town planners are required in the State Town and Country Planning Departments. This is in stark contrast to the present situation.

There are fewer than 4000 sanctioned positions for 'town planners' in these departments, half of which are lying vacant. An inadequate number of urban planners in the State planning machineries and lack of multi-disciplinary teams are serious issues. Also, in several States, ironically, a qualification in town planning is not even an essential criterion for such jobs.

The country has been producing graduates with degrees such as Bachelor of Planning since more than 3 decades and Master of Planning since early 1950s. However, so far, the urban planning profession has not yet gained a strong and unique identity of its own. As a result, prospective employers, unaware of these courses and skill sets of available graduates, end up hiring professionals from other disciplines to undertake the tasks of planning, thereby creating a negative feedback loop. This restrains the growth of urban-planning capacity in the country in terms of quantity of fresh graduates as well as the quality of work being delivered in this sector.

There are only about 7500 registered members in ITPI, a professional body of town planners in India. However, this institute is not a statutory body and its membership is voluntary. In the absence of an end-to-end system to track the number of urban planners who graduate every year, a fallacious sense of sense of shortage is created. The supply of urban planners needs to be supported with adequate job demand and not just the perceived need for planners or planning of cities. Planners must be organized in private sector companies to be able to deliver services or entrusted with roles of planning in public sector organisations. Till this doesn't happen, this workforce will remain unutilized and demand–supply will be disconnected.

Ramping up of human resources: NITI Ayog recommendation on capacity building

The public sector must have an adequate workforce in terms of quantity and quality to tackle the challenges of urbanization. The Advisory Committee recommends that the States/UTs may need to a) expedite the filling up of vacant positions of town planners, and b) additionally sanction 8268 town planners' posts as lateral entry positions for a minimum period of 3 years and a maximum of 5 years to close the gaps. It strongly recommends:

- Ensuring qualified professionals for undertaking urban planning: Urban areas and their developmental complexities have increased over the years. The discipline of urban planning or town planning has a dedicated course curricula with which graduates acquire a multi-sectoral overview and skillset to address such challenges. The States may need to undertake requisite amendments in their recruitment rules to ensure the entry of qualified candidates into town planning positions.

- Mainstreaming capacity-building activities and rejuvenation of capacity. building centres: Concerted efforts are required by the States/UTs to ensure regular capacity building of their town planning staff. Also, the existing centres of excellence established by MoHUA and State-level training institutions need to be further strengthened to regularly build the skills and expertise of urban functionaries

PLANNED CITIES

States & UT wise status of Proportion of cities with Master Plan – August 2023 (Towns based on Census 2011)																		
Sl.No	State / UT	Statutory Towns				Census Towns				Total No. of Towns (ST+CT) (3+7)	No. of Towns Having Approved M Plan (4+8)	No. of Towns have M Plan Under Preparation (5+9)	Total No. of Approved & Under Preparation of M Plan (12+13)	No. of Towns Haven't Master Plan (6+10)	Proportion of Cities - 2022			
		Numbers	Approved M Plan	M Plan Under Preparation	Haven't M Plan	Numbers	Approved M Plan	M Plan Under Preparation	Haven't M Plan						With Approved Master Plan (12/11*100)	Master Plan under Preparation (13/11*100)	Master Plan during 2022 (16+17)	Towns Haven't Master Plan (15/11*100)
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*
1	Andhra Pradesh	80	80	0	0	106	35	71	0	186	115	71	186	0	62	38	100	0
2	Arunachal Pradesh	26	0	6	20	1	1	7	-7	27	1	13	14	13	4	48	52	48
3	Assam	88	36	45	7	126	2	0	124	214	38	45	83	131	18	21	39	61
4	Bihar	139	13	15	111	60	0	0	60	199	13	15	28	171	7	8	14	86
5	Chhattisgarh	168	26	102	40	14	3	1	10	182	29	103	132	50	16	57	73	27
6	Goa	14	14	0	0	56	56	0	0	70	70	0	70	0	100	0	100	0
7	Gujarat	195	139	0	56	153	17	0	136	348	156	0	156	192	45	0	45	55
8	Haryana	80	58	13	9	74	49	6	19	154	107	19	126	28	69	12	82	18
9	Himachal Pradesh	56	18	0	38	3	0	0	3	59	18	0	18	41	31	0	31	69
10	J&K	86	11	0	75	36	11	3	22	122	22	3	25	97	18	2	20	80
11	Jharkhand	40	10	0	30	188	0	0	188	228	10	0	10	218	4	0	4	96
12	Karnataka	220	103	38	79	127	33	1	93	347	136	39	175	172	39	11	50	50
13	Kerala	59	28	31	0	461	13	42	406	520	41	73	114	406	8	14	22	78
14	Madhya Pradesh	364	118	0	246	112	10	0	102	476	128	0	128	348	27	0	27	73
15	Maharashtra	256	256	0	0	278	63	0	215	534	319	0	319	215	60	0	60	40
16	Manipur	28	0	3	25	23	0	16	7	51	0	19	19	32	0	37	37	63
17	Meghalaya	10	5	3	2	12	10	1	1	22	15	4	19	3	68	18	86	14
18	Mizoram	23	14	0	9	0	0	0	0	23	14	0	14	9	61	0	61	39
19	Nagaland	19	10	1	8	7	0	0	7	26	10	1	11	15	38	4	42	58
20	Odisha	107	71	17	19	116	26	0	90	223	97	17	114	109	43	8	51	49
21	Punjab	143	51	0	92	74	30	0	44	217	81	0	81	136	37	0	37	63
22	Rajasthan	185	184	0	1	112	52	0	60	297	236	0	236	61	79	0	79	21
23	Sikkim	8	4	0	4	1	0	0	1	9	4	0	4	5	44	0	44	56
24	Tamil Nadu	721	123	50	548	376	0	0	376	1097	123	50	173	924	11	5	16	84
25	Telengana	45	43	0	2	122	49	51	22	167	92	51	143	24	55	31	86	14
26	Tripura	16	13	0	3	26	0	0	26	42	13	0	13	29	31	0	31	69
27	Uttar Pradesh	648	106	2	540	267	49	0	218	915	155	2	157	758	17	0	17	83
28	Uttarakhand	74	30	8	36	41	14	15	12	115	44	23	67	48	38	20	58	42
29	West Bengal	129	50	7	72	780	86	37	657	909	136	44	180	729	15	5	20	80
30	A&N Islands	1	1	0	0	4	3	1	0	5	4	1	5	0	80	20	100	0
31	Chandigarh	1	1	0	0	5	5	0	0	6	6	0	6	0	100	0	100	0
32	NCT Delhi	3	3	0	0	110	110	0	0	113	113	0	113	0	100	0	100	0
33	D & N Haveli	1	1	0	0	5	5	0	0	6	6	0	6	0	100	0	100	0
34	Daman & Diu	2	0	2	0	6	0	6	0	8	0	8	8	0	0	100	100	0
35	Lakshadweep	0	0	0	0	6	0	0	6	6	0	0	0	6	0	0	0	100
36	Puducherry	6	5	0	1	4	1	0	3	10	6	0	6	4	60	0	60	40
	Total	4041	1625	343	2073	3892	733	258	2901	7933	2358	601	2959	4974	41	13	54	46

Status of Master Plan 2023		Numbers	Percentage
Statutory Towns	Having Master Plan	1625	40.21
	Master Plan under preparation	343	8.49
	Haven't Master Plan	2073	51.30
	Total	4041	100
Census Towns	Having Master Plan	733	18.83
	Master Plan under preparation	258	6.63
	Haven't Master Plan	2901	74.54
	Total	3892	100

Note:

- ✓ *The Census Town may be notified as an Industrial Development Authority or New Town Development Authority by State/UT Government. The Authority has to prepare a Master Plan delineated/notified area.*
- ✓ *The Census Towns doesn't have separate Master Plan. The towns may fall on jurisdiction of Metropolitan Cities, Municipal Corporation or Municipalities.*
- ✓ *Ministry of Housing and Urban Affairs through the State Government has been monitoring the Scheme on Formulation of GIS Based Mater Plans .However, the challenge is that all the cities and towns need to have Master Plans. Right now,40% of statutory towns have the Master Plans while 18.83% Census towns have the Master Plans.*

Source : Town and Country Planning Organization,Ministry of Housing and Urban Affairs.

AMRUT

About the Mission:

Atal Mission for Rejuvenation and Urban Transformation (AMRUT) was launched on 25th June 2015 in 500 cities and towns across the country. The Mission focuses on the development of basic infrastructure, in the selected cities and towns, in the sectors of water supply; sewerage and septage management; storm water drainage; green spaces and parks; and non-motorized urban transport. A set of Urban Reforms and Capacity Building have been included in the Mission.

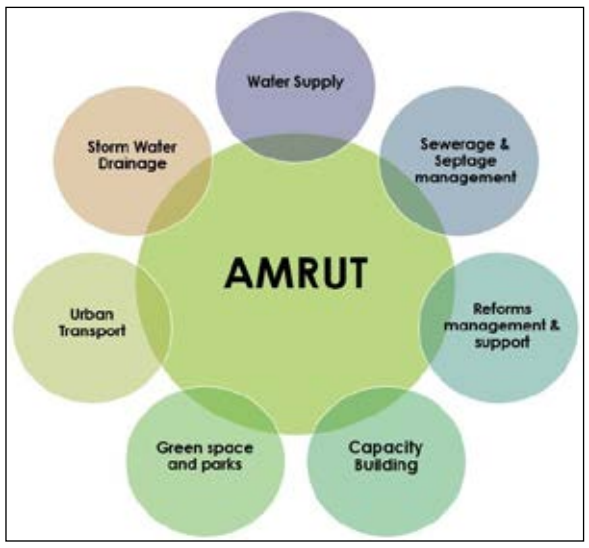


Illustration presenting components under AMRUT:

Ministry of Housing and Urban Affairs has approved State Annual Action Plans (SAAPs) under AMRUT 1.0 of all the States/Union Territories (UTs) amounting to 77,640 crore for the entire Mission period, which includes committed Central Assistance (CA) of 35,990 crore. So far, States/UTs have taken up 5,873 projects worth 82,222 crore, of which 4,676 projects worth 32,793 crore have been completed, and another 1,197 projects worth 49,430 crore have been grounded which are at various stages of implementation. Further, overall works worth around 66,313 crore have been physically completed and expenditure of 59,615 crore has been incurred.

Till date, 134 lakh water tap connections and 102 lakh sewer connections (including households covered through Faecal Sludge and Septage Management - FSSM) have been provided through AMRUT & in convergence with other schemes against targeted 139 lakh water connections and 145 lakh sewer connections respectively.

AMRUT Mission has been subsumed under AMRUT 2.0, which was launched on 01st October, 2021and ongoing projects of AMRUT 1.0 will be funded with CA till 31st March, 2023.

Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0 scheme, which has been launched on 01 October, 2021 for the period of 05 years i.e. from the financial year 2021-22 to the financial year 2025-26, is designed to provide universal coverage of water supply through functional taps to all households in all the statutory towns in the country and coverage of sewerage/septage management in 500 cities covered in first phase of the AMRUT scheme.

AMRUT 2.0 will promote circular economy of water through development of City Water Balance Plan (CWBP) for each city focusing on recycle/reuse of treated sewage, rejuvenation of water bodies and water conservation. It will help cities to identify scope for projects focusing on universal coverage of functional water tap connections, water source conservation, rejuvenation of water bodies and wells, recycle/reuse of treated used water, and rainwater harvesting. Based on the projects identified in CWBP, Mission envisages to make cities 'water secure' through circular economy of water.

Mission also has a reform agenda on ease of living of citizens through reduction of non-revenue water, recycle of treated used water, rejuvenation of water bodies, augmenting double entry accounting system, urban planning, strengthening urban finance etc.

Other components of AMRUT 2.0 are:

i. Pey Jal Survekshan to ascertain equitable distribution of water, reuse of wastewater, mapping of water bodies and promote healthy competition among the cities /towns.
ii. Technology Sub-Mission for water to leverage latest global technologies in the field of water.
iii. Information, Education and Communication (IEC) campaign to spread awareness among the masses about water conservation.

Overall

The total indicative outlay for AMRUT 2.0 is 2,99,000 crore including a Central share of 76,760 crore for five years. This outlay includes funding of 22,000 crore (10,000 crore as Central Assistance) for ongoing projects of AMRUT till March 2023.

Progress under the Mission is illustrated below:

Smart Cities Mission

The Smart Cities Mission was launched by the Hon' Prime Minister on 25 June, 2015. The main objective of the Mission is to promote cities that provide core infrastructure, clean and sustainable environment, and give a decent quality of life to their citizens through the application of 'smart solutions'. The Mission aims to drive economic growth and improve quality of life through comprehensive work on social, economic, physical, and institutional pillars of the city. The focus is on sustainable and inclusive development through the creation of replicable models that act as lighthouses to other aspiring cities. 100 cities have been selected to be developed as Smart Cities through a two-stage competition.

The Mission is operated as a Centrally Sponsored Scheme. The Central Government will give financial support to the extent of Rs. 48,000 crores over 5 years i.e. on an average Rs.100 crore per city per year. An equal amount on a matching basis is to be provided by the State/ULB. Additional resources are to be raised through convergence, from ULBs' own funds, grants under Finance Commission, innovative finance mechanisms such as Municipal Bonds, other government programs and borrowings. Emphasis has been given on the participation of private sector through Public Private Partnerships (PPP). Citizens' aspirations were captured in the Smart City Proposals (SCPs) prepared by the selected cities. Aggregated at the national level, these proposals contained more than 5,000 projects worth over Rs. 2,00,000 crores, of which 45 percent is to be funded through Mission grants, 21 percent through convergence, 21 percent through PPP and rest from other sources.

There is no standard definition or template for a smart city. In the context of India, the six fundamental principles on which the concept of Smart Cities is based are:

The strategic components of Area-based development in the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (greenfield development) plus a Pan-city initiative in which Smart Solutions are applied covering larger parts of the city. Below are given the descriptions of the three models of Area-based Smart City Development:

Retrofitting will introduce planning in an existing built-up area to achieve Smart City objectives, along with other objectives, to make the existing area more efficient and liveable. In retrofitting, an area consisting of more than 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare a strategy to become smart. Since existing structures are largely to remain intact in this model, it is expected that more intensive infrastructure service levels and a large number of smart applications will be packed into the retrofitted Smart City. This strategy may also be completed in a shorter time frame, leading to its replication in another part of the city.

Redevelopment will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizens. For instance, a new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage. Two examples of the redevelopment model are the Saifee Burhani Upliftment Project in Mumbai (also called the Bhendi Bazaar Project) and the redevelopment of East Kidwai Nagar in New Delhi being undertaken by the National Building Construction Corporation.

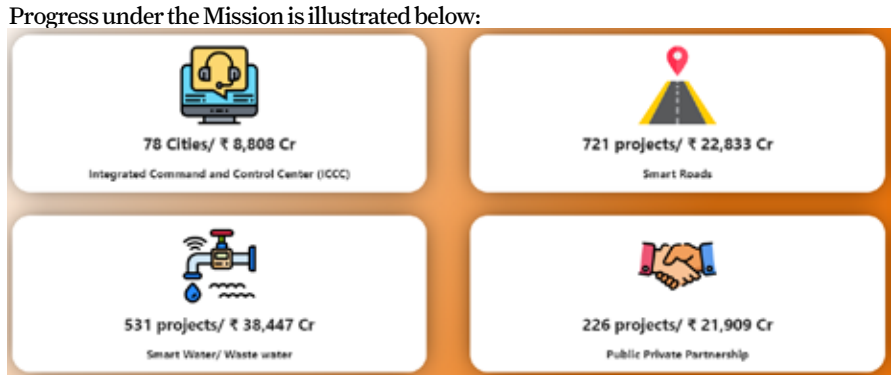
Greenfield development will introduce most of the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, plan financing and plan implementation tools (e.g. land pooling/ land reconstitution) with provision for affordable housing, especially for the poor. Greenfield developments are required around cities in order to address the needs of the expanding population. One well known example is the GIFT City in Gujarat. Unlike retrofitting and redevelopment, greenfield developments could be located either within the limits of the ULB or within the limits of the local Urban Development Authority (UDA).

Pan-city development envisages application of selected Smart Solutions to the existing city-wide infrastructure. Application of Smart Solutions will involve the use of technology, information and data to make infrastructure and services better. For example, applying Smart Solutions in the transport sector (intelligent traffic management system) and reducing average commute time or cost to citizens will have positive effects on productivity and quality of life of citizens. Another example can be waste water recycling and smart metering which can make a substantial contribution to better water management in the city

As far as Smart Solutions are concerned, an illustrative list is given below. This is not, however, an exhaustive list, and cities are given freewill to add more applications.

As of July 2023, work orders have been issued by 100 Smart Cities in 7,978 projects of which 5,909 projects (74%) have been completed. 73,454 crore has been released for 100 Smart Cities of which 66,023 crore (90%) has been utilized. The period of implementation of SCM has been extended upto June 2024 and all Smart Cities, including those in Odisha, are expected to complete their projects within the stipulated time.

Progress under the Mission is illustrated below:



Swachh Bharat Mission

Swachh Bharat Mission or Swachh Bharat Abhiyan is a campaign run by the government of India as a massive mass movement to initiate the theme of cleanliness all through the India. Swachh Bharat Abhiyan was launched by our hoAnorable Prime Minister Narendra Modi on 2nd October 2014 on the 145th birth anniversary of Mahatma Gandhi. This campaign was launched in seeking the way to create a Clean India target by 2019, 2nd of October means 150th birthday anniversary of the Mahatma Gandhi. The father of nation, Mahatma Gandhi was dreamed to make India a clean India and always put his hard efforts towards swachhta in India. This is the reason, why Swachh Bharat Abhiyan was launched on 2nd of October (the birthday of the Mahatma Gandhi). To complete the vision of the father of the nation, Indian government has decided to launch this campaign. This mission is managed by the Ministry of Housing and Urban Affairs in the Urban Regions, and the Ministry of Drinking Water and Sanitation in the rural regions. The aim of the mission is to cover all the rural and urban areas of the country to present this country as an ideal country before the world. The mission has targeted aims like eliminating the open defecation, converting insanitary toilets into pour flush toilets, eradicating manual scavenging, complete disposal and reuse of solid and liquid wastes, bringing behavioral changes to people and motivate health practices, spreading cleanliness awareness among people, strengthening the cleanliness systems in the urban and rural areas as well as creating user friendly environment for all private sectors interested for investing in India for cleanliness maintenance. The Swachh Bharat Abhiyan is so far the most significant Indian campaign with the participation of about 3 million students and government employees.The cleanliness drive improves the country's GDP growth, generates multiple employment sources, draws more tourists, and improves our economic conditions.As a majority of India's population lives in the rural region, this campaign helps in creating health and hygiene awareness among the people. In short, Swachh Bharat Abhiyan is a great start to make India cleaner and greener. If all the citizens could come together and participate in this drive, India will soon flourish. Moreover, when the hygienic conditions of India will improve, all of us will benefit equally. India will have more tourists visiting it every year and will create a happy and clean environment for the citizens.

Achievements - SBM 1.0:

This Mission has achieved significant levels of success against the above objectives, with massive engagement of citizens across all categories of society.

India's journey in Solid Waste Management: the launch of SBM-U, coupled with the promulgation of SWM Rules 2016 C&D waste rules, Plastic Waste Management rules etc, all combined to set the stage for India 8 to accelerate its progress on effective Solid Waste Management. Where unsightly heaps of garbage dotting the urban landscape, wreaking havoc on citizens' health used to be a common phenomenon prior to 2014, today there have been noteworthy improvements. Cities have become visibly cleaner, thanks to the fleet of more than 2.5 lakh collection vehicles that travel from door to door, collecting household and other solid waste. Source segregation of waste, which was negligible earlier, has now captured the imagination of citizens and is being adopted by more and more households. An enabling eco-system has been created through policy reforms designed to encourage conversion of waste to value added products. Awareness has also been generated on critical issues such as source segregation of waste, effective management of construction & demolition waste, reduction in single-use plastic usage, etc.

The results are there for all to see. At the time of its launch, the Municipal Solid Waste (MSW) treatment capacity was 26,000 TPD of waste (18%). This has been enhanced substantially in the last 7 years, and presently, waste processing capacity stands at nearly 1 lakh TPD (70%).

Door to door collection and source segregation have gone up from negligible levels in 2014 to cover 86,228 wards (97%) and 72,493 wards (85%) respectively. Economically weaker sections of society, especially women self-help group members from urban poor communities have more livelihood options, and over 90,000 informal waste workers have been formalized into the waste management value chain. 1.2.2 India's ODF journey: Urban India has become Open Defecation Free (ODF) under SBM-Urban: a fitting tribute to Mahatma Gandhi's vision. Not only has the sanitation objective of the Mission been fulfilled, but lakhs of citizens, especially women, have been provided dignity and safety, and significant reduction in vector borne diseases with consequent improvement in health parameters have been experienced, setting Urban India on the path of holistic cleanliness. Sanitation workers and SafaiMitras, a largely ignored section earlier, have become a key stakeholder for the Mission, with initiatives being taken to ensure safe, healthy and improved living conditions for them, and providing them with better livelihood options, dignity and respect. In terms of tangible outcomes, all Urban areas of 35 States/ UTs have become ODF (except 1 ULB of West Bengal), i.e. 4,371 ULBs (out of 4,372) have become ODF. This has been achieved through the construction (including under construction) of 66.86 lakh Individual Household Toilets (113% progress), and 6.40 lakh seats of Community/ Public toilets (CT/ PT) (126% progress).

Third party assessments & standardized protocols: In order to sustain the ODF status and ensure that no slippage occurs, MoHUA has introduced the ODF+ and ODF++ protocols. ODF+ protocol focuses on O&M of CT/ PTs by ensuring their functionality and proper maintenance for continued usage. ODF++ protocol focuses on addressing safe containment, evacuation, transportation and processing of fecal sludge from toilets and ensuring that no untreated sludge is discharged into open drains, water bodies or in open fields. Water+ protocol helps ensure that no untreated waste (used) water is discharged into the open environment or water bodies. Till 2nd October 2021, 3,309 cities have been certified ODF+, 960 cities have been certified ODF++, and 9 cities have become Water+, through third party verification.

Behavior change through Jan Andolan: SBM-U has emerged as the largest urban sanitation behavior change program in the world and has been able to accelerate India's progress in ensuring availability and sustainable management of water and sanitation for all (SDG 6). Under SBM-U, the sanitation discourse has been brought onto the centre stage of the nation's development agenda and has helped to transform a government mandate into a 'Jan Andolan'. Through the personal leadership and involvement of the Prime Minister, SBM has been able to put the sanitation discourse into a 'Jan Andolan', a people's movement. Massive mass media campaign, intensive outreach programs, stringent monitoring of Information, Education and Communication (IEC) fund spend, multiple stakeholder involvement including by celebrity brand ambassadors and influencers have been the pillars of its behavior change strategy. However, the major trigger for 10 behaviour change has been the ownership that people from the community have taken when it comes to leading and sustaining change on the ground. Through a judicious use of traditional, digital, social media campaigns and intensive interpersonal communication, SBM-U has been able to activate all categories of citizens - community volunteers, youth, students, home makers, senior citizens, celebrities, elected representatives, media and the industry. Till date, over 20 crore citizens have been engaged in the Mission, which is testimony to the 'Jan Andolan' that has been created.

Innovations Under SBM - 1.0

A variety of innovations have contributed to the success of the first phase of the Mission, as given below.

1. Swachh Survekshan: An innovative survey conducted by the Ministry of Housing and Urban Affairs (MoHUA) under the SBM-U, to rank cities on various sanitation and cleanliness parameters. The survey has been successful in enthusing cities with a spirit of healthy competition towards the concept of 'swachhata'. Swachh Survekshan has now emerged as one of the largest Urban sanitation surveys in the world, with participation from crores of citizens. As on 2nd October 2021, 6 rounds of surveys have been conducted, in which Indore has been adjudged the cleanest city for four years in a row. The 7th edition has now been announced, and is set to kick-off.

2. Star rating protocol for Garbage free cities: The protocol, based on various SWM parameters follows a SMART framework – Single metric, Measurable, Achievable, Rigorous verification mechanism and Targeted towards outcomes. The indicators include all components of SWM, viz. source segregation, scientific processing of waste, dumpsite remediation, penalties & spot fines for littering, compliance by bulk waste generators, cleanliness of drains & water bodies, plastic waste

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management, and managing construction & demolition waste, etc. which are critical for cities to achieve garbage free status. Till date, 6 11 cities have been rated as 5-star

3. Citizen connect through ICT initiatives:

• MoHUA has partnered with Google to map all public toilets on Google maps, thereby improving ease of access of sanitation facilities to citizens. Till date, more than 65,500 public toilet blocks across more than 3,100 cities are accessible through Google maps covering more than 70% of India's urban population.

• More than 2 crore citizens have downloaded Swachhata App (citizens' grievance redressal platform for all sanitation and waste management related complaints). Nearly 2.22 crore complaints have been registered and 2.08 crore complaints have been resolved with more than 90% resolution rate.

• MoHUA has deployed an e-learning platform to train municipal functionaries across India. The platform hosts over 175 modules on various topics covering sanitation and waste management. More than 90,000 municipal employees and other users have actively used the platform, and successfully completed over 8.8 Lakh certifications (including 7.56 lakh certifications to govt. employees).

4. Swachhata becomes everybody's business: The Mission engaged with a wide variety of stakeholders, from celebrities as brand ambassadors, engaging with influencers in society, partnering with industry partners and corporate entities, as well as social entrepreneurs, citizens, students and youth, women SHG groups, homemakers and senior citizens, to make 'swachhata' everybody's business.

5. Equity, inclusiveness, addressing special requirements: In order to ensure that benefits of the Mission accrue to every citizen in an equitable and inclusive manner, standardized protocols were put in place. For example, the ODF+ protocol specified mandatory gender-friendly, child-friendly, divyang-friendly features to be included in every CT/PT. These protocols, along with mapping of all CT/PTs on Google maps ensured that every citizen's needs were catered to, with nobody left behind.

Swachh Bharat Mission 2.0

Swachh Bharat Mission-Urban 2.0, being implemented by the Ministry of Housing and Urban Affairs (MoHUA),has launched the Revised Swachh Certification Protocols for ODF, ODF+, ODF++, and Water+ certifications. The launch event, held at Nirman Bhavan, New Delhi yesterday was chaired by Shri Manoj Joshi, Secretary, Ministry of Housing and Urban Affairs (MoHUA), and was attended by various stakeholders such as officials from States/UTs, Cities, and sector partners.

By increasing awareness among citizens and consistently improving the availability of sanitation facilities, the first phase of Swachh Bharat Mission-Urban was successful in achieving this target and 100% of urban India was declared as Open Defecation Free. However, the mandate of the Mission goes beyond making urban India ODF.

Through SBM-U, India has scripted for itself a successful sanitation narrative that is a fitting tribute to Mahatma Gandhi's vision of Clean India. Seven years since the Mission was launched,lakhs of citizens, especially women, children and divyangs, have been provided dignity and safety.The need of the hour is to sustain these sanitation achievements while steadfastly moving towards new sanitation goals.The revamped revised protocol is aligned with SBM-2.0 objectives and is designed to ensure:

• No untreated used water or fecal sludge is discharged into the environment and all used water (including sewerage and septage, greywater and black water) is safely contained, transported, and treated, along with maximum reuse of treated used water, in all cities with less than 1 lakh population.

• To sustain open defecation free status in all statutory towns.

It contains provisions to encourage cities to have robust infrastructure with reliable Operation & Maintenance (O&M) mechanisms to achieve the goal of clean urban India.Key interventions against each certification are:

• ODF - Robust monitoring mechanism ensured by increasing the number of survey sample size and location types.

• ODF+ - Focus on functionality of CT/PT and innovative O&M business model for their sustainability in the long run.

• ODF++ - Emphasis on mechanized cleaning of septic tanks and sewers. Safe collection & treatment of used water as well as safe management of fecal sludge.

• Water+ - The focus is on collection, transportation, treatment, and reuse of both used water and fecal sludge to prevent environmental pollution. (1) For towns having a population more than 20,000, a minimum of 25% households to be connected to sewerage networks. (2) Striving to achieve sustainability. (3) No untreated used water is let out in the environment.

Swachh Bharat Mission-Urban 2.0, launched by the Prime Minister on 1st October 2022 with the overall vision of creating 'Garbage Free Cities', has introduced Used Water Management as a newly funded component for towns with less than 1 lakh population. This showcases the Mission's commitments to improving the overall Used Water Management ecosystem in Urban India by ensuring that no un-treated used water is discharged into water bodies (as per the Water+ Protocol). Under the Mission, maximum reuse of treated used water is a key area focus along with eradication of hazardous entry into sewers and septic tanks through mechanization of their cleaning operations.

Pradhan Mantri Awas Yojana (PMAY-U)

प्रधान मंत्री
आवास योजना–शहरी
Pradhan Mantri Awas Yojana-Urban

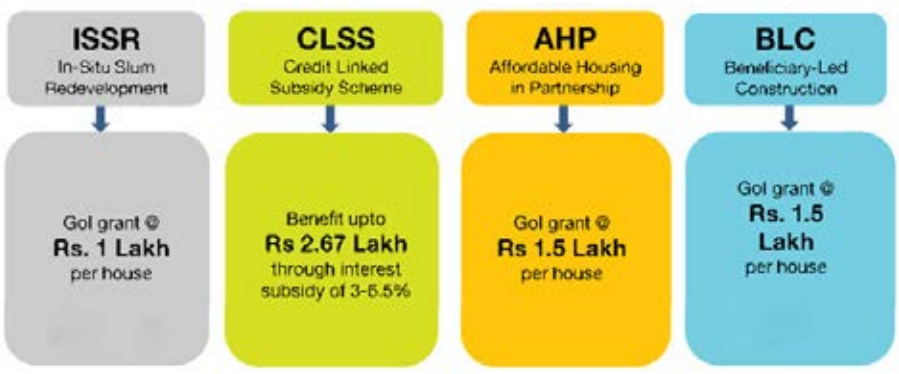
Government of India launched the Pradhan Mantri Awas Yojana-Urban (PMAY-U) on 25 June 2015 to provide allweather pucca houses to all eligible families with all basic civic amenities in the urban areas of the country to fulfil vision the vision of Hon'ble Prime Minister of 'Housing for All'. Under the Mission, Government of India provides central assistance/ subsidy to the beneficiaries through State/UT governments and Central Nodal Agencies. PMAY(U) aims towrds providing all-weather pucca houses to eligible families with civic amenities in the urban areas of the country.

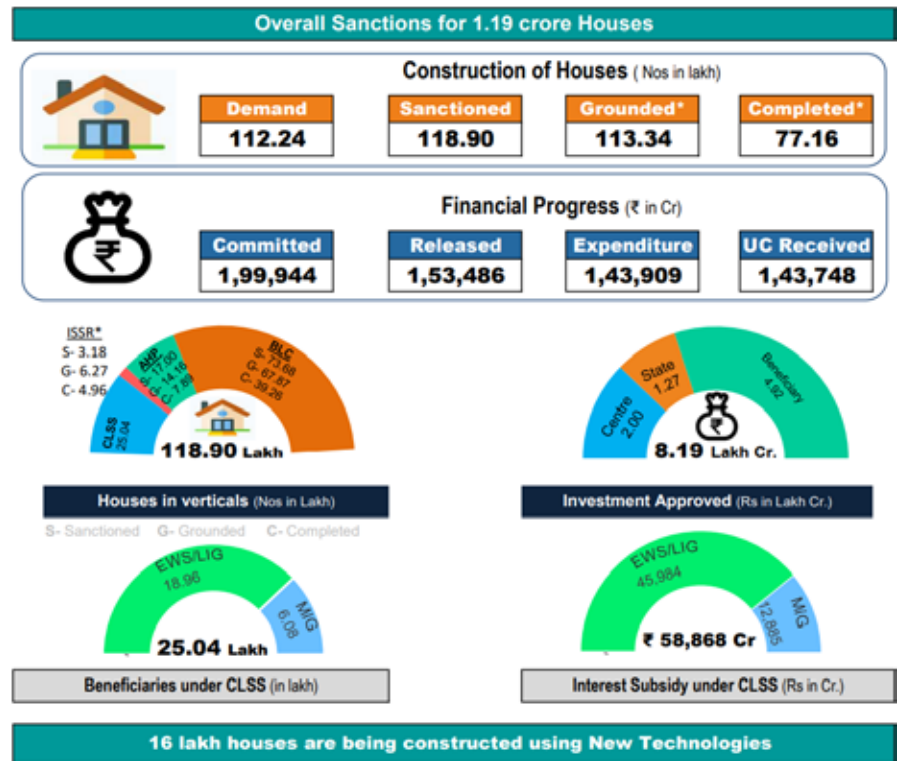
PMAY-U is one of the largest housing programs in the world. It is highly relevant and aligned with national development priorities and global goals for providing 'Housing for All'. Recognizing the need for tenure security, the Mission acknowledges the demand for housing across EWS, LIG and MIG sector and aims to build adequate physical and social infrastructure by providing all weather housing units with water, kitchen and toilet facilities. The Mission comprehensively addresses the commitment in achieving the Sustainable Development Goals:

- Goal 1 of no poverty, goal 5 of gender equality,
- Goal 6 of clean water and sanitation,
- Goal 11 of sustainable cities and communities,
- Goal 13 of climate action

The scheme covers the entire urban area of the country, i.e., all statutory towns as per Census 2011 and towns notified subsequently, including Notified Planning/ Development Areas. The scheme is being implemented through four verticals: Beneficiary Led Construction/ Enhancement (BLC), Affordable Housing in Partnership (AHP), In-situ Slum Redevelopment (ISSR) and Credit Linked Subsidy Scheme (CLSS). In August 2022, the Union Cabinet approved continuation of PMAY-U up to 31st December 2024 with all verticals, except CLSS, for the completion of already sanctioned houses till 31st March 2022.

As of October 2023, the mission has sanctioned 1.19 crore dwellings, of which 1.13 crore have been grounded and 77.16 lakh have been finished. The mission's total investment is 8.19 Lakh Cr.





National Heritage City Development and Augmentation Yojana (HRIDAY)

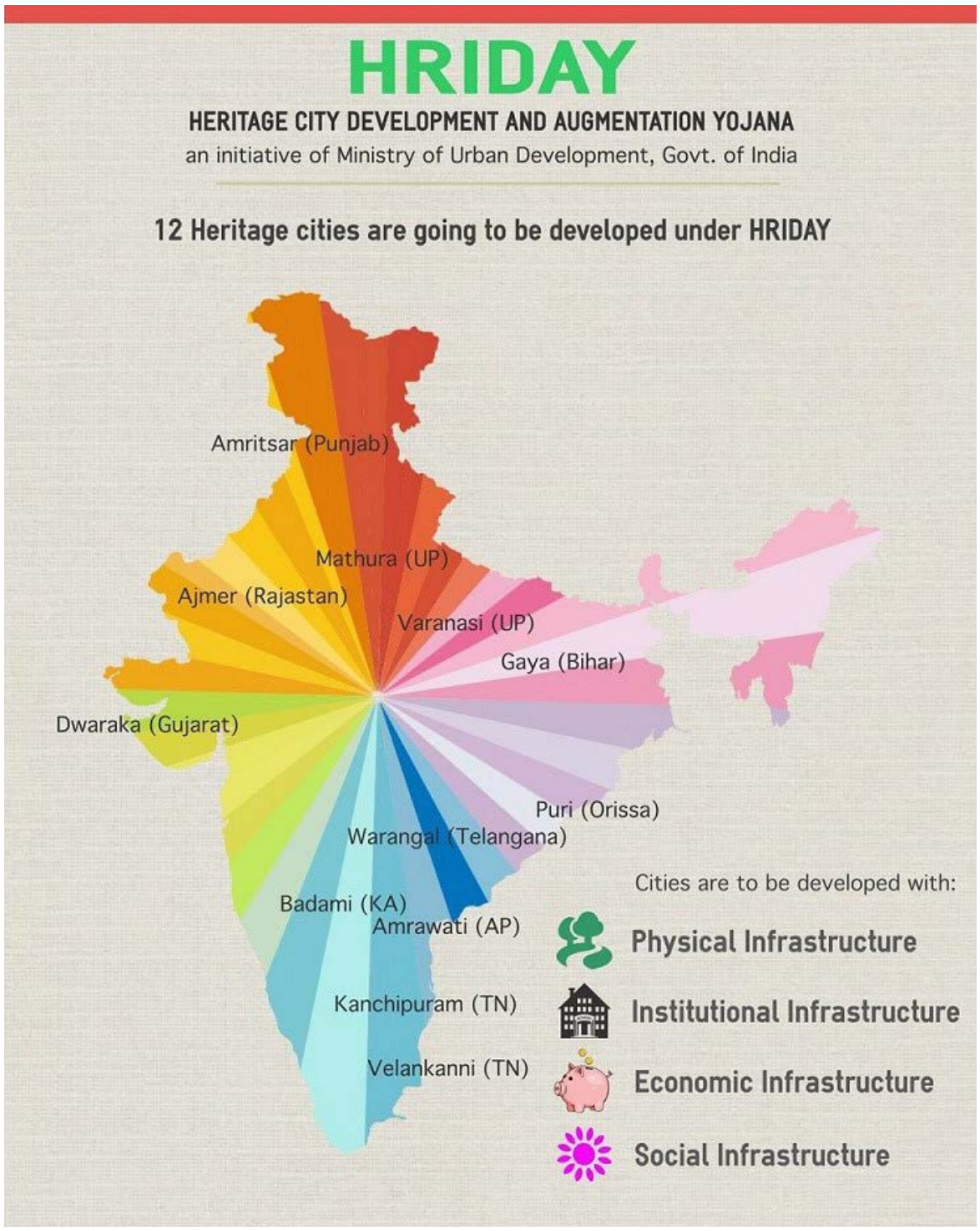
UNESCO defines Heritage as “our legacy from the past, what we live with today, and what we pass on to future generations.” Our cultural and ecological heritages are invaluable sources of life and inspiration. Today, On the one hand, the meaning of "Heritage" is broadening as it intersects with pressing challenges like climate change, urban disparity, and social injustice. Heritage, on the other hand, signifies different things to different communities in terms of "what," "why," and "for whom."

Recently, on World Cities Day, 31st October 2023, 55 new cities joined the UNESCO Creative Cities Network (UCCN). Kozhikode (Kerala) and Gwalior (Madhya Pradesh) from India are among the new Creative Cities Network. These cities were recognized for their great dedication to incorporating culture and creativity into their development strategies, as well as for demonstrating innovative approaches in human-centered urban planning. With the latest additions, the Network now counts 350 cities in more than one hundred countries, representing seven creative fields: Crafts and Folk Art, Design, Film, Gastronomy, Literature, Media Arts and Music.

As per UNESCO rankings, India is ranked 5th globally in the list of countries having the maximum number of World Heritage Sites.

India's first UNESCO World Heritage City, Ahmedabad or Amdavad in Gujarat, is steeped in history and tradition. Ahmedabad is endowed with a rich architectural heritage that is essential to the city's character and continuity. Along with the most important heritage Indo-Islamic sites from the 15th to 17th centuries, Ahmedabad has potential heritage precincts in the form of the Pols, medieval residential clusters. Today, all that remains of this are the gates, each standing proudly with intricate carvings, calligraphy, and some with extended balconies. Ahmedabad is divided into two parts, cut into distinct sections by the Sabarmati River.

In addition to a complicated maze of neighborhoods known as pols, which are an ancient system of community-based housing, the city is famed for its link with Mahatma Gandhi and houses some of the country's best medieval Islamic architecture.



Source: Ministry of Housing and Urban Affairs, 2018

Jaipur’s walled city added a new feather in its royal cap by becoming the second city to enter the exclusive league of UNESCO World Heritage Sites in 2019. Founded in 1727 AD under the patronage of Sawai Jai Singh II, it is the gateway to the royal heritage, testifying the grandeur of the Rajput kings, of India.

Also called Pink City, the capital of Rajasthan, remains suspended in time, with its heritage preserved in the overwhelming Hawa Mahal that gazes down at the bustling streets of Johari Bazaar. The biggest and the most awe-inspiring is the Amber Fort, which leaves one humbled with its expansive fortifications and grandeur.

In the early 18th century, architect Vidyadhar Bhattacharya designed Jaipur. It has evolved into a bustling metropolis while retaining its old-world charm over the years. Following India's independence from British rule, the principalities of Jaipur, Bikaner, Jaisalmer, and Jodhpur merged to become the current state of Rajasthan.

A legendary lost city, Hampi, declared as the UNESCO World Heritage Site in 1986, was once the powerhouse of an ancient kingdom and an auspicious temple town standing on the banks of the mighty Tungabhadra River. Situated in Karnataka, the city has widespread bazaars flanked on either side by storied Mandapas. The Mahanavami Dibba, a variety of ponds and tanks, and the row of pillared Mandapas are some of the important architectural remains of Hampi.

The magnificent structures here stand in testimony to Hampi's rich past under the powerful Vijayanagara empire (1336 – 1646 AD). Hampi finds mention in the Hindu epic Ramayana as well. It is said to be the location of the monkey kingdom, Kishkindha.

Some of the important heritage sites include a queen's bath, a spectacular Lotus Palace, a royal stable, or a temple, which is said to have been the sacred place of the wedding of Lord Shiva and Goddess Parvati. Despite being plundered later, Hampi maintains about 1,600 monuments, including palaces, forts, memorial constructions, temples, shrines, pillared halls, baths, and gates. Today, this laid-back city is a tourist hotspot, attracting fanatics, adventurers, and thrill-seekers.

This do reveals that every corner of India awaits history with bated breath. Whether you visit one of the country's ancient bazaars or a magnificently maintained palace, vanished legends echo that much has changed and yet the past is just around the corner. However, it has yet to explore the full potential of such resources. Previous efforts to conserve historic and cultural resources in Indian cities and towns were frequently conducted in isolation from the needs and aspirations of the local communities, as well as the main urban development issues in the areas, such as local economy, urban planning, livelihoods, service delivery, and infrastructure provision.

In lieu with the same, The Ministry of Housing and Urban Affairs started the National Heritage City Development and Augmentation Yojana (HRIDAY) on January 21, 2015 which aims to conserve heritage, improve urban planning, and boost the economic growth of heritage cities. The Scheme focused on development of twelve heritage cities namely: Ajmer, Amravati, Amritsar, Badami, Dwarka, Gaya, Kanchipuram, Mathura, Puri, Varanasi, Velankanni and Warangal. The mission has ended on 31st March, 2019 and no new projects/cities were taken up after 31st March, 2019.

The Central Government also launched a scheme of Financial Assistance for the Preservation and Development of Cultural Heritage of the Himalayas. It offers US$ 12,195.52 (Rs. 10 lakh) per year to schools or institutions for Himalayan cultural heritage studies and research.

Another scheme launched was providing Financial Assistance for the Development of Buddhist/ Tibetan Culture and Art. It gives financial assistance to non-profit Buddhist or Tibetan organisations involved in the propagation and scientific advancement of Buddhist or Tibetan culture, tradition, and research in relevant subjects.

The Government of India has authorized to establish the 'Indian Institute of Heritage' (IIH) as a Deemed to be University in Noida, Gautam Buddha Nagar, Uttar Pradesh, in accordance with the UGC (Institutions deemed to be Universities) Regulations, 2019. It is expected to be the first of its kind in the country, delivering higher education and research in the subjects of Indian heritage and conservation.

The way forward in this regard will require o overcome modern challenges. While technology has enormous potential, difficulties such as technological obsolescence, limited IT manpower, and conversion costs can be overcome with ongoing collaboration, research, and investment in developing technologies. India's efforts to use technology to safeguard and promote its cultural, natural, and archeological heritage have shown promising results. Through digitization, improved scanning techniques, collaborative projects, and research, India is preserving, making accessible, and showcasing its rich cultural heritage. India can conserve its past for future generations while also raising awareness of its unique cultural fabric by embracing innovation and technology.

River Cities Alliance

A city-led movement for promulgating river-sensitive planning and development

In a landmark move towards sustainable urban development, the Hon'ble Prime Minister of India, Shri Narendra Modi, articulated a visionary call for river-sensitive planning during the inaugural meeting of the National Ganga Council in December 2019. Emphasizing the need for a paradigm shift in city planning, the Prime Minister highlighted the crucial role cities can play in rejuvenating their rivers, urging a departure from regulatory approaches to a more holistic and developmental mindset.

This call to action paved the way for the River Cities Alliance (RCA), a ground-breaking initiative conceptualised by the National Mission for Clean Ganga (NMCG) and the National Institute of Urban Affairs (NIUA) to foster river-sensitive urban development across India. The River Cities Alliance currently has 142 member cities from across 19 states of India and is touted to become global in the upcoming COP 28, with an aim of adding river cities from other countries to enable knowledge exchange on river-related good practices.

At the core of RCA's objectives is the facilitation of river-centric urban planning and development thus nudging the member cities to revitalize their rivers, a task that demands collaborative effort and innovative thinking. Beyond this, RCA aims to offer dedicated technical and handholding support to member cities as they implement interventions for river-sensitive development.

Envisioned as a city-led Alliance, the agenda and operations of RCA are determined by its member cities. To facilitate the functioning of the Alliance, a Secretariat has been established at NIUA in collaboration with NMCG.

What are the key benefits for the member cities of RCA?

- Pioneering Initiative: Member cities have the opportunity to be part of a ground-breaking initiative that sets the stage for river-sensitive planning and development globally.
- Strengthened Governance: RCA provides a platform to strengthen governance aspects specific to river cities, ensuring effective and sustainable urban river management.
- Knowledge Access: Member cities gain access to state-of-the-art knowledge, frameworks, and tools for urban river management, enhancing their capabilities in the field.
- Peer Interactions: Cities can engage with other peer cities, exchanging practical knowledge on river management and learning from each other's experiences.
- Capacity Building: RCA offers opportunities for participating in niche and unique capacity-building programs, empowering cities to implement effective river-sensitive strategies.
- Technical Support: Cities receive technical support for planning and implementing interventions related to urban river management, fostering practical and impactful solutions.
- Demonstration Projects: Member cities have the chance to serve as sites for unique demonstration projects initiated by NIUA and NMCG, showcasing innovative approaches to river-sensitive development.
- Funding Advisory: RCA provides valuable advice on funding options for different interventions, aiding member cities in securing the necessary resources for their projects.
- International Collaboration: Member cities gain access to international partners collaborating with NIUA and NMCG, fostering global partnerships for shared learning and development.
- Enhanced Liveability: As a larger vision, Implementing river-sensitive strategies can improve the overall liveability of cities, attract external economic investments and contribute to sustainable urban development.

The Alliance has been an active actor in propagating a river-sensitive course of urban development. As ongoing initiatives, multiple training sessions have been organized on developing urban river management plans, implementing river-sensitive master plans, practical applications of treated used water, water body diagnosis and other crucial aspects of river management, thus providing member cities with a solid foundation for their initiatives.

In conclusion, the River Cities Alliance stands as a driving force for cities seeking to transform their relationship with urban rivers. Through collaboration, knowledge exchange, and shared commitment, member cities can spearhead a new era of sustainable and river-sensitive urban development, setting an example for the world to follow.

National Institute of Urban Affairs

River Cities Alliance

Collaborative Governance in Urban River Management

Concept Note

The River Cities Alliance (RCA) is a joint initiative of the Department of Water Resources, River Development & Ganga Rejuvenation under the Ministry of Jal Shakti (MoJS) & the Ministry of Housing and Urban Affairs (MoHUA), with a vision to connect river cities and focus on sustainable river cenfric development. Beginning with 30 member cities in November 2021, the alliance has expanded to 143 river cities across India and one international member city from Denmark. The National Mission for Clean Ganga (NMCG) in association with the National Institute of Urban Affairs (NIUA) jointly operate as the RCA Secretariat to provide a platform for member cities to discuss and co-learn good practices for managing urban rivers.

Innovation

RCA has evolved as a striking example of collaborative governance among central, state and city governments, with the objective of undertaking sustainable management of urban rivers. A two-pronged approach has been adopted by developing a collaborative governance mechanism of Core Working Group involving various stakeholders in a river-city and developing a cutting-edge tool, Urban River Management Plan (URMP) for driving RCA as a city led movement in promulgating river centric development and river sensitive planning.

The success of the RCA in addressing the challenges of urban river management in India has gradually paved the way for constituting a global city-led movement focused on sustainable management of urban rivers. India is therefore in a position to act as a "Global Bridge between developed & developing nations for sustainable management of urban rivers.

RIVER CITIES ALLIANCE

A city-led movement for promulgating river-sensitive planning and development

RCA, is an exceptional partnership between the Ministry of Jal Shakti and Ministry of Housing and Urban Affairs towards reshaping urban development into sustainable river-centric development. RCA's success story lies in in its collaborative governance, bringing central, state and city governments together to achieve sustainable urban river management and set the benchmark for river-sensitive planning.

Now going GLOBAL

With RCA's expansion, India now stands as a 'Global Bridge' between developed and developing nations in the realm of urban river management

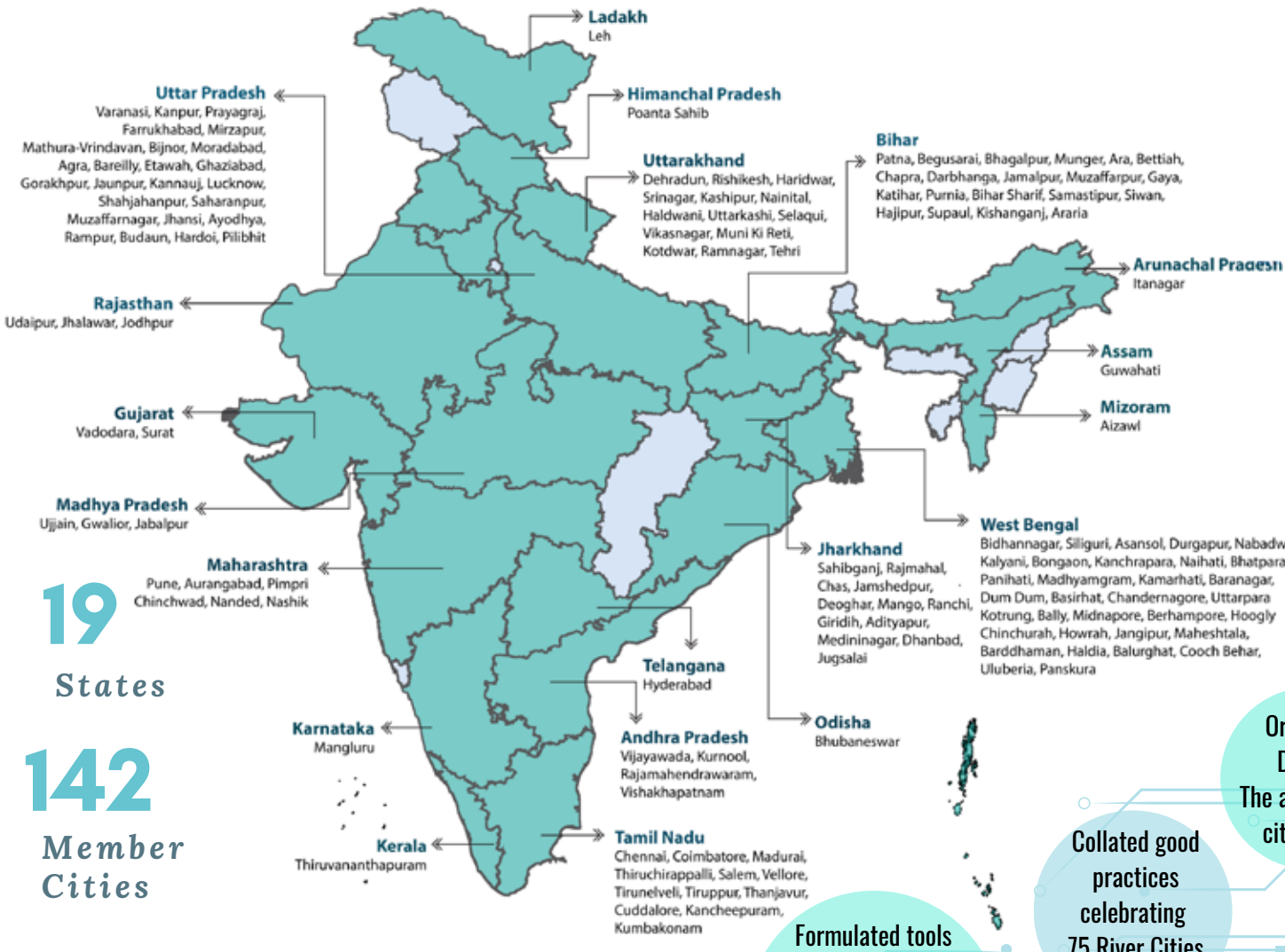
Rivers 78

River Basins 28

Ganga Basin Cities 86

31 Smart Cities

96 AMRUT Cities



19 States

142 Member Cities

Objectives of RCA

- Information exchange on aspects of urban river management
- Access to state-of-the-art knowledge, frameworks
- Strengthen the governance aspects
- Dedicated technical and handholding support

- Organized DHARA- The annual river cities meet
- Collated good practices celebrating 75 River Cities Initiatives
- Formulated tools like Water Bodies Diagnosis Tool for cities to rapidly assess their water bodies
- Supported cities in preparing Urban River Management Plans (URMPs). URMPs for 60 member cities in pipeline
- Organized dedicated trainings on Practical Application of Treated 'Used' Water
- Conducted trainings on River-Sensitive Master Planning

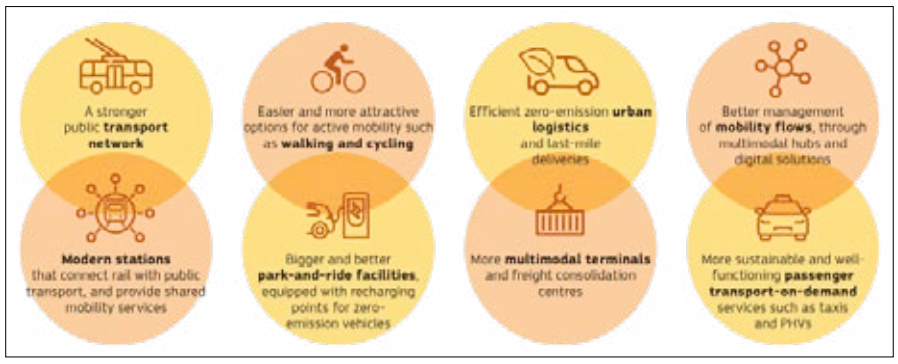
URBAN MOBILITY

Rapid urbanization, population expansion, and technological improvements are driving a transformational shift in urban mobility in India. With a growing population and a rising middle class, demand for transportation is soaring, putting enormous strain on existing infrastructure and causing a slew of problems such as congestion, air pollution, and road safety concerns. As cities grow and populations swell, the need for efficient and sustainable transportation solutions has never been greater.

In India, the contemporary urban mobility landscape is defined by a combination of traditional forms of transportation, such as buses and auto-rickshaws, as well as an increasing reliance on app-based ride-sharing services and the progressive acceptance of electric vehicles. Public transportation, including buses and metros, is the backbone of urban mobility in India, serving a large section of the population. Through programs supporting electric mobility and the development of smart, networked transportation systems, the government's quest for cleaner, greener transportation is clear.

Challenges, however, persist. Traffic congestion, pollution, road safety, inadequate infrastructure, and last-mile connectivity issues remain hurdles to seamless urban mobility. The need for integrated, multi-modal transport solutions is evident, encouraging the adoption of public transportation, cycling, and walking to complement existing private vehicle usage. Despite these challenges, India presents significant opportunities for improving urban mobility:

- Rapid technological advancements: The adoption of smart mobility solutions, such as intelligent traffic management systems and real-time travel information platforms, can significantly improve traffic flow and reduce congestion. The mobility sector in India is undergoing a digital transformation.



Source: Sustainable Urban Mobility, European Commission

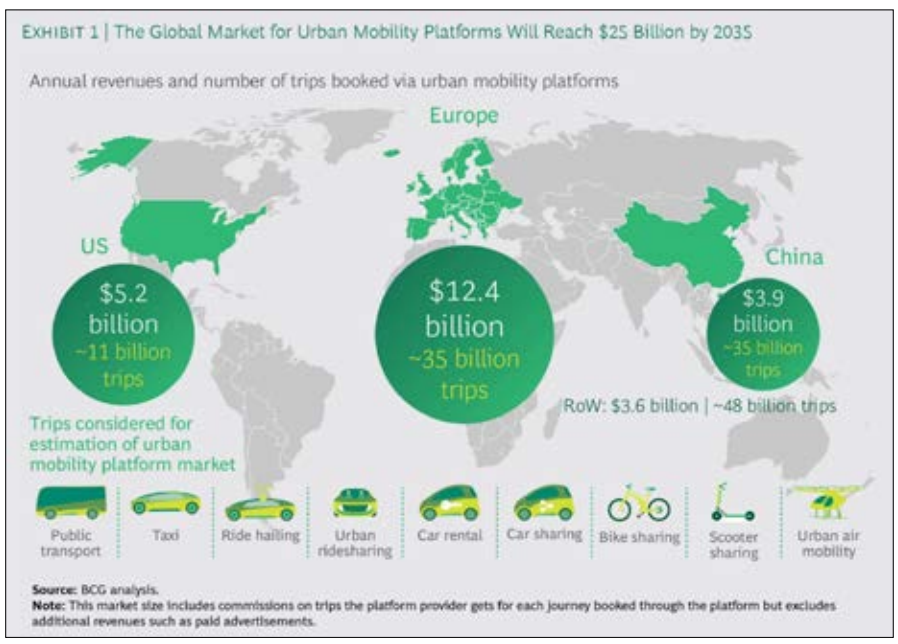
- Electrification of transportation: Shifting towards electric vehicles and self-driving cars can substantially reduce air pollution and greenhouse gas emissions, promoting cleaner and more sustainable urban mobility. Self-driving cars are quite widespread now, with 30 million driverless cars out there. However, they may not be as concentrated in Europe as in China and the US.

- Promoting non-motorized transport: Investing in dedicated infrastructure for walking and cycling can encourage the use of these healthy and environmentally friendly modes of transportation.

- Enhancing public transport: Improving the quality, reliability, and connectivity of public transport systems can make them more attractive to commuters and reduce reliance on private vehicles.

- Integrated transportation systems (mobility-as-a-service) increase metropolitan mobility by combining diverse modes of transportation such as trains, buses, ride-hailing, and micro-mobility into a single application where users can simply plan, schedule, and pay for trips.

Cities in India are undergoing significant transformations. Urban planners are rethinking urban architecture to make public infrastructure more usable and accessible.



For example, public bike share systems in Bhopal and Mysore have revolutionized how people commute, and street remodelling in Bangalore has resulted in a safe pedestrian network. In other places, such as Mumbai, Pune, Bhubaneshwar, and Gurgaon, the public right of way is being reinvented with pedestrian safety in mind.

The Indian government has undertaken various initiatives and policies to address urban mobility challenges and promote sustainable transportation solutions. These include:

1. The National Urban Transport Policy (NUTP) 2014 outlines a comprehensive framework for developing efficient, safe, and sustainable urban transport systems in India.

2. In recent years, smart city initiatives have gained momentum, with a focus on leveraging technology to optimize traffic flow, reduce congestion, and enhance overall transportation efficiency. The integration of data-driven solutions, such as real-time traffic monitoring and predictive analytics, is helping authorities make informed decisions for urban planning and development.

3. Metro Rail Policy, 2017: This policy aims to promote the development of metro rail systems in Indian cities to provide high-capacity, rapid, and reliable public transport.

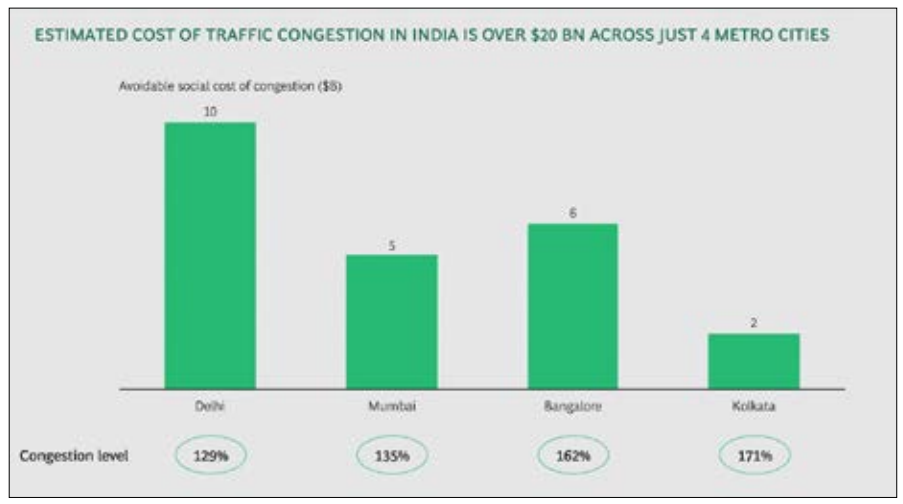
4. The National Electric Mobility Mission Plan (NEMMP) 2020 was launched by the Central Government in 2013 to boost the manufacture of hybrid and electric vehicles in India and aims to achieve production of seven million electric vehicles by 2020.

Following the pandemic, policymakers have new challenges in regulating urban transportation, but they also have an opportunity to guide urban mobility toward a more sustainable, resilient future. This transition has sparked a re-evaluation of urban mobility requirements as well as the investigation of novel solutions such as micro-mobility and flexible transportation services.

Currently, transportation is the major source of CO_2 emissions, accounting for 24% of total emissions, with road vehicles accounting for 74.5%. It is becoming clear that an effective strategy to counteract global warming necessitates a concerted effort in urban and transportation design. Developing and deploying non-fossil-fuel transportation modes is a critical piece of this puzzle.

Given these issues, green mobility has emerged as a critical necessity in India. Urban Green mobility is the use of environmentally friendly and egalitarian public transportation technology such as electric automobiles, hybrid vehicles, and alternative fuels such as biofuels and hydrogen to increase commuter accessibility and public transit use. India can reduce its reliance on fossil fuels, improve air quality, and cut greenhouse gas emissions by encouraging the adoption of these technologies.

For a variety of reasons, urban green mobility has become a critical issue in India. To begin with, India has one of the world's largest and fastest-growing vehicle marketplaces. India's automobile sector is the fourth largest in the world and is predicted to become the third largest by 2021, resulting in a huge increase in the number of automobiles on the road. According to a WHO research, 14 Indian cities are among the top 20 most polluted in the world, resulting in lower quality of life and fatal diseases such as lung cancer, stroke, heart disease, and chronic bronchitis.



Source: Boston Consulting Group

Secondly, as per world bank data India's welfare losses due to air pollution is approximately 7.5% of GDP. The particulate matter PM 2.5 concentration in the air is above alarming level. Metropolitans in India have concentration around 150 microgram per cubic metre of concentration which is hazardous. The major contributors for the concentration of PM2.5 are vehicular emission, domestic activity, construction activity, road dust and industrial activity. Vehicular emission contributes around 30-35% of PM2.5.

Thirdly, according to World Economic Forum, the number of million plus urban agglomerations has increased from 35 in 2001 to 53 in 2011 and is estimated to be 87 by 2030. Major Indian cities like Delhi, Mumbai, Kolkata, Bengaluru, and Pune are ranked among the most congested cities of the world.

Fourth, the average speed on arterial roads of Delhi is recorded to be 27km/hr in off peak hours which is way less than the design speed. Delhi alone suffers around 10 billion USD annually due to congestion. Similarly, Bengaluru Development Authority reported

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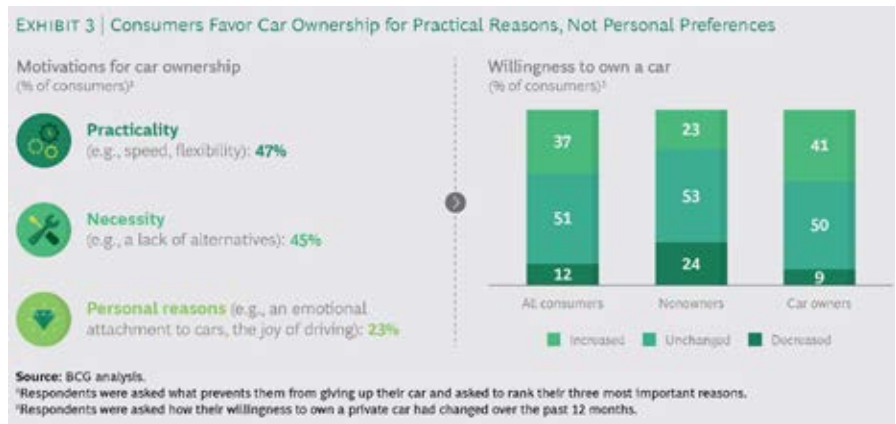
Finally, under the Paris Agreement on Climate Change, India has pledged to lowering its greenhouse gas emissions. The transportation sector in India is a substantial contributor to greenhouse gas emissions, accounting for around 15% of total emissions.

The future of urban mobility in India requires a comprehensive and integrated approach that addresses the challenges while capitalizing on emerging opportunities.

1. A Link Between Transport and Green Infrastructure needs to established to:
- Reduce the carbon footprint of transport, mitigate the negative effects of land uptake and fragmentation, and boost opportunities to better integrate land use, ecosystem and biodiversity concerns into policy and planning.
- Minimise the fragmentation of nature networks by choosing specific design solutions, e.g., tunnels, or viaducts which minimise land-take or by allowing watercourses, including natural banks, to continue under the structure.
- Mitigate the barrier effects for wildlife by implementation of green bridges and eco-tunnels.
- Use Green Infrastructure solutions, harnessing the potential of new or restored peat lands and forests for carbon uptake and storage.

2. Land-Use and Public Transport Integration to make:
- The public bus service and railway service approachable and convenient to all socio-economic sections of the society.
- Accommodate mixed use land use around the transit corridors to help increasing the ridership.
- A neighbourhood plan comprising of commercial, office areas and mixed housing to be developed around transit corridors so that people from all walks of life can conveniently access public transits.
- Incentive public Transit fares based on economic group.
- Public Transport efficient by supporting para transits and NMT. Public Bicycle Sharing System should be promoted to access public transits. Dedicated walking and cycling tracks should be designed to promote its usage.
- In Indian conditions climate is a major factor. In summers, the climate is harsh enough for cycling or walking. Green Infrastructure should be developed to enhance



NMT in harsh climate condition. Proper parking areas should be provided to support NMT infrastructure.

India can create a more efficient and ecologically friendly urban mobility ecosystem for its rising population by supporting sustainable transportation, investing in public infrastructure, utilizing technology, and enacting effective laws. Collaboration between the public and commercial sectors, as well as people, is critical to accomplishing radical change in the urban transportation scene.

In recent years, the Indian government has launched several programs to encourage green mobility, including the Faster Adoption and Manufacturing of Electric Vehicles (FAME) project, which intends to increase the country's adoption of electric vehicles. The government's emphasis on smart mobility solutions, electrification of transportation, and promotion of non-motorized transportation offers exciting opportunities for enhancing urban mobility. As India's urbanization continues, effective and sustainable urban mobility solutions will be critical in shaping the country's future growth and liveability.

The role of reliable measurement in the Circular Water Economy for a water secure future

Water is a finite and precious resource. Rapid urbanization, climate change and population increase have led to enhanced demand on this already stressed resource. It is estimated that worldwide urban popula-tion will nearly double by the year 2050. This will lead to increased wastewater and water pollution. The situation in India is even more challenging. India, already on the list of water scarce countries, has 18% of the world's population but only 4% of the total water resources.

India largely follows a linear water cycle process where water is taken from the source, used and most of it is discharged untreated. India has capacity to treat only 28% of the total generated sewage and the re-used water percentage of this treated sewage is less than 25%. By 2050, India's population is expected to reach 1.55 billion and the share of urban population is likely to grow from the current 35% to 50%. The current model – a linear water cycle - is not sustainable. This emphasizes the need to investigate alterna-tive approaches to ensure a water secure future.

Circular Water Economy

What if we could use water in a way that waste and pollution were never created in the first place? This is what the Circular Water Economy (CWE) is about, a concept with huge potential impact on water sustain-ability compared to the traditional water economy.

The Circular Water Economy is an innovative approach to managing water resources sustainably and effi-ciently. It aims to mimic the circular principles found in nature, where resources are continuously recycled and reused. This can help not only in the conservation of this precious resource but also ensure sustainable supply of water to future generations.

To establish an effective Circular Water Economy, we need to focus on the following elements:

- Reduce: It has been observed that the importance of water conservation is not well understood and that exploitation of groundwater as well as surface water continues to occur. This demands, in the first place, reliable and real time water consumption data. Similarly, analysis on unaccounted water, especially water lost during transportation due to leaks, is another area that can help re-duce waste.

Today, we have highly efficient flow and pressure measurement solutions available that, when coupled with acoustic sensors, can provide valuable data on total consumption, consumption pat-terns, and predictive analysis on distribution network efficiency including leaks. Data from all field sensors can be modeled using AI to develop highly efficient distribution networks. The data can al-so be disseminated to consumers which, in turn, can help raising awareness of consumption and ultimately help with water conservation.

- Reuse: The used water needs to be treated so that it can be made available for reuse in various activities such as for agriculture, construction and more. Advanced membrane technologies, such as reverse osmosis (RO) and nanofiltration can effectively remove contaminants and pollutants from wastewater, making it suitable for various reuse applications.

However, before the treated water can be reused, it should meet the requirements for use in a par-ticular field. For example, for treated water to be reused for irrigation, the fundamental require-ment is to ensure that it is free from heavy metals. The policy makers need to define the standards for treated water reuse. Real time digital water quality analyzer solutions can support this, ensuring efficient treatment as well as the right quality of water for reuse.

The sludge created can be used for bio-gas generation which can be used as fuel for cooking or as biofuel for running automobiles. Online gas analyzer solutions can ensure that bio-gas genera-tion plants are efficient, and reuse is environmentally sound.

- Restore: Due to over-exploitation of groundwater, the groundwater table is fast depleting and as a cause of infrastructure development, many natural aquifers are drying up. Rainwater harvesting and using the treated water to rejuvenate the natural aquifers and filling up ponds can help ensure higher availability of water for reuse. It can also help recharging the groundwater table to ensure a water secure future.

To gauge progress on this and to further promote efforts in this direction, the policy makers need hydrological data of the current situation, total capacity of treated water, and the treated water supplied for reuse. This can be supported with hydrological sensors for groundwater monitoring, flow measurement solutions for checking capacity, utilization of treatment plants as well as data about the total supply and consumption of treated water.

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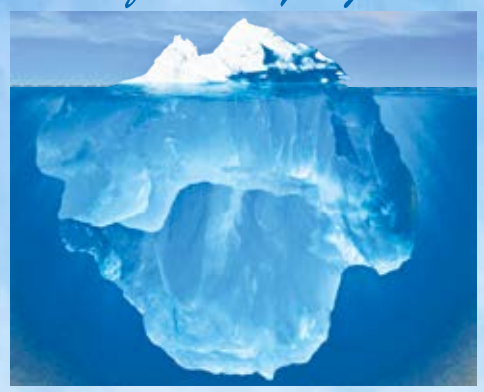

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Non Clog Submersible Sewage Pumpsets *(ANS)*

Submersible Slurry Pumpset *(ASS)* **Submersible Slurry Hydro Electric Pumpset** *(ASSHE)*

Submersible Dewatering Pumpset *(ASSJ)*

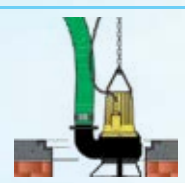
Submersible Dredging Pumpset *(ADS)* **Submersible Dredging Hydro Electric Pumpset** *(ADSHE)*

Submersible Dredging / Slurry Pumpset *(ADSJ)*

Submerged Elbow Pumpsets *(AES)*

Submerged Mine Dewatering Pumpsets *(AMS)*

Dry Pit Installed Non Clog Flood Proof Submersible Pumpsets *(ANFP)*



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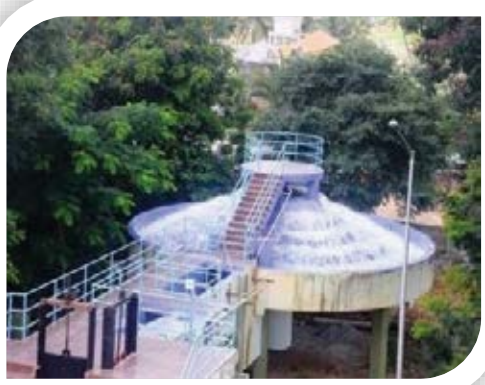
Shri. Siddaramaiah
Hon'ble Chief Minister
Government of Karnataka

KUIDFC
Working Towards Better Urban Living

Shri. Suresha B.S
Hon'ble Minister for Urban Development and Town Planning (including KUWSDB and KUIDFC) and Kolar District incharge Minister
Government of Karnataka

Creating Smart Infrastructure – Smart Solutions for Urban Centers



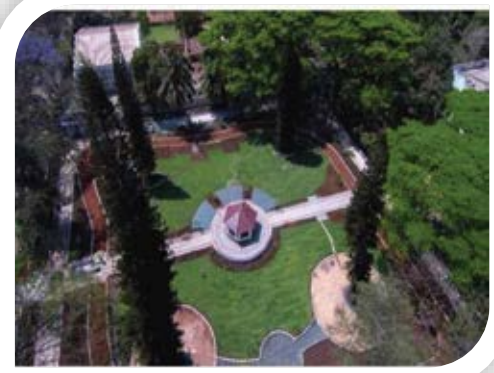
Water Treatment Plant of Ranebennur

Sewage Treatment Plant in Davanagere

Kundawada Lake, Davanagere

E-Library Tumakuru

Command Control Center Belagavi



Nathpai Park Belagavi

Bal Bhavan Bengaluru

Kalyani Davanagere

Ring Road, Tumakuru

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Potholes Complaints

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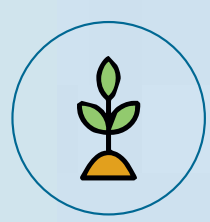
Pest Control

Animal Husbandry Welfare



Forest and Horticulture issues

Crematorium

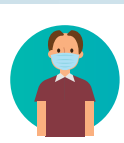
Property tax issues

Trade License

Birth / Death / Khata Certificates

Building Plan Approval

Rakesh Singh, IAS
Administrator, BBMP



Wear Mask

Follow Physical Distance

Maintain Hand Hygiene

Tushar Giri Nath, IAS
Chief Commissioner, BBMP

Scripting Success Stories In 24/7 Drinking Water Projects In Urban Karnataka

Karnataka Urban Infrastructure Development & Finance Corporation was set up in 1993 under Companies Act 1957, with the aim to finance and formulate and implement Urban Infrastructure projects in ULBs of Karnataka. KUIDFC, over the years has acted as a financial intermediary for various Externally Aided Projects assisted by the Asian Development Bank (ADB) and the World Bank (WB) besides Central and State schemes encompassing drinking water supply, sewerage, roads, solid waste management, stormwater drains, among others.

In 30 years of its existence KUIDFC has evolved through various roles as Fund Manager, as Nodal Agency, Executing and Implementing Agency for various projects and facilitating urban reforms. It supports urban agencies and departments by providing financial assistance, technical advisory keeping in view the overall objective of the Urban Development Department, GoK. It also managers various financial instruments such as Megacity Revolving Fund, Karnataka Water & Sanitation Pooled Fund Trust and Urban Infrastructure Development Fund. It has an impressive fund portfolio extending thousands of crores of rupees assistance to urban parastatals for taking up their projects. Thus, it has secured the status of State Level Financial Institution (SLFI) from the Government of India.

Project Portfolio, Achievements.

KUIDFC has pioneered and played pivotal role in scripting and successfully implementing 24/7 pressured water supply projects in ULBs across Karnataka, Ilkal Municipality being the first in country followed by Gokak, Nippani, Kundapur, Ranibennur, Harihara, conversion to 24/7 mode is in progress for 14 ULBs and ongoing projects in Kalaburgi, Belagavi, Hubballi-Dharawada, Davanagere, Byadagi, Managaluru, Udupi and Puttur with World Bank and ADB loan assistance. There is remarkable reduction in non-revenue water, 100 percent metering and coverage of households.

Use of information Technology & innovation are inherent part of all projects. IT enabled Command control centers have been set up in smart cities. In order to attain operational and financial sustainability, KUIDFC procured GIS enabled Billing & Collection IT Module for payment gateway and monitoring of the O&M, Enterprise Asset Management is under implementation. The Non-Revenue water reduction achieved in these 3 Cities are less than 20% per month as per the operator's KPI. Customer Redressal System is operational through the Customer Service Centre manned by the Operator and the grievances related to water supply are addressed as per the stated timelines by the Cities in Water Service Charter (WSC).

Upcoming programs

Urban floods being a recurring phenomenon in recent times with devastating effect on life and economy in urban centers, to address these issues it is proposed to take up Climate Resilient Urban Storm Water Drainage Improvement Program in 10 city corporations with assistance from KfW – German Development Bank. CRISIL Risk Infra Advisory has prepared feasibility reports for these cities. KUIDFC is also nodal agency for implementation of Used Water Management in all ULBs of Karnataka.

Brief details of the progress of works undertaken in the last 06 months in Bruhat Bengaluru Mahanagara Palike

1. Administrative Department:-
• In order to provide timely facilities to the citizens of Bangalore city at the zonal level, decentralization of power will be done by assigning one senior Indian Administrative Service team officer to each zone.
• The existing 198 wards under BBMP have been redivided into 225 wards for administrative and public interest.
2. Revenue Department:-
• Scanning and digitization of all 20 lakh property records under BBMP has been started and all property records will be computerized GPS coordinates and maps.
• E-Asti / Namma swaththu will be completed by January 2024 to fully integrate of all 20 lakh additional assets of BBMP with Cauvery.
3. Road infrastructure:-
• BBMP has been handling road network of 13800+kms. Due to economic growth and development, the city has witnessed exponential growth in population and also vehicular population. To congest and create inclusive Mobility Plan 08 Consultants are shortlisted at "Global Level" for preparation of comprehensive Bangalore traffic decongestion plan and "Achievement Report" is being submitted.
• To build a "white topping road with long durability and low maintenance cost". Government grant of Rs.800.00 crores will be prepared for the action plan.
• BBMP has set up its own "Asphalt Batch Mix Plant" for achieving early response to resolve the problem of potholes repair and filling.
4. Storm Water Drain:-
• BBMP has a strong 859.00kms of Storm Water Drain network out of which 492 kms are lined channels and 194 kms of Storm water drain is being provided with retaining wall.
• Further, 173 kms of Storm water drain will be provided with retaining wall under World Bank Program and is in the pipeline.
5. Management of Lakes:-
• In the development work of lakes, the main works are construction of fence for the border of the lake, removal of silt, waste water diversion channel, construction of inflow and outflow blocks, sedimentation pond, and construction of footpath.
• Development and revival works of 87 lakes have already been undertaken under various grants from the Central and State Governments and so far 45% of the works have been physically completed.
6. Indira Canteen :-
• A total of 169 Indira canteens and 08 mobile canteens are functioning under the BBMP. Indira canteens have been equipped to provide better service to the public after carrying out necessary repairs.
• Locations for setting up 50 new Indira canteens are also being identified under the Corporation.
7. Solid Waste Management:-
• In order to increase the capacity of wastes treatment in solid waste management, In the P.P.P. model for the next 25 years in order to make new comprehensive solid waste management around 100 acres of land will be identified in 3 to 4 directions of the city and a plan will be drawn up for adequate treatment of all types of waste.
• High capacity (150 to 200 tonnes per day) transfer stations for secondary waste management are planned to be scientifically constructed, one for every two assembly constituencies. A transfer station has already been constructed near Ejipura in BTM Assembly Constituency and will be ready for use.
8. People Friendly Mobile Apps / Strategies:
• Lakes Monitoring System:- An independent web application has been developed for surveying and management of lakes in Bangalore.
• Parks Monitoring System:- Developed an independent web application to survey and review parks in Bangalore.
• Hasiru Rakshak:- An independent web application has been developed to monitor the trees planted by the Forest Department in Bangalore.
• Indira Canteen:- Developed web application to survey and review Indira Canteens in Bangalore.
• QR Code-Jana Mitra:- By using this QR system, the public can get the details of the representatives and officials belonging to that road.
• Palike Bhoomi:- this application collects information on BBMP properties, lease details, BDA notification documents, court cases and original encroachment details, acquired BBMP properties, slums, namma clinic, Indira canteen, parks and lake encroachment details.
• Prism-H: Using this app to identify mosquito breeding sites and take necessary measures for control and management.
9. Brand Bangalore:-
• With the objective of all-round development of Bangalore and making Bangalore a center of global attraction, the Government of Karnataka has launched the "Band Bangalore" campaign.
• Various themes of "Band Bangalore" Campaign are:
1. Sugama Sanchara Bangalore
2. Green Bangalore
3. Clean Bangalore
4. Vibrant Bangalore
5. Healthy Bangalore
6. Tech Bangalore
7. Jalasukraksha Bangalore(Water Security)
8. Education Bangalore
• Bengaluru City University as a knowledge partner has been tasked with compiling public and expert suggestions on these 8 issues and presenting a brief report.
• The Government of Karnataka has decided to give a new look to the Bangalore city built by Nadaprabhu Kempegowda and in this context, the "Brand Bangalore" campaign has been launched to implement the ideas given and increase Brand of Namma Bengaluru which is launched by Honourable Deputy Chief Minister, Government of Karnataka

Best Practices Initiatives in ULBs of Karnataka

1. Title of the story: Resuse of STP water

Theme: Wastewater management – treatment, reuse and recycle

Ballari City Corporation

Best Practice / Innovation undertaken by the ULB to solve the aforesaid issue

By providing 175 KM length of UGD network system in the city, seepage of sewage water into the soil &environmental is prevented. Corporation is treating 33 MLD of water out of 45 MLD generation and supplying treated water to various industries. By this way it has saved consumption of fresh water and also generating income of Rs.41.28 Lakhs p,a. by providing treated water to industries. Up gradation of existing old STPs to enhance treatment of sewerage water of UGD project was undertaken .All the households got connected to UGD and Treated water got allotted to industries

Impact of the Initiative

The STPs are maintained with a very green space surrounding it which is offering home to multiple species of birds, more industries are now showing interest in using treated water and Most of the households got connected to safe disposal of their sewerage. Re-use of waste water by industries reduced demand for fresh water.

2. Title of the story: Best practices in 3R (reduce, reuse and recycle)

Theme: Effective Management of MRF Facility

Udupi CMC

The segregated dry waste is transported to sorting sheds later, dry waste will be loaded onto the conveyer belt by feeding into hopper by small bins. Then each sorting worker who are on both sides of the conveyer belts will sort the incoming dry waste into 2-3 categories assigned to them, and overall it will be sorted upto 15 to 18 categories, majorly as high valuable, low valuable scraps and non-recyclables will be segregated.

Impact of the Initiative

By installation of dry waste processing - conveyor belt and baling machine by this manual sorting was replaced to improve the quality of work. After sorting, bundles are baled using hydraulic baler and stored until be dispatched. The recyclable items are sold off to scrap dealers and non-recyclables like Multi Layered Plastics (MLPs) and Segregated Combustible Fractions (SCF) like cloth & foot wears are sent to cement factories for co-processing. Till date 150 MT of non-recyclables have been dispatched to various cement factories across the state.

3. Title of the story: Best Practices to promote inclusive sanitation

Theme: Implementation of Faecal Sludge Treatment Plant

Devanahalli TMC

Earlier faecal sludge is being disposed in the un-designated location due to water scarcity in the city. But now, It is properly planned for the sewer network (UGD) in the ULB. This project was taken with the support of Consortium of DEWATS Dissemination (CDD) society India. The TMC has implemented sanitary and safe disposal of human excreta and improved sanitation chain value, which has resulted eco-friendly environment in the city. ULB with has more than 50000 Population and with no UGD network can adopt this technology which is economically viable.

Impact of the Initiative

The UBL has achieved the safe disposal of human excreta and Farmers has shown the interest to take the compost produced from the plant and also improve the sanitation value chain and reuse and increase agricultural productivity.

4. Title of the story: Best practices in 3R (reduce, reuse and recycle)

Theme: Preparation of Agarbatti (Incense Sticks) from Market Flower Waste

ULB name: Belagavi City Corporation

With the concept of Waste to Wealth Belagavi City Corporation has initiated innnovative solutions for waste from Flower market. Daily about 400 to 500 kgs of flower waste will be colllected and being converted to incense sticks.

Initially Fresh flower waste is dried (Moisture removal) by applying external heat through electrical heaters. Later, manually removed petals and stored differently based on colours and the powder is prepared from dried from petals. The same powder is used to prepare incense sticks.

Impact of the Initiative

This initiative is successful and converting flower waste around 300 kgs to 500 kgs Incense Sticks. This has created an income, employment, in production of incense sticks 5000 pcs (100 packs) per day. This has reduced bad smell/ odour, nuisance and bird menace in the city.

5. Title of the story: Waste Water Management in Karwar City

Theme: Tree Plantation & UGD Waste water utilisation

ULB name: Karwar CMC

The Karwar city had prepared detailed action to repair the sewage system, to treat the sewage water and recycle the treated water. By this project unauthorized UGD connections have been regularized by imposing penalty. A total of 1907 houses in 8 wards have been provided UGD connection and the service charge is collected at 98% of the total demand every year. For this, to purify the water in good quality, A German technology called MBR has been adopted. This work is being carried out efficiently to get crystal clear purified water.

Impact of the Initiative

- By planting trees the sides and divider of the road, CMC Karwar is making the city become beautiful and as well as protecting the environment.
- The area around the sewage treatment plant is odor free because of MBR technology
- Purified sewage water is being recycled as per the norms given by NGT. By this underground water is being economized.
- Treated sewage water is sprayed on the road to prevent dust from flying.

6. Title of the story: Best Practices to Promote Inclusive Sanitation

Theme: Restrooms for Pourakarmikas (Safai Karamcharis)

ULB Name: Chikkaballapura CMC

Pourakarmikas will start work early morning from 5 am by Sweeping/Cleaning the streets in wards. Considering their convenience, CMC authorities has planned to provide restrooms exclusively for Pourakarmikas, who maintains the cleanliness of the city. Water and electricity are provided by CMC for this project. These restroom are located Near CMC office premises. These restrooms also have facilities like dress changing room for male/female Pourakarmikas. Mobile charging facilities and first aid kit is provided in these rest rooms. The new initiative will benefit around 151 Pourakarmikas and health staff employed CMC on both permanent and temporary basis.

Impact of the Initiative

This project has provided the basic facilities with very high standards like toilet, dress changing room, feeding room and with many more facilities exclusively for Pourakarmikas which has resulted in efficiency in work.

7. Title of the Story: E-waste Collection by Smart Electric Vehicles

Theme: Best practices in 3R (reduce, reuse and recycle)

ULB name: Mysuru City Corporation

To take off the initiative, separate smart Electric vehicles were deployed for the collection of E-waste. The ward wise route map of the vehicle has fixed and published through local newspapers, local news channels, and audio announcement through Door to Door garbage collection vehicles, etc. Electronic waste (E-waste) generated in the residential areas of Corporation will be collected in a separate vehicle & stored at E-Collection center at a designated place. The collected waste will be sold to registered e-waste authorized persons.

Impact of the Initiative

The hazardous E waste is now collected and transported scientifically without dumping of these products unscientifically. From this E waste is segregated at source, hence saving cost. The valuable items can be recovered from the E waste and environmental pollution can be controlled. This is an added income for the urban local body.

8. Title of the Story: Rejuvenation of Open wells

Theme Water Conservation, Rejuvenation

ULB name: Kalburgi City Corporation

The Kalaburagi city corporation with an aim to conserve water source and to improve the ground water quality. This has initiated an ambitious project of rejuvenation and restoration of open wells which are located across 55 wards of the Kalaburagi city. In this project total of 59 open wells where surveyed and identified by the Corporation engineers. This project was proposed in 15th finance scheme action plan for the year 2020-21.This was taken up for drinking water sector for rejuvenation of water sources.

Impact of the Initiative

Rejuvenated open wells became the additional source of water and recharge for the public use. Preventing residents from dumping Municipal solid waste into wells lead to increase aesthetic view of the city.

It has solved multipurpose objectives like conservation of water bodies, prevention of water pollution, improvement of health and preserving ancient structures.

9. Title of the Story: Beautification of Public Toilets

Theme: Sanitation

ULB name: TMC Tarikere

All Public and community toilets of the town were identified and a report of the facilities required was prepared accordingly. All the toilets were provided with proper 24 hours water supply facility and electric connections were made. The toilet walls and buildings which had become old were painted and special arts were made on the toilet walls to attract public for use of Toilets.

Restoration of electric Connections for toilets and Water connection were made to provide continuous water supply, Painting on walls to make the premises appear clean and attractive. Special facility for physically handicapped was availed by providing ramp and compatible toilet seat and also maintainence of hygiene by placing of Sanitary Napkin Vending Machine and incinerator facility in toilets.

Impact of the Initiative

The unusable toilets were converted into usable and public friendly toilets.

- Different variety of arts and paintings made on the toilet walls attracted people to use the toilets thus eradicating open urination and open defecation.
- Facilitating handicapped people to use the toilets with ease

10. Title of the Story: Sustainable Solid Waste Management

Theme: Effective Waste Management in ULBs

ULB name: Hosadurga TMC

In order to achieve the effective implementation of SWM 2016 rules and ISWM TMC Hosadurga made proper planning and execution of SWM norms in ULB.

The vehicles were mapped with auto tippers GPS and route map was introduced for door to door collection, commercial, institutional and other waste collection through designated vehicles. Created awareness about segregation at source and importance of segregation of dry and wet waste among public. Wet waste will be processed through using vermin and windrow method. The ULB has established dry waste collection center at Landfill site, where secondary sorting of dry waste carried out regularly 28 types (paper, plastic, carton, tetra pack, PET, etc) dry waste categories retrieved from collected waste.

By this total Revenue generated from sale of compost and dry waste has accumulated Rs. 41.98 Lakhs and also from user charges under municipal waste.

Impact of the Initiative

- TMC 100% source segregation at source TMC is managing wet, dry and sanitary waste in a scientific way was achieved.
- Beautification and gardening at Landfill site by using Recyclable materials has been carried out.

11. Title of the Story: Zero waste Practices in Municipal Offices

Theme: Reduce, Reuse, Recycle

ULB name: Moodabidri TMC

Best Practice / Innovation undertaken by the ULB to solve the aforesaid issue

TMC set up zero waste office to promote managing the waste in ULB office. Awareness was provided to each employee of the ULB about waste. Still the usage of single plastic has an throwing habit by the public. CUTLERY BANK (steel plates, mugs, spoons etc), was commissioned in ULB office that can use it and avoid the parcels in single use items in day to day life in ULB.

The staff in the Municipality will be a leading example in showing that life is possible without single use plastic, paper cups & plates. The compost generated in the office is divided wet and dry waste and later in to 7 types of categories in ULBs. The waste generated will go to land fill site , this has been managed effectively in ULB. An internal official order has been passed to the employees and to follow the rules laid by the ULB in maintaining good environment and provide awareness about zero waste management.

12.Title of the Story: Best practices to promote waste to wealth like coconut husk to production of nutrition rich fertilizer (Cocopeat).

Theme: Waste to wealth

ULB Name: Town Municipal Council Chittapur

In the beginning there was no proper segregation and disposal of municipal solid waste, because this there was a formation of waste coconut dumps, we have planned to overcome this issue started the segregation at the source level after that we have purchased a coconut shredding machine to shred the coconut husk and started a production of nutrition rich fertilizer (Cocopeat) this can be used for gardening and tree plantation, currently we are using for gardening and tree plantation and selling at a price of Rs 50/- per Kg. Revenue generated around Rs.1300/-

Impact of the Initiative:

This initiative helps in the reduction of waste and waste to wealth (nutrition rich fertilizer), after this initiative Rajashree Cement Factory Malakhed workers and other ulbs officials visited our plant to implement the same in their respective places.

Directorate of Municipal Administration

Digital Connectivity in Built-up Environments

The exponential growth in digitalization during the last decade has revolutionized the world, empowering and impacting everything from economy, innovation, science and education, to health, sustainability, governance, and lifestyles of the people. society. Digital transformation is rapidly changing the way we live, work, and interact with the world around us. Buildings and campuses are no exception, and they are increasingly being fitted with digital technologies to improve efficiency, productivity, and user experience. Further, globally 80% of mobile data is being consumed indoors and is expected to increase to around 95% in the years to come.

Enabling smart building technologies, such as sensors, actuators, and control systems, rely on digital connectivity to function, supporting the Internet of Things (IoT), the IoT devices are increasingly being used in buildings to collect data and provide insights that can improve operations and maintenance, providing seamless connectivity for occupants of buildings a seamless connectivity, regardless of where they are located in the building. It is evident from the fact that, by 2030, each person shall own 15 connected devices . This means the number of devices per household would go up to around 60. Increasingly, a fundamental requirement of buildings ii becoming robust, reliable, and affordable, digital connectivity inside the building. Thus, Digital connectivity includes access to high-speed internet, mobile communication, and Wi-Fi/ public Wi-Fi, PM-WANI etc.

The Government of India has launched the Digital India program with the vision of transforming India into a digitally empowered society and a knowledge-based economy. The National Broadband Mission (NMB) aims to provide affordable and reliable broadband connectivity to all citizens of India.

Telecom Regulatory Authority of India (TRAI) and the Government have taken various policy initiatives to fulfil the demands of telecom connectivity including (i) Issuing recommendations on rating buildings for digital connectivity, (ii) Issuing a consultation paper on the regulation of rating frameworks for digital connectivity in buildings or areas. Further, DOT amended licensing conditions with respect to RoW so that no licensee is able to enter into exclusive agreement with building owners.

These policy interventions have helped in improving connectivity, resulting in wider coverage and higher data throughput. However, all these efforts have fallen short in achieving the desired level of digital connectivity experience of the users, who now prefer to work from anywhere, at any time.

The rollout of 5G network has further stimulated the need for a seamless experience of the 5G services, specifically inside the buildings. TRAI has conducted many studies to assess the quality of connectivity, identify challenges in providing connectivity, and suggest the way forward. Based on these studies, TRAI published a Monograph on "Quest for a Good Quality Network inside Multi-Storey Residential Apartments: Reimagining ways to improve quality".

The emphasis of these recommendations is on providing a framework for the creation of an ecosystem for Digital Connectivity Infrastructure (DCI) to be an intrinsic part of building development plan similar to other building utility, services such as water, electricity, or Fire Safety System. DCI is to be co-designed and co-created along with building development through collaborations among various stakeholders including Property Managers (owner or developer or builder, etc.), service providers, infrastructure providers, DCI Professionals, and Authorities at various urban/local bodies. This framework would also open job opportunities for the young professionals to become DCI Professionals and be part of Design, Deployment, and Evaluation of Digital Connectivity Infrastructure .

In summary, Common Digital Communication Infrastructure for high-quality connectivity in built-up environments plays a vital role in achieving the goals of sustainable development and digital transformation.

BIM applications and its importance in building and infra construction sector

The major emerging technologies in the engineering and construction segment include prefabrication and modular construction, augmented reality and virtualisation, cloud and real-time collaboration, 3D scanning and photogrammetry, and building information modelling (BIM). The adoption of these technologies for Indian construction will offer several benefits in terms of risk reduction and increased efficiency. It will also enable a smooth transition to the operations and maintenance stage and better monitoring of project progress in the design and construction stage, thereby ensuring that the project is completed within the scheduled time and the stipulated budget.

The key benefits of BIM are reduced delivery costs, green performance, predictable planning, reducing risks, reduced operational costs & increased quality and value. Additional benefits are high levels of collaboration, communication, and coordination among the stakeholders, consistent and coordinated designs and highly constructible design solutions. There are a varied number of tasks in the project lifecycle which can benefit from the incorporation of BIM technologies, and these benefits are documented as BIM Uses. The primary BIM Uses are design authoring, 2D documentation, clash detection, cost estimation, structural analysis, construction planning, BIM for facility management integration and many more. Moreover, for some of these BIM Uses to be executed, it is essential to have other set of primary BIM Uses executed as a prerequisite. It is essential to realise the relationship between these BIM Uses which can be considered for future study. The criticality of any particular BIM Use depends on the project type and its complexity.

Broadband India Forum (BIF)

Broadband India Forum (BIF) was formed in 2015 with the sole objective of Proliferation of High Quality and Affordable Broadband to all across the country in a technology-neutral, service neutral and all-inclusive manner, to empower consumers with efficient and economical broadband to realize the true Digital India.

BIF functions through an APEX Executive Council and Various Specialists Committees in diverse areas of Information and Communications Technology (ICT). In the short span of 8 years, BIF has emerged as a recognised, independent, knowledge-based think-tank, in the digital communications ecosystem in the country.

BIF represents 65 reputed organisations and growing steadily, in broad spectrum in this diverse sector in a non-partisan manner. We work closely with the Government – the policy makers, regulator, decision makers and implementers – for proliferation of the broadband ecosystem in the country.

BIF is a strong proponent of the values of liberalisation and free and fair competition in the industry. Besides promoting the need for developing a world-class, robust digital communications and broadband ecosystem in the country, BIF has also been a strong advocate for greater, equal and non-discriminatory access to all information and communications technologies (ICT) available for all Indians, including Persons with Disabilities (PwDs). In fact BIF has a focussed Committee for Accessibility & Inclusion, which focus on the use of ICT for the community.

BIF also has a specialist committee on FTTX and In-Building Solutions (IBS), realising that about 70 to 80 percent of mobile data traffic is generated indoors; the digital connectivity in buildings to facilitate seamless communication, collaboration, and information sharing among occupants and even the guests to these buildings, leading to enhanced productivity and innovation is paramount. To meet this objective, BIF is seriously engaged and involved in most of the activities and had played an active role in Addendum to Model Building Byelaws-2016 (NBC), Common Telecom Infra, and Digital Connectivity Infra in buildings through Fiber and public WiFi (PM-WANI).

BIF contribution in NDCP-2018 is known to everyone in industry for propagating awareness and in-depth discussions on technology developments and best global practices.

BIF strongly believes that a robust Digital Infrastructure, based on a balanced interplay of essential primary and complementary/ alternate technologies.

Path towards Sustainable Urban Development – BIS Perspective

Without any indifference to the global trend in urbanization, India's growth of urban areas remains steadfast. By the year 2050 when more than 85% of population in the developed countries will be in the urban areas, India is poised to have half of its people, from the existing 37%. This phenomenal shift brings with it opportunities of growth, economy, employment and with it the challenges in terms of creating more buildings (be it residential, commercial, hospitals, education) and the associated infrastructure development within the finitely available natural resources.

The building and construction sector which is already the key driver of growth requires major supplementation by all the stakeholders such as the various professionals, material manufacturers, technology providers, planning authorities and approving agencies, so as to ensure that the buildings and infrastructure are resilient enough from the disasters faced periodically including those induced in recent times due to climate change. The onus is now not only on achieving safety but also resiliency in the built environment thereby achieving overall sustainability. Buildings in particular need to cater to all safety concerns like: Structural Safety, Fire Safety, Health Safety, Life Safety, Public Safety, Electric safety, Environment Safety.

Bureau of Indian Standards has been contributing to the above particularly through its Special Publications like the National Building Code of India and over 1800 standards available in the field of Civil Engineering. The current version of the Building Code, NBC 2016 in its 13 Parts having 33 chapters in particular provides the necessary guidelines for regulating the building construction activities and serves as a Model Code for adoption by all agencies including the government construction departments, local bodies and private construction agencies.

Next Revision of NBC:

With the experience and feedback received over the last 7 years, and to address the rapid advances in the field of building and construction, the next revision of the Code has been taken up by the BIS through its National Building Code Sectional Committee, CED 46 (under the chairmanship of Shri V. Suresh, Former CMD, HUDCO) and its 22 Expert Panels lead by equal number of industry stalwarts as the Conveners and over 1,100 individual experts. The revision of the Code aims to address the vast housing needs, disaster mitigation, sustainable development, inclusive development, innovation in design & construction, use of digital technologies, overall efficiency, to name a few.

Aspects on proof checking, peer review, energy auditing, structural health monitoring, promoting industrialized building systems, online building permit process, demolition permits, permits process for signage and outdoor display structures, permit process for Transferrable Development Right, Accommodation Reservation, Transit Oriented Development, stage-wise construction of buildings in townships will all be comprehensively addressed.

Updated norms for amenities for towns/cities; updates to open space requirements; Special developments like prisons, old-age homes, integrated townships, amusement parks; Urban design features; Heritage conservation; EV infrastructure and other sustainable infrastructure like wind energy generators, solar banks; Accessibility audit; Requirements of open space for fire tender movement; Fire and life safety provisions of special occupancies including data centres, cold storages will also be covered.

The revision also aims to elaborate the Fire safety aspects of high rise construction, mixed usages in the same building, integrated basements in multiple towers, podium construction, composite construction, underground buildings, etc.

Update Basic Wind Speed Map of India, the new Seismic Zoning Map of India based on probablisitic seismic hazard method, safety of building fabric from wind borne debris; emphasis on testing of piles, introduction of piled-raft foundations; use of timber from Plantation/social/agro-forestry; confined masonry construction technique; 3D printing, Prefabricated and Prefinished Volumetric Construction; Detailed provisions on glazing systems will address the aspects of structural safety.

Building Services related provisions will be updated to cover Solar PV installation, EV infrastructure in buildings; detailed provisions on HVAC for data centres, hospitals, clean rooms; elaboration on Fireman's Lift and Occupant Evacuation Lifts; BMS integration and smart building services.

Recycle and reuse of water, water efficient fixtures; biodigesters, packaged STPs, prefab/precast structures for conducting waste waters are the major points regarding plumbing services in buildings.

With clearer understanding of the concepts of climate change, green materials and practices fillip will be provided to the approaches to sustainable buildings. More details on management of the assets including using BIM/AI are on the anvil.

Further provisions will be included in the Code on involving all the professionals involved underscoring the requirement of a high level of co-ordination; integrated inputs for planning, design, execution; and above all maintenance of such assets throughout the life cycle.

All the above are with a view to establishing and ensuring an orderly, safe, accessible and sustainable built environment. Coordinated and Integrated approach with muti-disciplinary professionals is imperative from design, execution and maintenance stage for life cycle of buildings.

The Bureau of Indian Standards (BIS) lead by its Director General, Shri Pramod Kumar Tiwari (IAS) is thus geared up to support in addressing all the above with a view to establishing and ensuring an orderly, safe, accessible and sustainable built environment. The 'Draft Development and Building Regulations, 2022' prepared based on NBC 2016 by BIS, circulated for suggestions and finalized recently is another such effort.

HUDCO- Promoting Inclusive and Sustainable Habitat for Enhancing Quality of Life

Housing and Urban Development Corporation Limited (HUDCO), a premier techno-financing Mini-ratna CPSE in the field of housing and urban development, has been playing a pivotal role in the socio-economic development of India since its inception in 1970. With a mission to facilitate inclusive and sustainable habitat development, HUDCO has been a key player in addressing the country's housing and infrastructure challenges for more than five decades, making significant contributions to the nation in various domains, fostering growth and improving the quality of life for millions, especially for economically weaker sections and lower income groups of the society. Its economic contribution to the nation can be gauged from the fact that HUDCO is ranked amongst the top 10 CPSEs in the services sector in terms of net profits, financial investment, capital employed, net worth, contribution to central exchequer and dividend paid (Public Enterprises Survey 2021-22).

HUDCO Funding for Bengaluru Metro

HUDCO's Contribution in Housing & Urban Development

Commencing its business operations with a meagre capital of Rs. 2 crore in 1970, HUDCO's financial assistance has been a catalyst for the development of sustainable urban ecosystems. In its glorious journey of over 53 years, has cumulatively sanctioned a total of17342 housing and urban infrastructure projects with a total loan sanction of Rs.2.50 lakh crore and disbursements of Rs.2.06 lakh crore, as on 31st October 2023 to state governments and its agencies/parastatals such as Development Authorities, Housing Boards, Urban Local Bodies, Water Supply & Sewerage Boards, Roads & Bridges Development Corporations, etc. The total loans outstanding portfolio of Rs. 81594 crore consists of housing finance loans of 52.6% and urban infrastructure loans of 47.4%. However, as affordable housing has been accorded the infrastructure status, today HUDCO has emerged as one of the key infrastructure financiers in the country, with share of infrastructure financing (including affordable housing) is more than 75% of its total loan portfolio. The Company has sanctioned financial assistance to more than 20 million housing units both in rural and urban areas in the country, of which 18.72 million (95%) pertains to EWS/LIG categories with the motto of 'profitability with social justice', thereby promoting social inclusivity.

HUDCO is a consistently profit -making institution since its inception with an average annual profit in the last 5 years of more than Rs.1,500 crore. In the FY 2022-23, the company earned a net profit of Rs.1701.62 crore. The Company has the highest Domestic Credit Rating of AAA from ICRA, CARE, and India Ratings & Research. Presently, HUDCO is a NSE and BSE listed Central Public Sector Enterprise (CPSE) since 19th May, 2017 with Paid-up Capital of Rs.2001.9 crore. The Government of India has disinvested shareholding in HUDCO to the extent of 24.83% till October 2023.

HUDCO's Support to GoI Flagship Programme/Missions

Apart from being the think tank in formulation of various Policies and programmes, HUDCO has also contributed meaningfully in the implementation of the Govt. of India flagship programmes such as Pradhan Mantri Awas Yojana (Urban)-Housing for All (PMAY-U), Smart Cities Mission, Swachh Bharat Mission, Atal Mission for Rejuvenation & Urban Transformation (AMRUT), Jal Jeevan Mission, etc. providing a range of support starting from planning to financing of programmes. HUDCO is one of the three Central Nodal Agencies (CNA) for CLSS component of PMAY-Urban, apart from providing viability gap funding to other three components of PMAY. HUDCO, till 30th September 2023 has released cumulative CLSS subsidy of Rs. 2632.00 Crore to 1,11,718 beneficiaries throughout the country.

Technical, Consultancy & Capacity Building Support

HUDCO's role extends beyond mere financial support. With its multidisciplinary professionals and wide networking of offices located in different parts of the country, HUDCO is the only techno-financing institution which provides affordable financial assistance along with the requisite technical tie-up encompassing city and neighbourhood level planning, layout planning, building design, environment protection, promotion and propagation of appropriate technologies and locally available building materials, as also efficient construction management practices. HUDCO actively engages in consultancy services, training, capacity building and knowledge sharing activities. HUDCO has a dedicated research & training institute in the name of 'Human Settlement Management Institute (HSMI)', set up in 1985, which conducts training programs, and capacity building activities for various stakeholders involved in urban development, fostering a culture of innovation and best practices.

CSR Activities of HUDCO

As a socially conscious and responsible CPSE, HUDCO also actively engages with CSR activities such as funding for: night shelters, rehabilitation works, augmentation of public health, construction of anganwadis, public toilets, community halls, procurement of pick-up trucks, installation of bio-digester toilets, etc. HUDCO has also contributed Rs. 125 Crore to 'PM Cares Fund' and Rs. 27.85 Crore to 'Swachh Bharat Kosh'.

Way forward

With the increased thrust on infrastructure-led growth in India and huge capital expenditure requirement of about Rs. 111 trillion in infrastructure sectors in India during fiscals 2020 to 2025, as per NIP Report, HUDCO is dedicated to finance the full spectrum of required infrastructure projects in the country. Further, in order to align with the country's net zero goals, HUDCO also aims to increase its funding to 'green economy' sectors such as green buildings, sustainable transport, water, waste management, land management and renewable energy. HUDCO's impending transition from a Housing Finance Company to an NBFC-IFC (Infrastructure Finance Company) in the new RBI regulatory framework, would go a long way for a quantum jump in its business operations, where it aims to increase its present balance sheet from Rs.82,000 crore to Rs. 2 lakh crore in next five years.

HUDCO's multidimensional contributions to the country are significant and far-reaching. From addressing the housing needs of the economically vulnerable to supporting the development of sustainable urban infrastructure, HUDCO has been a key partner in India's journey towards holistic and inclusive development. As the nation continues to urbanize and face new challenges, HUDCO's role remains crucial in shaping resilient, sustainable, and livable urban spaces for generations to come. HUDCO shall continue to work on the ideals of reaching the 'unreached', serving the 'unserved', banking the 'unbanked' and building assets for the nation.

HUDCO-Funded Cochin International Airport

EWS Housing at Jabalpur under JNNURM-VGF by MC Jabalpur

Building Inclusive, Self Sufficient & Sustainable Urban Development

Housing and Urban Development Corporation Ltd. (HUDCO) is India's premier techno-financing public sector enterprise, in the field of housing and infrastructure development in our country.

Housing for All

Urban Development

Infrastructure

Consultancy Services

Building Technologies

CSR Initiatives

- Celebrating 53 years of dedicated service to the nation
- A techno financial Mini Ratna PSE of the Government of India financing urban housing and infrastructure projects in India
- With its motto of "Profitability with Social Justice" HUDCO lays emphasis on projects for the economically weaker sections as well as Low Income Groups

Housing and Urban Development Corporation Ltd.
(A Govt. of India Enterprise)
Registered Office : HUDCO Bhawan, Core-7A, India Habitat Centre, Lodhi Road, New Delhi-110 003

CIN: L74899DL1970GOI005276
GSTIN: 07AAACH0632A1ZF
Website: www.hudco.org.in
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Signature Global - Leading Transformation in Green Homes and Sustainable Living

Signature Global, a key player in India's real estate development sector, has been pioneering a transformation in the affordable and mid-housing segments. Their emphasis on quality execution, value creation, and global standards has propelled them to a market share of 19% in Delhi NCR in these segments. Founded in Gurugram in 2014, the company boasts a team of seasoned professionals with extensive experience in the financial services sector. Backed by marquee equity investors like HDFC and IFC, Signature Global practices high corporate governance within the organization. It has currently delivered over 6 million square feet and has ongoing projects in 17.21 million square feet area along with a robust forthcoming pipeline of 21.29 million square feet of saleable area. The total portfolio currently comprises 60 projects, with nearly 28,000 units sold and about 21 forthcoming projects.

Signature Global has been following a disciplined approach to land acquisition, with a lead-time from land acquisition to project launch of close to 18 months. All the projects are perfectly positioned in key locations in Delhi NCR and micro markets such as South of Gurugram (Sohna), Golf course extension road, Dwarka Expressway, Vaishali (Ghaziabad), and Karnal.

Embracing Green Homes for Sustainability

Signature Global, like other leading developers, recognizes the significance of implementing Green Homes. These practices not only impact environmental consciousness but also contribute significantly to sustainability in the real estate sector.

1. Energy Efficiency: Green Homes prioritize energy-efficient technologies like insulation, LED lighting, and smart home systems, reducing energy consumption and carbon emissions.

2. Renewable Energy Integration: Incorporating renewable sources like solar panels helps in reducing greenhouse gas emissions and promotes sustainable energy practices.

3. Long-Term Cost Savings: By focusing on energy and water efficiency, Green Homes lead to significant cost savings over time, attracting buyers and advocating sustainable practices in the industry.

Norms and Guidelines for Green Homes

For a project to qualify as a Green Home, developers must adhere to specific norms and guidelines promoting sustainable practices. Signature Global employs a disciplined approach from land acquisition to project launch, focusing on eco-friendly materials, waste reduction, and site selection strategies that minimize ecological impact.

The company practices effective waste management, monitors and appraises performance, and complies with local building codes to ensure their projects meet sustainability and environmental standards.

Signature Global's Initiatives for Green Homes

The company has spearheaded innovative measures such as Advanced Aluminium Formwork (AFW) technology for earthquake-resistant, leak-proof, and high-quality structures. They also operate under the mantra of 3R - Reduce, Recycle & Reuse, incorporating waste materials like bricks, tiles, and steel in construction. Furthermore, they use fly ash brickwork and aim for zero waste in construction processes to safeguard the environment.

Benefits for Homebuyers

Future homebuyers investing in Green Homes developed by companies like Signature Global can expect lower utility bills due to energy savings, enhanced thermal comfort, reduced noise pollution, improved air quality, and increased property value.

Recognition and Certifications

Signature Global's commitment to environmentally friendly practices is validated by certifications like IGBC Gold rating, EDGE certification, and ISO 9001, 14001, and 45001. These certifications acknowledge their adherence to quality management, environmental standards, and occupational health and safety.

Water Conservation Strategies

The developer employs low-flow fixtures, rainwater harvesting, greywater recycling, and efficient irrigation techniques to reduce water wastage. These strategies contribute to water conservation and sustainable water usage.

Healthier Living Environment

To ensure a healthier living environment, Signature Global monitors air quality and deploys pollution monitoring networks during construction. They focus on good indoor air quality, thermal comfort, and energy-saving features to enhance occupant satisfaction, productivity, and well-being.

In summary, Signature Global's commitment to Green Homes is setting a benchmark in the real estate sector, promoting sustainability and environmental consciousness while ensuring a high quality of life for homeowners. Their initiatives and adherence to green standards are vital steps towards a more eco-conscious and sustainable future in real estate development.

SIGNATURE GLOBAL®
MAKING INDIA AFFORDABLE
AN ISO 9001:2015; 14001:2015; 45001:2018 CERTIFIED COMPANY

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MAKING INDIA AFFORDABLE
AN ISO 9001:2015; 14001:2015; 45001:2018 CERTIFIED COMPANY

IGBC GREEN CHAMPION

Your own home isn't a place but a feeling.
Created with hopes and dreams, not just bricks and beams.

Where late night laughter can freely echo within its halls,
and children's unbound imagination adorn the walls.

Where the answers to peace of mind lie,
and questions about lease or rent do not arise.

It's a feeling that welcomes you each time with open doors,
and lets in the sweet smell of your success through its windows.

INDEPENDENT FLOORS FOR THE INDEPENDENT YOU

GURUGRAM & SOUTH OF GURUGRAM

APNA GHAR®,
TOH APNA HI HOTA HAI!

Signatureglobal (India) Limited, Ground Floor, Tower A, Signature Tower, South City -1, Gurugram, Haryana-122001

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Disclaimer: Promoter urges every applicant to inspect the project site and shall not merely rely upon any architectural impression, plan, sales brochure, advertisements, representations, statements of whatsoever nature' and, therefore, requests to make personal judgment prior to submitting an application for allotment. The Project is being developed in phases, hence, certain facilities/amenities etc, may be used by allottee of other phases. Unless otherwise stated, all the images, visuals, materials and information contained herein are purely creative/artistic and may not be actual representations of the product and/or any amenities. Further, the actual design may vary in the fit and finished form, from the one displayed above. Journey time shown, if any, is based upon Google Maps which may vary as per the traffic at a relevant point of time. *Rate mentioned above does not include GST and other statutory charges, if applicable. T & C Apply. 1 sq. mt. = 10.7639 sq. ft.

Green Built Environment Movement in India

1. Introduction

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government and civil society, through advisory and consultative processes. A step towards this direction was the launch of 10 Centre's of Excellence focussing on a particular specialized service.

CII - Sohrabji Godrej Green Business Centre (CII-Godrej GBC), one of the Centres of Excellence, was conceived and designed to offer one-stop solution on various aspects of environmental management to Indian industry and in the process facilitate India emerge as one of the global leaders in green business. CII, under the thought leadership of Mr Jamshyd Godrej embarked on this Mission and walked the talk in spearheading the green building movement in India. As part of the Mission, it was decided to construct CII Godrej GBC as a demonstration green building in India. A green building is one which uses less water, optimises energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building.

As a result of concerted efforts, in the year 2004, CII Godrej GBC building earned the unique distinction of becoming India's first platinum rated green building, which in turn triggered the modern National green building movement. The Indian Green Building Council (IGBC) was set up by CII to promote and facilitate the establishment of green buildings in India. Since then, this demonstration green building has been playing a catalytic role in the spread and growth of green building movement in India. CII had the honour of Dr APJ Abdul Kalam, the then President of India, inaugurating the Green Business Centre.

The vision of IGBC is to facilitate India emerge as a global leader in green buildings and green built environment by 2025. In a span of last 2 decades, CII-IGBC through its multi-pronged approach could facilitate in bringing about a paradigm shift in the way buildings are conceived and designed across various forms of built environment. This approach is appropriately matched with a corresponding green building rating system. CII-IGBC has launched 30 Green Rating Systems for Buildings and Built Environment which are designed to address various building typologies like – residential, commercial, education, health and wellbeing, transit, industrial including logistics facilities, cities, and villages. IGBC is representing India at global forum –'World Green Building Council' among 90+ country councils and is the founding member of WorldGBC since 2004. IGBC is leading the Asia Pacific Network in green building related discussions.

CII - Godrej GBC, Hyderabad - India's first Platinum Rated Green Building, 2004

Thought leadership of Mr. ParasuRaman, Mr Jamshyd Godrej and Dr. Prem C. Jain and the cooperation of all the Council members has shaped India's Green Building Movement. IGBC has demonstrated that "Green Buildings make Good Business Sense".

2. Green Building Movement in India

Green building movement today is a Pan India movement with over 11,580 projects with green footprint of over 10.42 Billion Sq.ft., making India the second country with largest green building footprint in the world. Today, More than 90% of green buildings in the country is being facilitated by IGBC and more than 3,900 projects certified & fully operational.

IGBC

Confederation of Indian Industry

IGBC & Multi National Corporations

100+ MNC organizations have adopted IGBC Net Zero & Green Building Ratings

MNC's adopting IGBC ratings across sectors:

Automobile, Finance, FMCG, Hospitality, IT, Factories, Media, Textile, etc.

Corporates

Carrier, Decathlon, Dell, D E Shaw & Co, Infosys, Johnson Controls, Larsen & Toubro, LuLu, Reliance Industries Limited, Skechers, Standard Chartered, Sony Pictures Networks, Tata Consultancy Services

Developers

Brookfield Properties, Candor Realty, CapitaLand, nexus Malls, Shapoorji Pallonji

Factories

ABB, Alstom, BMW, Bonfiglioli, Cummins, Emerson, GE Industrial Solutions, Grundfos, Ingersoll Rand, JCB, John Deere, L'Oreal, Mars, Nivea, OTIS, Schneider Electric, Siemens, Skoda Volkswagen, Tetra Pak, Unilever

Data Centers

adanIconnex, Jio, netmagic, NTT Data, ST Telemedia Global Data Centres

Tenants in Various Projects Adopting IGBC Ratings

EY, Bottega Veneta, Eaton, Coca-Cola, CBRE, Cognizant, Fidelity, citi, Canali, Alcatel-Lucent, Aricent, adidas, amazon, Apple, ABB, accenture, MetLife, Google, Pizza Hut, pwc, Oracle, Novartis, Microsoft, IBM, KPMG, JLL, intel, Siemens, genpact

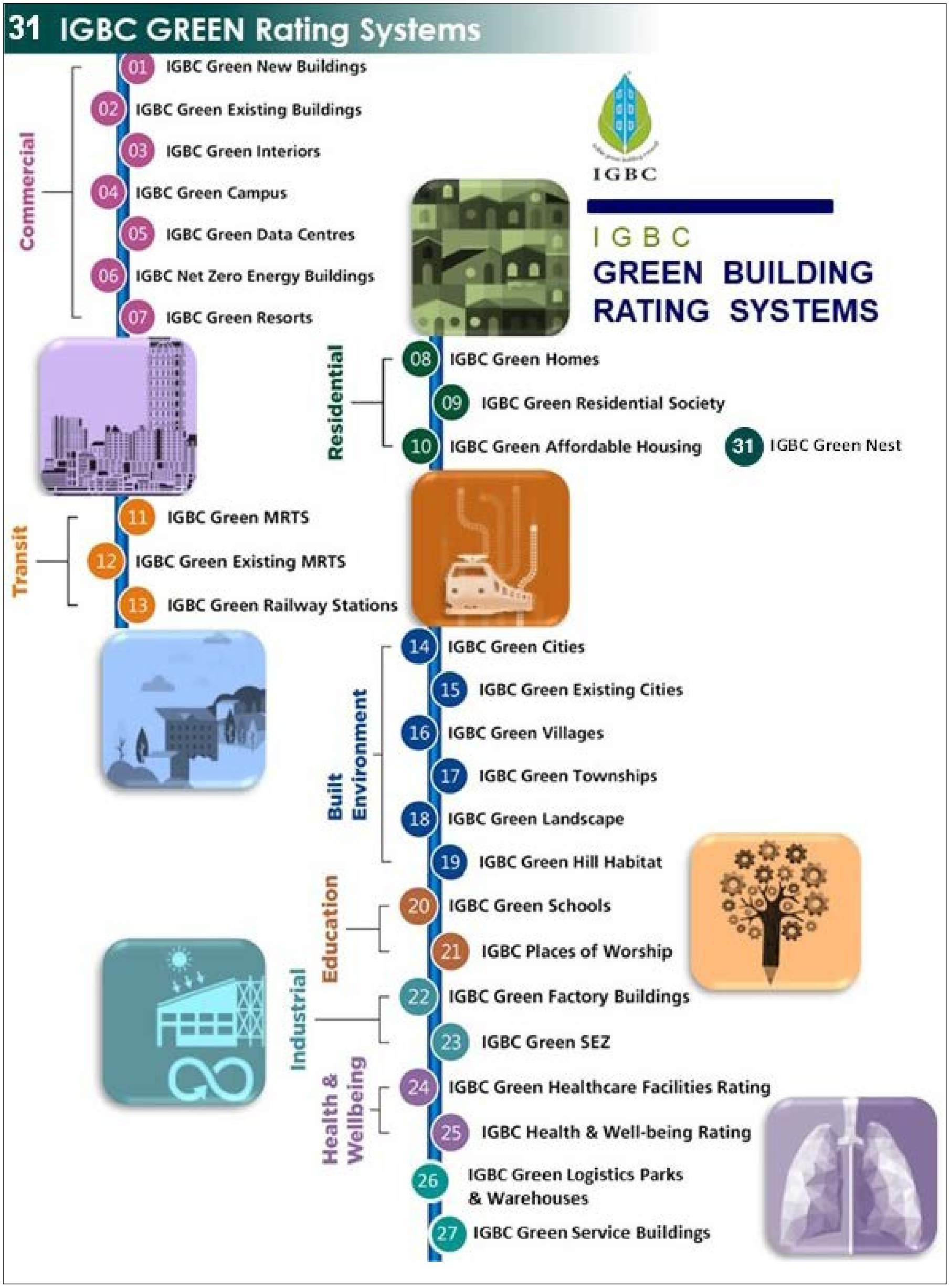
* Not exhaustive list

IGBC ratings programs are ...

National by Choice, Global in Performance !

www.IGBC.in

2.1. IGBC Green Rating systems for Buildings & Built Environment



Each building typology is unique and require specific design and approach for implementing green measures. Hence, IGBC has developed rating tools specific to building typologies. All IGBC Rating System have been developed based on the holistic approach and are a perfect blend of ancient architectural practices and modern technological innovations. IGBC rating systems are evolved so as to be comprehensive and at the same time user-friendly.

While all asset classes of buildings are covered, residential buildings with 3 ratings have reached out to 21.38 lakh residences with over 2.4 Billion sq.ft. of residential green footprint. Various types of building typologies in a city like - homes, schools, hospitals, new buildings, existing buildings, places of workshop and other forms of built environment have adopted IGBC green building rating systems and in the process facilitated a greener and healthier India.

2.2. Spread of Green Buildings projects

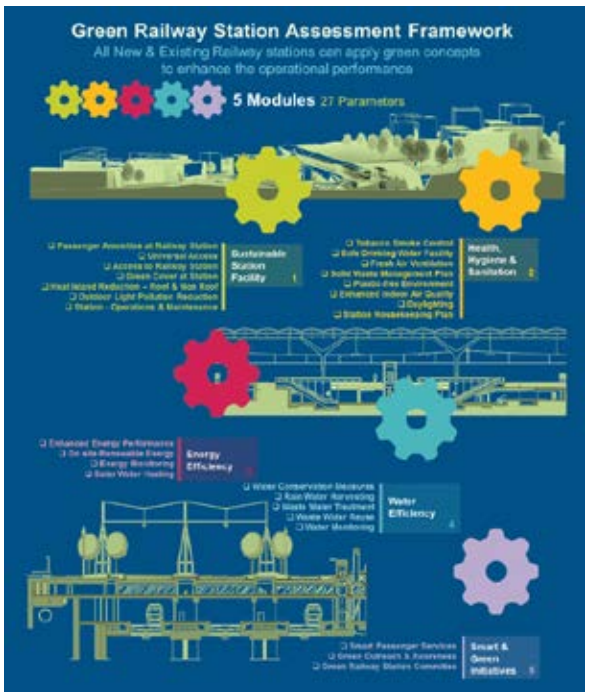
29 IGBC Chapters in various States are working towards a common vision. 4000+ Stakeholder organisations are the Green Champions who are spearheading India's Green Building Movement. IGBC local chapters are involved in policy advocacy, training & capacity building, networking & business opportunities, awareness & sensitization programmes, demonstrating green building projects as case studies. IGBC projects are spread across 500 plus towns and cities of India. Projects in the

built environment from Kashmir to Andaman and Surat to Shillong have adopted IGBC's green ratings. CII-IGBC is working closely with Government of India on green building projects for more than 1000 projects across the country.

Under the leadership of Mr V Suresh and Mr Gurmit Singh Arora, IGBC led the green path to go beyond 'Green Buildings'and pioneered into 'Green Built Environment' to cover neighbourhood, campus, town ships and to Green cities and Green villages.

2.3. India's Leadership in Greening Infrastructure and Built Environment

The world population of 6.1 billion in 2000 is likely to expand to 9.3 billion by 2050. India has to build massively with doubling the construction needs by 2030 with speedy construction. Addressing the same, IGBC has worked in last decade and a half on ratings for large infrastructure projects.



IGBC Green Mass Rapid Transit System (MRTS) Rating: Applicable to Urban transportation systems such as rapid transit, metro rail, monorail, other light rail transit systems

IGBC Green Mass Rapid Transit System (MRTS) Rating is the World's first exclusive rating system to address sustainability in new Mono Rail and Metro Rail systems. The rating system is a tool to enable Rail based MRTS to apply green concepts during design & construction, so as to further reduce environmental impacts that are measurable. The overarching objective of IGBC Green MRTS Rating is to ensure environmental sustainability while enhancing the commuter experience. This rating is applicable for Underground, Elevated and At grade MRTS stations.

IGBC Green MRTS Rating has received tremendous response from metro rail authorities across the country. Over 700 metro stations in India from 17 metro rail authorities amounting to a built-up area of 70 million sq.ft and covering over 600 kms, are going green with IGBC Green MRTS Rating, which include Delhi Metro (100+ stations), Chennai Metro (40 Stations), L&T Hyderabad Metro project (61 stations), Kochi Metro project (22 stations), Mumbai Metro project (27 stations), Mumbai Metro (MMRDA) (53 stations), Lucknow metro project (21 stations), Kanpur Metro (30 stations), Kolkata Metro (12 stations) Noida Metro (21 stations) and Nagpur Metro project (37 stations) among the metro projects in major cities.

IGBC Green Railway Stations Rating: Applicable to Long-distance rail based transportation systems with operations throughout the country

IGBC Green Railway Stations Rating System has been developed by IndiaGBC with the support of Environment Management Directorate of Indian Railways. The rating system was launched by the then Hon'ble Minister of Railways in 2016. The rating is a tool to facilitate adoption of green concepts, thereby reduce the adverse environmental impacts due to station design, construction, operation & maintenance. The overarching principle of the rating is to optimize resource usage and enhance commuter experience.

Confederation of Indian Industry (CII) and Indian Railways have signed a memorandum of understanding to facilitate green initiatives in Indian Railways since 2016, As part of the MoU, CII is working in the areas of energy efficiency in manufacturing facilities, railway workshops, green railway stations. CII has been working with more than 60 railway stations and facilitated 40 railway stations to achieve Green Railway station rating so far.

The first 30 Green railway stations have achieved an annual savings of 40 crores per year, energy saving of 22 Million kWh/ year and water savings of 3 Billion Litres/ year. Over 100 Indian Railway establishments

(Railway Stations, Offices, Training Campuses, Schools, Hospitals) have adopted IGBC Green rating programs for design, construction, and enhanced operational performance, leading to significant savings in energy and water.

The IGBC Green Cities rating (Greenfield cities) recognises the the 'CITY/ SEZ/ SIR/ Industrial Parks' for initiatives, covering master planning, urban design and the various planned & implemented initiatives in the city in respect of water supply, energy efficiency, waste management, e-governance, green cover & several other initiatives and policy interventions.

Greenfield developments refer to the creation of planned communities, industries or commercial hubs etc on previously undeveloped land. Comprehensive development in the greenfield cities will improve quality of life, create employment and enhance incomes for all, leading to inclusive cities. IGBC is working closely with development authorities and developers to apply green concepts and planning principles in several Indian Cities, resulting in reduced environmental impacts that are measurable and thus improving the overall quality of life.

The IGBC Green Cities rating (Existing cities) recognises the 'Municipal cities/ Smart Cities/ AMRUT Cities/ SEZs/ Aero Cities/ Industrial parks' based the implementation of various green city measures and demonstrating achievement of 24 Green City Indicators with measurable benefits to the existing city in respect of water supply, energy, waste management, e-governance, green cover & several other initiatives and policy interventions.

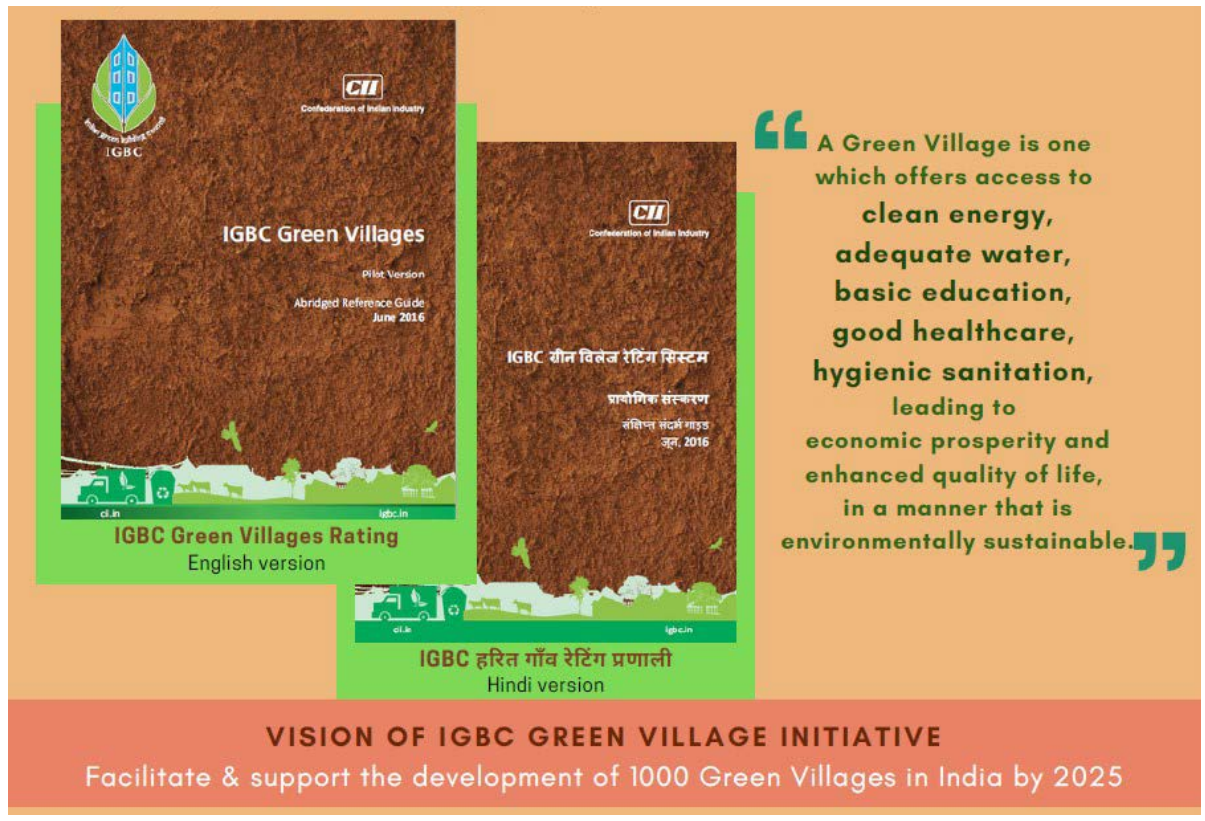
'IGBC Green Cities' Rating programme has been adopted by more than 25 cities across India including Dholera SIR (Special Investment Region) Gujarat, Sri City AP, GIFT Gujarat, New Town Kolkata, METL Haryana, Mahindra Industrial Cities in Gujarat & Tamil Nadu, Bangalore Aerocity, Kandla port SEZ, Zydus Pharma SEZ, Electronic City Karnataka, Rajkot, Pune, Navi Mumbai, Panchkula, Bhopal among others.

IGBC Green Village Rating : Tool for infrastructure gap identification and implementation of green features at village. The rating system is available in Hindi and English language.

To address the major challenges faced in our villages such as open defecation, drinking water scarcity, lack of adequate health care, access to basic amenities & school and power shortage, IGBC has developed a Green Village rating to convert existing villages to green & self-sustainable villages, ultimately resulting in enhanced health and well-being.

So far, 35 villages have adopted Green Village Concepts in 11 states which include, Mawlynnong (Meghalaya), Punsari & Surpur (Gujarat), Tilpat & Bhond (Haryana), Baligaon (Assam), Mori Moripodu, Puttamraju Kandriga, Burripalem and 10 villages in Denduluru Constituency (Andhra Pradesh), Ralegan Siddhi, Nanded Gaothan & ISKCON Govardhan, 6 Villages in Satara District (Maharashtra), Uttaramundamunha (Odisha), Railthal (Rajasthan), Narmetta & Gangadevipally (Telangana), Sollepura & Kuthamballam (Tamil Nadu) and Madiwala (Karnataka).

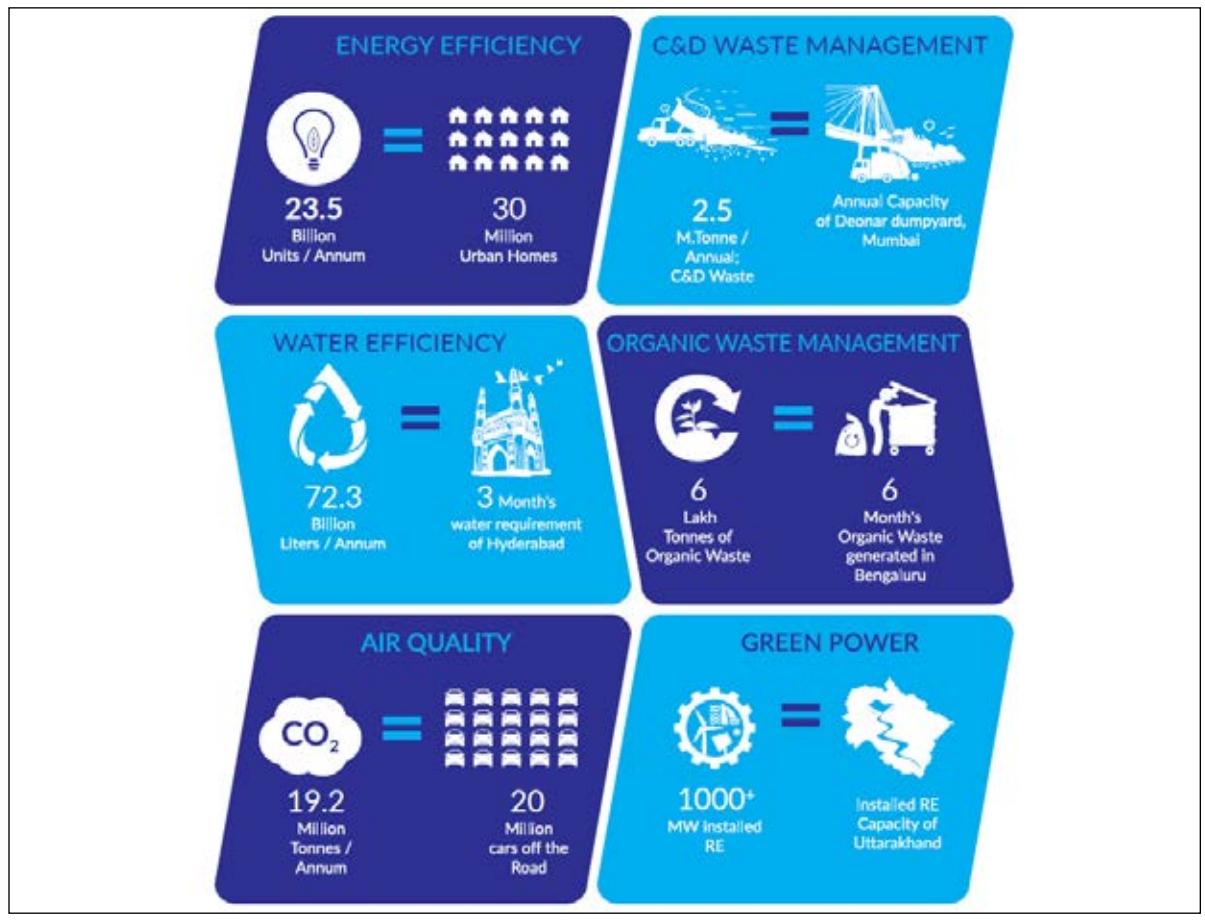
These include 16 villages adopted under the CSR programs of ICICI Foundation, Feedback Infra, Bharat Forge, Aditya Birla Fashion & Retail and Suchir India Foundation for transformation into IGBC rated mdoel Green Villages in India. A recent 'IGBC newsletter on Greening of Rural India' is attached.



2.4. Impact of IGBC rated Green Buildings at National level

Some of the Tangible impacts resulting every year from the green building movement in the country based on 3,900+ certified and fully functional projects are highlighted below:

- 23.5 Billion Units of Energy Savings per annum - Equivalent to providing electricity to 30 Million urban households
- 72.3 Billion Litres of Water savings per annum - Equivalent to Hyderabad's Water demand for 3 months
- Reduction in CO_2 emission by 19.2 Million Tonnes - Equivalent to keeping 20 Million Cars off the road for a year
- Reduction in C&D Waste diversion to landfill by 2.50 Million Tons /Annum
- Reduction in Organic Waste diversion to landfill upto 6 Lakh Tonnes/ Annum
- More than 1000 MW Installed Renewable Energy in IGBC rated projects



2.5. Stakeholder Engagement

CII-IGBC has signed MoU with Confederation of Real Estate Developers' Associations of India (CREDAI), National Real Estate Development Council (NAREDCO) and Builders Association of India (BAI) to accelerate the green building movement in India. The partnerships are focussed on collaborative promotion of green building concepts among the stakeholders and citizens, through networking, capacity building and sharing of information on latest green concepts & technologies with the premier bodies and more than 20,000 developers associated with the association. Thus, facilitate India's growth as a global leader in green buildings and green built environment.

The guidance and support extended by all our MoU partner organisations including- IPA, CREDAI, IAPMO, ISHRAE, IIA, BAI, ISOLA, IIID is enabling IGBC rating systems to become 'National by Choice and Global in Performance.'

CII-IGBC with the support of all the stakeholders could successfully demonstrate that the place we live, work, study, play, commute and all other forms of built environment can go the green way and, in the process, also, enhance the quality of life of every citizen on Planet Earth and make the Planet a better place for us and all the species around us. India's green leadership in facilitating greening of various forms of built environment. It also showcases India's immense potential in driving innovative and futuristic models. Indian Construction sector is in inspiring and exciting times and CII-IGBC will continue to forge new global partnerships and in the process, offer new growth opportunities to all stakeholders.

3. Government incentives for green buildings

CII-IGBC's approach is aligned with National priorities and complements various Government initiatives including the National Building Code (NBC); Energy Conservation Building Code (ECBC); Smart Cities Mission; Swachh Bharat Mission; AMRUT cities, PMAY. IGBC is also playing a catalytic role in realizing UN's SDG goals.

The support and guidance of various Government departments to our green building mission has always been excellent and is paving way for offering more incentives/ fast track approvals for Green building projects. Central government and 13 state governments are now providing incentives for IGBC green building rated projects. Financial Institutions have also extended incentives to IGBC rated green projects.

Our partnership with Indian Railways has gained significant momentum and the second phase of MoU signed on 13 September 2019 will further strengthen our activities in greening of more railway stations, schools, homes, hospitals, administrative blocks of Indian Railways.

CII-IGBC is recognised as Green Building council in 'Model Building Bye-Law, 2016' under chapter 10 on Green Buildings and sustainbility provisions. Also, IGBC is an Alliance Partner to the MoHUA's NIUA Climate Centre for Cities and has facilitated the city wise data for 126 cities as part of Climate Smart City Assessment Framework (CSCAF) 2.0, MoHUA. IGBC team has been involved in capacity building exercises as part of CSCAF.

Faster Clearance:

- Faster environmental clearance by The Ministry of Environment, Forest and Climate Change (MoEFCC) via notification on green buildings, for projects applying for IGBC green building certification.

Additional floor space of 5-15 percent for IGBC-rated green buildings, by:

- Govt. of Rajasthan
- Govt. of Punjab
- Govt. of Uttar Pradesh
- Govt. of West Bengal
- Govt. of Maharashtra
- Govt. of Himachal Pradesh
- Govt. of Jharkhand
- Govt. of Haryana

Financial Incentives:

- Govt. of Andhra Pradesh – 20% reduction in building permit fees, and one time reduction in stamp duty.
- SIDBI – concessional interest rate for loans to IGBC-rated green buildings in MSMEs.
- Govt. of Kerala – Upto 50% reduction in One time building tax, up to 1% reduction in Stamp duty and up to 20% reduction in Property tax for green projects.
- Govt. of Gujarat
  - Gujrat Tourism Policy 2021-25 - Reimbursement of 50% of Green Certification fee, with a maximum limit of INR 10.0 lakh, to hotel / wellness resorts obtaining IGBC rating.
  - Industries Commissionerate, Industries and Mines Department - Incentive upto 50% of consulting charges, with a maximum limit of INR 2.50 lakh, for Industrial Buildings with IGBC rating.
  - Climate Change Department - Reimbursement up to INR 3 lakhs OR 50% of IGBC Certification fee, whichever is lesser, to IGBC projects.

Ministry of Environment & Forests

MAKE IN INDIA

Government of Rajasthan

GOVERNMENT OF UTTAR PRADESH

Government of Maharashtra

झारखण्ड सरकार

Department of Town & Country Planning
Government of Himachal Pradesh

SIDBI

4. Way Forward - Advancing Net Zero Buildings & Built Environment In India

The building sector accounts for over 30% of GHG emissions in the country. The green building movement has contributed for improving resource efficiency and significant reduction in GHG emissions. Considering the environmental issues and climate change, this has to be taken to the next level of moving towards 'Net Zero'.

CII-IGBC is leading the Net Zero Movement in India and 350+ organisations have signed as part of IGBC Mission on Net Zero launched on Earth Day 2021 with a vision that 'India to become one of the foremost countries in transforming to Net Zero by 2050'. Net Zero Building aims to reach a regenerative future, focusing on 4 main areas :

- Net Zero Energy
- Net Zero Water
- Net Zero Waste
- Net Zero Carbon

To achieve the target, CII-IGBC with the support of stakeholders has brought out the First-of-its-kind ratings for Net Zero Energy, Net Zero Water, Net Zero Waste and framework for Net Zero Carbon. This will play a major role in climate change agenda and actions for all cities.

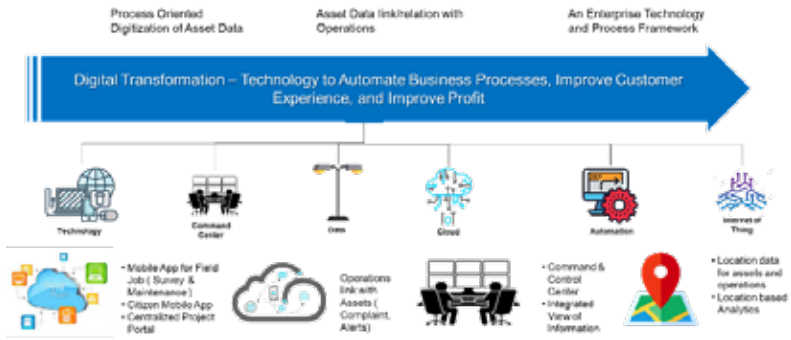
As on date, more than 100 projects have started implementing the measures to make their buildings Net Zero in terms of Energy, Water and Waste. About 40 Million sq ft of built-up area of different types of buildings including corporate offices, IT/ITES buildings, factory buildings and warehouse are in the processing of implementing Net Zero Concepts and 32 projects have already achieved the status of Net Zero projects.

IGBC will continue to facilitate the Indian building construction sector to move towards Net Zero Energy, Water, Waste and Carbon and contribute to the country in achieving its commitment to become 'Net Zero' by 2070.

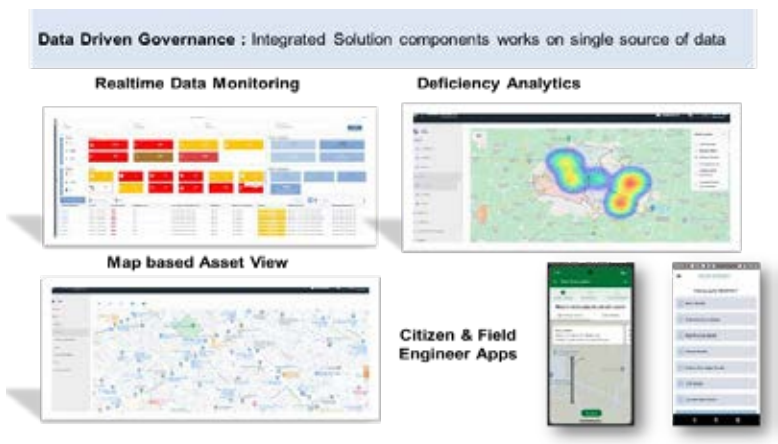
Empowering Urban Transformation through Smart Streetlight Management

Rapid urbanization and the challenges it poses, cities worldwide are seeking innovative solutions to enhance sustainability, efficiency, and safety. Smart streetlight management solution has emerged as a frontrunner in this domain, empowering cities to transform into beacons of progress and environmental consciousness.

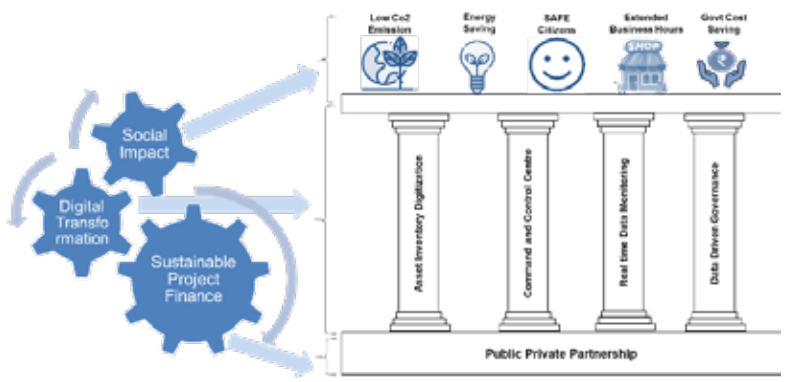
A Comprehensive Solution for Urban Transformation: Tata Projects' smart streetlight management solution stands out as a comprehensive and innovative approach to urban transformation. Built upon a cutting-edge architecture, the solution seamlessly integrates a range of advanced technologies, including artificial intelligence, big data analytics, and the Internet of Things (IoT), to optimize streetlight operations, enhance safety, and support a multitude of smart city applications.



At the heart of the solution are smart streetlight controllers, meticulously installed on each streetlight, enabling precise control over on/off operations, and dimming capabilities. These controllers continuously gather data on energy consumption, light levels, and other critical environmental factors, providing valuable insights for optimizing streetlight usage.



Reaping the Rewards of a Smart City Solution: The implementation of Tata Projects' smart streetlight management solution unlocks a myriad of benefits for cities, propelling them towards a more sustainable, efficient, and secure future.



Illumination Success Stories

Pune | Ludhiana | Nashik | Noida

Total 3.72 Lakhs Streetlights

Financial Impact	Social Impact
Lifetime Energy Saving Rs. 1072 Cr	Achieved Energy Savings 56 -62%
Lifetime Carbon Credits Rs. 6.61 Cr	Lifetime Energy Savings 11.99 Lakhs MWH
Operation Cost Saving Rs. 134 Cr	Carbon Credits 11.29 Lakhs

A Sustainable Business Model for Mutual Benefit: Tata Projects' smart streetlight management solution operates on a self-sustaining model, generating recurring revenue for Tata Projects while providing cities with significant energy and cost savings. This win-win model underscores Tata Projects' commitment to create sustainable urban solutions that benefit both the clients and the communities it serves.

Investment	Operational Expenses	Revenue
• *Special Purpose Vehicle formation for the project* • *Tri-party agreement between Tata Projects Limited, Finance Partner and ULB (Tata brand attracts leading financers to project)* • *Initial investment in Infrastructure procurement and commissioning*	• *OPEX is self-sustained as savings from the transformation generates considerable margin over expenditures.* • *Future cost escalations are also neutralized within the projects*	• *Energy saving is shared between respective Local Body and the concessioner* • *This brings additional earning to the Local Body from saved energy cost plus annual maintenance cost of electrical fixtures and network*

Illuminating the Path to a Sustainable Urban Future: As cities embrace the concept of smart city development, Tata Projects stands ready to empower them with the tools and expertise necessary to achieve their sustainable development goals.

By harnessing the power of technology and innovation, Tata Projects is illuminating the path to a brighter, more sustainable future for cities and their inhabitants. The company's commitment to sustainability, environmental stewardship, and community empowerment is evident in its smart streetlight management solution, which is transforming cities nationwide into beacons of progress and environmental consciousness.

TATA PROJECTS
Simplify.Create

TATA

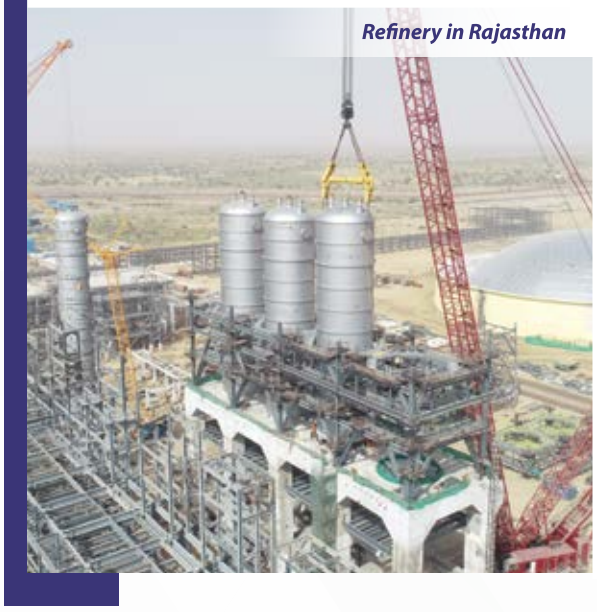
Transforming Lives

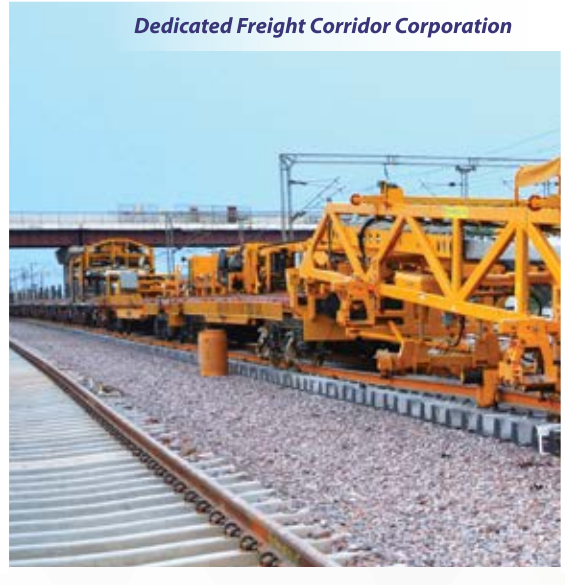

New Trans Harbour Sea Link


New Parliament Building

Strong Foundation for a Strong Nation


Fastest Constructed Airport


Refinery in Rajasthan


Dedicated Freight Corridor Corporation

Building Nation

Implementation Partner

Nashik Smart City :
Tradition Meets Innovation, Redefining Urban Living with Technology

"Nashik Smart City Projects has been a game-changer for our Nashik City, providing a cutting-edge environment that seamlessly blends technology and tradition. The city's commitment to innovation has significantly enhanced our operational efficiency and overall success."

- Nashik Smart City is a Special Purpose Vehicle (SPV) established under Nashik Municipal Corporation (NMC) and is a limited company wholly owned by NMC and State Government of Maharashtra named as “Nashik Municipal Smart City Development Corporation Ltd. (NMSCDCL)
- Nashik Smart city is progressing towards renewable and clean energy sources to embrace sustainable coexistence with nature.
- Nashik Smart city aims to make citizen-friendly and cost effective-increasingly rely on online services to bring about accountability and transparency.

ICCC

STREET LIGHT

SOLAR PANEL

SMART SCHOOL

WTP

GODA PARK

NASHIK MUNICIPAL SMART CITY DEVELOPMENT CORPORATION LIMITED.
Loknete Panditrao Khaire Panchavati Divisional Office, 4th - Floor Makhmalabad Naka
Panchavati, Nashik 422003

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Implementing Smart LED Street Lights across Nashik City - Project Duration : 9 Months Implementation + 7 Years O&M

Summary:
To modernize and improve Nashik city's current street light network, the key aim is to implement an advanced smart infrastructure that will result in significant reductions in both energy consumption and carbon emissions and ensures a Streamlined and Technologically advanced management system for optimal performance and minimal operational disruption.

The scope of work includes a comprehensive process, covering the Design, Development, Manufacturing, Testing, and Supply of Energy-Efficient Luminaires equipped with all necessary accessories and components of the Central Street Lighting Management System.

Below are Existing luminaires replaced by Advance Smart LED Luminaries

Key Highlight of Project:

- Central Management Software
- Advanced Smart LED luminaries
- Web based Energy System
- Current Control Driver Circuit
- Group and Individual dimming
- Remote Communication Ability
- Predictive diagnostics
- Group and Individual dimming
- Energy-Efficient
- No human intervention

Project Details:
This system enables efficient oversight of streetlights through the coordination of FPC and SLC. The luminaires are specifically engineered for rugged service, capable of withstanding operational and environmental conditions encountered during service. They include LED lamps with a current Control Driver Circuit, complete with a mounting bracket suitable for streetlights and high mast lights.

The system entails a Web-Based Central Street Lighting Management Software (CSLMS) for the comprehensive viewing, operation, and management of the lighting system. Initially hosted on a cloud server, the CSLMS is slated for migration to the Smart City Operations Centre (SCOC) the software incorporates a mechanism to track and manage repairs for faulty light fixtures or gateways, enhancing maintenance efficiency.

To replace all Current Conventional and Non-Conventional light fittings with
Advanced Smart LED luminaries featuring specific capabilities. Fixtures with a
wattage of 90 and above must offer Individual On-off Control, Individual Dimming, and Individual Addressing, covering On/Off/Fault, Fault type, voltage, current, wattage, and Power Factor per phase. For fixtures below 90 watts, group On-Off Control and Group dimming are required, while Individual Dimming and optional group/individual addressing are also permissible. This mandate ensures the integration of energy-efficient and technologically advanced LED luminaries with tailored control and monitoring functionalities.
The scope of work includes a comprehensive process, covering the Design, Development, Manufacturing, Testing, and Supply of Energy-Efficient Luminaires equipped with all necessary accessories and components of the Central Street Lighting Management System.

Sr. No.	Existing luminaires	Quantity Replaced by Advance Smart LED luminaries (Nos)
1	Sodium Vapor Lamp	75455
2	Other Fixtures	16559

BIF™
BROADBAND INDIA FORUM
"Think Tank for Digital Transformation"

With Best Compliments For Municipalika - 2023 From Broadband India Forum

- BIF formed in 2015
- An Independent Policy Forum and Think Tank for Digital Transformation
- Working through an apex Executive Council and various Specialist Committees
- Mission of BIF – Proliferation of high quality and affordable broadband to all in the country in a technology-neutral, service- neutral and all-inclusive manner
- Promote, Support and Enhance all policy, regulatory & standards initiatives for the development & enhancement of the entire broadband ecosystem in the country

BIF MEMBERS

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HFCL, inmarsat, interdigital, Microsoft, NOKIA, QuadGen, TCIL, zoom, CEWiT INDIA

BIF functions and creates value through Specialist Committees

- AI & IoT
- Broadband Infrastructure
- Cross Sectoral Digi Infra
- Cyber Security
- Device Ecosystems
- FTTX & IBS
- ICAG (Internet Content, Applications & Governance)
- Committee for Accessibility & Inclusion (PwD)
- Interconnect Exchange
- Manufacturing – Network
- New Technologies
- Online Skill–Based Gaming (OSBG)
- Rural Digital Initiatives
- Satcom
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- Startup & MSME
- Wi-Fi
- Working Group on Academia & Standards

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PAVING THE WAY FOR A **GREENER & BRIGHTER** TOMORROW.

re Sustainability

We are committed to make alternative energy a reliable medium of power for the electricity needs of a fast-growing nation. Through state-of-the-art #WTE facilities, we power the grid of cities with green energy.

5th Generation Waste-to-energy Plants

#1 India's Leading Waste to Energy Service Provider (48 MW of Energy Generation)

Near ZERO emissions and completely odor free operations

World class Command & Control Centre with state-of-the-art DCS with integrated IOT, fuzzy logic & AI solutions

resustainability.com

Natural Smoke Heat Exhaust Ventilator (NSHEV)

Best Practices, Certification, Sustainability through Standardization

Earlier when land was abundant and urbanization was far less to what we have today, we built horizontally, and not tall, also saw restrictions to building tall due to Construction & Building Technology at that time.

Architectural changes over time

With advancements in technology, we now build taller owing also to rapid urbanization, with lack of space in Cities. However, such buildings were predominantly concrete structures with a higher wall to window ratio.

With advancements in Glass and Aluminium Technology we began seeing buildings getting enveloped by this form, which brought a Greener & Quicker way to build with brilliant views to the conventional concrete structures.

With that said, such buildings pose a high risk when it comes to Fire & Life Safety due to its sheer height, occupancy loads, mixed bag of fitouts and, not well thought out Fire Strategy.

In our Region many high-rises, above 15 meters upto super tall scaling, 200 meters and beyond, the facilities to ventilate smoke during a fire emergency are usually not given enough importance, as much as it should be given.

Modern Glass enveloped buildings accompanied by, in many or few cases with ACP can cause a catastrophic combination when it comes to building fires today. In our Region, there is little to no focus on having separate smoke shafts to extract smoke due to which we use Top Hung Open Out Manual Vents which are fitted with Handles. The providers of these system are unaware why they are providing a window with a handle, and many assume it is for Natural Ventilation, which is not the case.

As per Present NBC

Openable panels shall be provided on each floor and shall be spaced not more than 10 m apart measured along the external wall from centre-to-centre of the access openings. Such openings shall be operable at a height between 1.2 m and 1.5 m from the floor, and shall be in

the form of openable panels (fire access panels) of size not less than 1 000 mm × 1 000 mm opening outwards. The wordings, 'FIRE OPENABLE PANEL — OPEN IN CASE OF FIRE, DO NOT OBSTRUCT' of at least 25 mm letter height shall be marked on the internal side. Such panels shall be suitably distributed on each floor based on occupant concentration. These shall not be limited to cubicle areas and shall be also located in common areas/corridors to facilitate access by the building occupants and fire personnel for smoke exhaust in times of distress.

As seen in the present NBC, the occupants and fire officers are deemed responsible to open the vents for smoke extraction in an emergency which is not the right way to place the vents, nor can be expected of an occupant or fire officers to open the vents during an emergency. As seen in the representation, the smoke tends to settle at the person's waist as opening is at low level. In many cases the vents are also too large to be opened by an individual or stuck due to lack of maintenance or handles removed, in highly data secure properties.

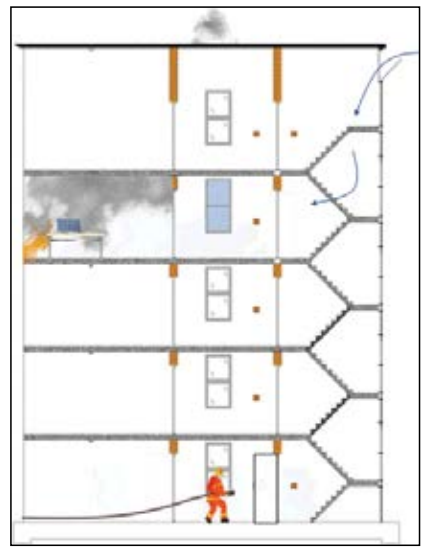
Today we have systems which can Automate these vents in the incipient stages of the fire lifecycle. Products must be tested & certified to EN 12101/ISO 21927 respective clauses & annexes.

For Commercial Glass Façade Buildings,

1. Occupant Areas, - Bottom Hung Open Out placed at close to false ceiling as possible, as that would be the smoke extraction zone. This can be made applicable in Schools.

"By allowing for a smaller shorter vent, giving larger angle of opening, which is to be tested, certified, and standardized, we will lead to a more sustainable solution in smoke ventilation".

2. Lift Lobbies & End of Corridor - Bottom Hung Open Out, or a square shaped Side Hung Open Out, this can be made applicable in Hotels, Schools, and Hospitals.
3. Escape Stair locations, where pressurization or no means of Smoke Ventilation is provided, you must provide Bottom Hung Open Out Vents at Top of Stair. This can be made applicable in Hotels, Schools, and Hospitals.

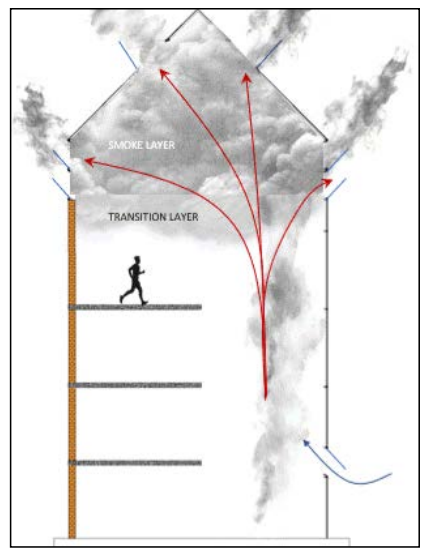


For Large Public Building spaces like Malls, Airports, Railway Stations, these buildings are designed with large open spaces, with double & triple height sections. For such locations,

1. Make-up Air Ventilation on the vertical façade using, low level Top Hung Open Out Vents.
2. Roof smoke extraction units or High-level Façade Vents Bottom Hung Open Out which will automatically open for the smoke to release from the roof area.

Atria Ventilation with Make-up Air Ventilation & Roof or Top of Façade Automatic Extractors

In both the cases explained above, following are to be taken care of when calculating the sizes, amount of opening, and as this system is related to Fire Safety, care also to be taken when considering cable type, sizing, and distances,



1. Size of vent to be shorter and wider, than taller, this will give more angle of opening.
2. No. of Vents based on 2.5% of Floor Area for commercial buildings.
3. No. of Vents based on 3-3.5% of Floor Area for larger public utility buildings.
4. Free Areas, we can only use area of Effective Smoke Release & not Punch Window.
5. Cables - Fire Survival or Fire Rated Low Smoke Copper Armoured.
6. Maintenance schedule & AMCs must be kept in place.

Above are few of the considerations, among others, when designing an Automatic Smoke Ventilation System (ASVS) for any building type. Contact us to specify right.

Considering the varied applications & the cost of implementation being more optimal than Mechanical Extraction, including Maintenance, when done right, combined with on-going trend of Glass Façade Buildings, Automatic Opening Vents (AoVs) is the best solution for early Smoke Extraction for all Glass Façade building in our Region.

IN A FIRE, SMOKE KILLS.

FIRE SAFETY | GIVE OCCUPANTS A FIGHTING CHANCE

EXTRACT SMOKE TO SAVE LIVES.

DON'T TAKE RISKS. TAKE RESPONSIBILITY

Project - Manohar International Airport, GOA (GGIAL)

System 1 - Automatic Roof Vents Fully tested to EN12101-02 - Smoke Ventilation & compatible Control systems

System 2 - Automatic Make-up Air Vents Actuated by SE Controls Actuators and Compatible Control systems

SE CONTROLS

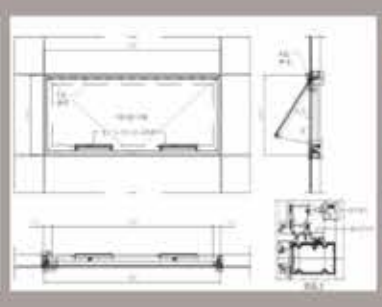
Smoke Ventilation is an integral part of a buildings design for fire safety, without it you compromise the life safety of occupants.

The most common cause of death for fire-related fatalities is asphyxiation by smoke, which is trapped within the environment.

For over 40 years, SE Controls has been developing innovative control systems that automatically open vents in the early stages of a fire to facilitate the extraction of smoke, keeping escape routes and the perimeters of facade clear for the fire service to enter the building and allowing occupants to escape safely.

SE Controls is the trusted global expert in fire safety, facade engineering and product manufacturing, providing bespoke project specific smoke ventilation and controls by partnering with our clients from early stages of the project to system installation, commissioning and testing.

Contact us today for technical tailor made solutions for your facade ventilation needs, as every building is different.


MADE IN BRITAIN

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Creating a healthier & safer environment

UltraTech - A building Solutions Powerhouse

UltraTech is the first choice of engineers and professionals who value quality. In addition to having a pan-India presence, UltraTech has been the cement of choice in some of the country's most major landmark and pride projects. UltraTech Cement is the ultimate destination for all types of building products - from gray cement to white cement, building solutions, and a variety of ready-mix concrete, catering to varied applications and needs.

UltraTech Very Amazing Concrete is engineered for enhanced behavior, composition, performance, and is superior to conventional concrete. It is applicable to a wide range of projects and is designed for typical end applications in projects. With UltraTech's extraordinary capability, customers no longer have to worry about the risks and challenges of conventional practices.

To meet the high demand for more sustainable building materials that provide high-performance physical properties that stand the test of time, presents Enviroplus. A made-to-order product by UltraTech that adds sustainability, by implementing environment-friendly measures, to your constructions. Enviroplus acts as a building partner for construction jobs ranging from foundations, rafts, piles, pavements, retaining walls, buildings, and many more. Enviroplus reinforces Carbon Dioxide reduction by cutting down up to 50% Embodied CO_2 from the concrete.

Apart from enabling environment-friendly construction, our products support in getting green building ratings for sustainable construction by reducing impact on Greenhouse emissions and providing high level of durability. We offer up to 50% embodied carbon dioxide reduction with customised products offering to balance different levels of carbon reduction. Our concrete exhibits excellent workability and consistency of concrete, low porosity and permeability. It is made by using materials like Pulverised fuel ash and granulated slag, designed by expert concrete technologists and is produced in state of the art automatic batching plants.

In the endeavour to provide complete sustainable solutions to customers and to be 360 Degree building material destination, UltraTech Cement has established UltraTech Building Products Division. UltraTech Building Products division manufactures and markets technologically re-engineered products for construction and infrastructure industry. Today the construction industry is demanding products which can replace conventional products as well as conventional methodology for fast track constructions. To meet this challenging demand, it offers a complete portfolio of end-to-end solutions, covering the entire spectrum of construction.

Building Product range includes Tiles Adhesives (TILEFIXO-CT, TILEFIXO-VT, TILEFIXO-NT, and TILEFIXO-YT), Repair Products (MICROKRETE and BASEKRETE), Waterproofing Products (SEAL & DRY, FLEX, HIFLEX, and MYKROFILL), Industrial and Precision Grout (POWERGROUT NS1, NS2, and NS3), Plasters (READIPLAST, SUPER STUCCO), Masonry Products (FIXOBLOCK), Light Weight Autoclaved Aerated Concrete Block (XTRALITE).

UltraTech White Topping was developed to address various critical issues for damaged roads and make city roads safer and pothole-free. In essence, White Topping is a Portland Cement Concrete (PCC) overlay that is constructed on top of an existing bituminous road. This overlay acts as a long-term alternative for the rehabilitation or structural strengthening of roads. Its advantages include prevention of rutting, structural cracks and potholes, which provides a safer and faster commute.

It also improves the structural capacity of existing bitumen pavements. Initial budget is slightly more than bitumen roads but the life-cycle cost is far lower than both bitumen and concrete roads. With a turnaround time of just 14 days, it's much faster than the turnaround time for concrete roads. Improves visibility and commuter safety at night by enhancing light reflectance. This reduces the illumination

load of any road, thus saving energy (20-30%). Reduces pavement deflection, resulting in less vehicular fuel consumption (10-15%) and thus, reduced emissions. Lowers vehicular braking distance, making it safer in both dry and wet surface conditions.

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Light House Projects - Torchbearer for Propagation of Innovative Construction Technologies in the construction sector

Introduction

Urban India is transforming at an unprecedented rate as regards urban renaissance is concerned. Besides, Atal mission for rejuvenation and urban transformation (AMRUT), there are other flagship programmes run by Ministry of Housing & Urban Affairs such as Smart Cities Mission, Swachh Bharat (Urban) Mission, Heritage City Development & Augmentation (HRIDAY) Scheme, Urban Transport & Pradhan Mantri Awas Yojana - Urban (PMAY-U). The PMAY-U has been the landmark in the annals of India history where it is dreamt to provide shelter security to one and all. It is one of the biggest missions ever thought of around the globe with the objective of providing 11.224 million houses. Under the mission, 11.863 million houses has been sanctioned, out of which 11.340 million houses are grounded and 7.761 million houses are completed/delivered to beneficiaries. More than 1.6 million houses are being constructed with emerging construction technologies in various States. It is high time to bring paradigm shift in the traditional construction practices through sustainable technologies which can speed up delivery of quality durable houses. The global pandemic COVID-19 have further accelerated disruption in the construction sector and modularization, standardization, off-site construction, introduction of new and lighter materials, safety and sustainability are going to be new normal in the sector.

The cast-in-place brick by brick construction and RCC beam-column construction are the things of past and are slow track construction practices. Also, it has been realized that these methodologies often offer time & cost overruns and are unsustainable in the long run. The world over, building construction has been shifted from site to the factory where building components partially or fully are manufactured and then transported to the site for their erection, assembly and finishing. This is known as typically precast or prefabricated construction where building components as a whole or in parts are cast in the factory. In addition, there are other options also such as replacing the wall by sandwich panels or creating a customized formwork for the building or manufacturing the entire three-dimensional building in the factory which can be pre-finished or printing the building layer by layer manufacturing at site. Most of these techniques are time-tested and proven and it is high time that we look at these global construction practices and adapt them to suit Indian conditions. These are fast track construction systems with much improved structural & functional performance, better durability, low life-cycle cost, resource-efficient, with minimum wastages, air & land pollution than the cast-in-situ RCC construction.

In order to have an integrated approach for comprehensive technical & financial evaluation of emerging and proven building materials & technologies, their standardization, developing specifications and code of practices, evolving necessary tendering process, capacity building and creating appropriate delivery mechanism, MoHUA set up a Technology Sub-Mission (TSM) under PMAY-U with the Mission statement as 'Sustainable Technological Solutions for Faster and Cost Effective Construction of Houses suiting to Geo-Climatic and Hazard Conditions of the Country'.

Global Housing Technology Challenge - India

To give it further impetus Ministry of Housing and Urban Affairs (MoHUA) conceptualized the Global Housing Technology Challenge – India (GHTC-India) as a platform with which a holistic eco-system can be facilitated so that appropriate technologies from around the world and relevant stakeholders can be catalysed towards effecting a technology transition in the housing and construction sectors of India. The challenges has three components (i) Conduct of a biennial Construction Technology India, Expo-cum-Conference, to provide a platform for all stakeholders to exchange knowledge and business (ii) Identifying Proven Demonstrable Technologies from across the world, and mainstreaming them through field level applications in Light House Projects (LHPs) across India, (iii) Promoting Potential Future Technologies through the establishment of Affordable Sustainable Housing Accelerators-India (ASHA-India) for incubation and accelerator support.

GHTC-India was launched by Hon'ble Minister of State (Independent Charge), MoHUA in January 2019 at New Delhi. Subsequently, Construction Technology India – 2019 (CTI-2019) : Expo-cum-Conference was held at Vigyan Bhawan, New Delhi during 02-03 March, 2019 to bring together multiple stakeholders involved in innovative and alternative housing technologies, for exchange of knowledge and business opportunities and master classes. The Expo was inaugurated by Hon'ble Prime Minister of India.

The applications were invited online globally from prospective technology providers. 54 alternate technologies were shortlisted based on the technical parameters and are being promoted as future technologies for the construction sector. These 54 technologies have been further categorized into 6 broad categories.

A. Precast Concrete Construction System - 3D Precast volumetric (4 Technologies)
B. Precast Concrete Construction System – Precast components assembled at site (8 Technologies)
C. Light Gauge Steel Structural System & Pre-engineered Steel Structural System (16 Technologies)
D. Prefabricated Sandwich Panel System (9 Technologies)
E. Monolithic Concrete Construction (9 Technologies)
F. Stay-in-Place Formwork System (8 Technologies)

Construction of Six Light House Projects under GHTC-India

The proven technologies are being showcased through six Light House Projects (LHPs) being built across six locations namely, Indore, Rajkot, Chennai, Ranchi, Agartala and Lucknow, using distinct technologies from each of the six broad categories. The objectives of the Light House Projects (LHPs) are:

a) Acquisition of innovative and proven housing technology knowhow by State/UTs.
b) Demonstrating and delivering ready to live houses with speed, economy and with better quality of construction in a sustainable manner.
c) To create mass awareness among stakeholders such as State/UT, Urban Local Bodies, technical professionals, builders, development agencies and others on alternate technologies being adopted in respective LHPs.
d) To serve as live laboratories for both faculty and students of IITs/ NITs/ Engineering colleges/ Planning and Architecture colleges, Builders, Professionals of Private and Public sectors.
e) Technical evaluation & documentation of alternate & innovative technology & mainstreaming of the technology.
f) Development of Schedule of Rates (SoRs) for selected proven technologies by CPWD and BMTPC.

The salient features of the LHPs are:

a) LHP, means a model housing project with approximate 1,000 houses built with shortlisted alternate technology suitable to the geo-climatic and hazard conditions of the region. This will demonstrate and deliver ready to live houses with speed, economy and with better quality of construction in a sustainable manner.
b) The minimum size of houses constructed under LHP is in accordance with the prevailing guidelines of the Pradhan Mantri Awas Yojana (Urban).
c) Constructed housing under LHPs include onsite infrastructure development such as internal roads, pathways, common green area, boundary wall, water supply, sewerage, drainage, rain water harvesting, solar lighting, external electrification, etc.
d) Houses under LHPs have been designed keeping in view the dimensional requirements laid down in National Building Code (NBC) 2016 with good aesthetics, proper ventilation, orientation, as required to suit the climatic conditions of the location and adequate storage space, etc.
e) Convergence with other existing centrally sponsored schemes and Missions such as Smart Cities, AMRUT, Swachh Bharat (U), National Urban Livelihood Mission (NULM), Ujjwalla, Ujala, Make in India have been ensured during the designing of LHPs at each site.
f) The structural details have been designed to meet the durability and safety requirements of applicable loads including earthquakes and cyclone and flood as applicable in accordance with the applicable Indian/International standards.
g) Cluster design includes innovative system of water supply, drainage and rain water harvesting, renewable energy sources with special focus on solar energy.
h) The period of construction was 12 months from the date of handing over of sites to the successful bidder after all statutory approvals. Approvals have been accorded through a fast track process by the concerned State/UT Government.

S.No.	Location	DUs, Storeys	Technology
1.	Indore, MP	1024, S+8	Precast Sandwich Panel system (Precast RCC Columns & Beams, Hollow Core Slabs, EPS Cement Sandwich Panel walls)
2.	Rajkot, Gujarat	1144, S+13	Monolithic Concrete Construction (Tunnel Form)
3.	Chennai, Tamil Nadu	1152, G+5	Precast Concrete Construction –Precast components assembled at site
4.	Ranchi, Jharkhand	1008, G+8	Precast concrete construction – 3D Volumetric Construction
5.	Agartala, Tripura	1000, G+6	Light Gauge Steel Structural System & Pre-Engineered Steel Structural System
6.	Lucknow, UP	1040, S+13	Stay-in-Place Formwork System (Steel Structural System, composite decking floor & Stay-in-Place Formwork for walls)

The details of the LHPs are as under:

These LHPs are pilot housing projects which are paving the way for further adaption and use of these innovative technologies in the construction sector. The projects are showcasing construction of ready-to-live houses which are sustainable, cost-effective, resilient and built in much lesser time from the conventional cast-in-situ RCC framed construction. The Light House Projects at Chennai, Rajkot and Indore have been completed & handed over to the beneficiaries by the Hon'ble Prime Minister. The LHPs at Lucknow, Ranchi & Agartala are at advanced stage of completion.

These light house projects is acting as open live laboratories for different aspects of transfer of technologies to field applications. An online drive for Enrolment of TECHNOGRAHIS under GHTC-India: Light House Projects was launched by MoHUA. Technograhis are the Change Agents of innovative and sustainable technologies who will bring about technology transition in the construction sector for its adoption & replication in the country. They will act as Catalysts to Transform the Urban Landscape for New Urban India to full the vision of AatmaNirbhar Bharat. So far more than 35000 Technolograhis have registered for various LHPs. Technograhis are being exposed to the innovative construction technologies through onsite activities to learn different phases of use of innovative technologies in LHPs as well as through offsite Workshops/ Webinars, Webcasting, Mentoring on Technical know-how/Module etc.

The details of innovative technologies used in six Light House Projects are as under:

Light House Project at Chennai, Tamil Nadu

Project Brief:

- No. of Dwelling Units : 1152 Nos. (G+5)
- No. of Block / Tower : 12 Blocks
- Units in each Block / Tower : 96 Nos.
- Technology Used: Precast Concrete Construction System-Precast Components Assembled at Site

Technology Details:

- Precast building components (beams, columns, slabs, staircases, sunshades) are cast in casting yard near site
- Precast components erected sequentially to construct the entire building
- The joints between precast components (i.e. beam-column, beam-slab, column-foundation) are cast-in-situ for structural integrity and monolithic action
- The walls comprise of light weight and environment friendly Autoclaved Aerated Concrete (AAC) Block masonry.
- Internal services are pre planned in sync with precast components
- Minimum use of shuttering and scaffolding materials

About the Precast Concrete Construction System-Precast Components Assembled at Site

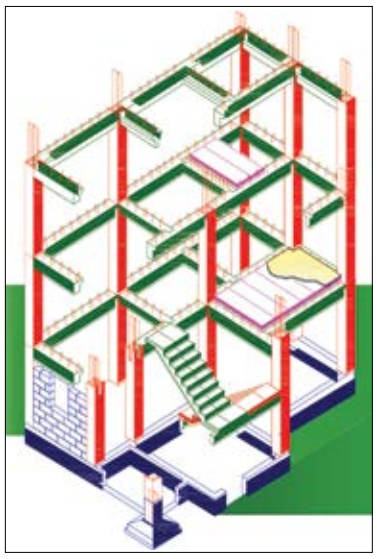

Fig.1: Structural configuration of 3S System

3S system incorporates precast dense reinforced cement concrete hollow core columns, structural RCC shear walls (as per design demand), T/L/Rectangular shaped beams, stairs, floor/roof solid Precast RCC slabs, lintels, parapets and chajjas. AAC blocks are used for partition walls. Hollow core columns are erected above substructure, over which beams are integrated in the column notches followed by erection of slabs. Structural continuity and robustness is achieved through wet jointing using Dowel bars/ continuity reinforcement placed at connections and filling the in-situ self-compacting concrete in hollow cores of columns. All the connections and jointing of various structural framing components is accomplished through insitu self-compacting concrete/ micro concrete/non-shrink grout as per design demand along with secured embedded reinforcement of appropriate diameter, length and configuration to ensure monolithic, continuous, resilient, ductile and durable behavior.

3S Prefab Technology completely eliminates the use of timber and forest produce of any category. On the contrary, use of flyash and GGBS enhances the sustainability. The thermal and acoustic insulation provided by the AAC block masonry, facilitates reduction in energy towards maintaining comfort level temperature within enclosed habitat space. Also, considerable reduction in dead load is achieved due to use of form finish precast components & AAC material resulting into better performance under seismic loads.

All the structural components are pre-engineered and manufactured in factories / site factories with objective quality control resulting into dimensional accuracy, correctness in spacing of reinforcement, uniform protective cover, full maturity of components and assurance on design strength due to use of design mix concrete having minimal water-cement ratio which ultimately results into durable structure.

Fig.2: Beam – Column jointing

Essential Requirements : Precasting yard / factory set up is required with facilities such as Casting Yard, Computerised batching plant, Moulds, Transportation facility, Stacking yard for materials & components, Lifting and loading facility, Laboratory to test raw material & finished products, Water tank of enough holding capacity as required for 2 – 3 days, Service road, etc. Utmost attention is required for process engineering before taking up any field work. Close co-ordination between design crew, field staff and quality crew is essential.

Light House Project at Rajkot, Gujarat

Project Brief:

- No. of Dwelling Units : 1144 Nos. (S+13)
- No. of Block / Tower : 11 Blocks
- Units in each Block / Tower : 104 Nos.
- Technology Used: Monolithic Concrete Construction using Tunnel Formwork

Technology Details:

- Conventional RCC foundation is first laid upto plinth level
- Over the plinth, customized Tunnel formwork, made in the factory, is installed along with reinforcement cage
- Concrete is then poured into the Tunnel formwork to cast monolithically the entire module of the Unit.
- Next day, tunnel formwork is removed and taken to the next floor.
- During installation of the formwork for a floor, the service lines i.e. electrical, plumbing are also installed in the already cut openings.
- Once the structure is finished, finishing items are installed.

Fig.3: Completed Light House Project at Chennai

About the Monolithic Concrete Construction using Tunnel Formwork

Tunnel formwork is customized engineering formwork replacing conventional steel/plywood shuttering system. It is a mechanized system for cellular structures. It is based on two half shells which are placed together

Fig.4: Installation of Tunnel Formwork

to form a room or cell. Several cells make an apartment. With tunnel forms, walls and slab are cast in a single day. The structure is divided into phases. Each phase consists of a section of the structure that will be cast in one day. The phasing is determined by the program and the amount of floor area that can be poured in one day. The formwork is set up for the day's pour in the morning. The reinforcement and services are positioned and concrete is poured in the afternoon. Once reinforcement is placed, concrete for walls and slabs shall be poured in one single operation. The formwork is stripped the early morning next day and positioned for the subsequent phases.

Fig.5: Concreting

The on-site implementation of 24 hour cycle is divided into following operations.

1. Stripping of the formwork from the previous day.
2. Positioning of the formwork for the current day's phase, with the installation of mechanical, electrical and plumbing services.
3. Installation of reinforcement in the walls and slabs.
4. Concreting and if necessary, the heating equipment.

The types of Formwork System are given below:

i. Modular Tunnelform

Tunnel forms are room size formworks that allow walls and floors to be caste in a single pour. With multiple forms, the entire floor of a building can be done in a single pour. Tunnel forms require sufficient space exterior to the building for the entire form to be slipped out and lifted up to the next level.

This Tunnelform consists of inverted L-shaped half tunnels (one vertical panel and one horizontal panel) joined together to create a tunnel. Articulated struts brace the horizontal and vertical panels. These struts enable the adjustment of the horizontal level of the slab and simplify the stripping of the formwork. The vertical panel is equipped with adjustable jacking devices and a triangular stability system. Both devices are on wheels.

A range of spans is possible by altering the additional horizontal infill panel's dimensions. Due to the distribution of the horizontal beams on the vertical plank, the formwork also cast staggers and offsets in the layout of the walls as well as differing wall thicknesses. The half-tunnels shall be equipped with back panels to cast prependicular shear walls or corridor walls. Assembly and levelling devices ensure that the formwork surfaces are completely plumbed and levelled.

ii. Wallforms

Wallforms are temporary moulds in which concrete is poured in order to build a structure. Once the concrete is poured into the formwork and has set, the formwork is stripped to expose perfect finished concrete. These

Fig.6: Tunnelform placing and casting of concrete

forms constitute a system approach for construction and are particularly suited to build structural walls, columns, bridge piers, culverts etc. This system adopts well to daily work-phase of both repetitive and non-repetitive tasks. The equipment used each day is productive and is reused in subsequent phases. The four daily operations which outlines the daily production cycle for wall form equipment are identical to those for Tunnel form equipment with the exception that it is solely used for casting concrete walls. The slabs are cast as a secondary phase. The existing equipment can be adapted on a day-to-day basis by the addition of standard elements and corner-wall formwork to take into account different wall configurations on site. All safety and stability devices shall be fully integrated into the standard version of Wallform equipment.

These Wallforms are tools specially designed to be used on specific buildings and structures. This vertical wallform panel is a multi-purpose formwork system. This system has been designed and developed to

Fig.7: Completed Light House Project at Rajkot

ensure that it is simple and quick to assemble and position the following:

- A full range of standard dimensioned components
- Multiple combination of panels for simple adoption to specific configurations
- Basic standard equipment incorporates complete safety, circulation and stability equipment
- Caliper–device opposing Wallform packages are craned into position in one lift.

Light House Project at Indore, Madhya Pradesh

Project Brief:

- No. of Dwelling Units : 1024 Nos. (S+8)
- No. of Block / Tower : 8 Blocks
- Units in each Block / Tower : 128 Nos.
- Technology Used: Prefabricated Sandwich Panel System with Pre-Engineered Steel Structural System

Technology Details:

- Over RCC foundation up to plinth level hot rolled steel columns and beams are erected, aligned and assembled to form structural skeleton frame
- Subsequently, deck slabs are laid with in-situ concrete screed for floors
- The factory-made Rising EPS Cement Panels are erected as wall panels. These are sandwich panels having light weight concrete core with thin cement fibre board as outer faces.
- While laying walls the service lines i.e. electrical, plumbing are also installed in the already cut openings
- Once the structure is finished, finishing items are installed.

About the Prefabricated Sandwich Panel System with Pre-Engineered Steel Structural System

These are lightweight composite wall, floor and roof sandwich panels made of thin fiber cement/calcium silicate board as face covered boards and the core material is EPS granule balls, adhesive, cement, sand, flyash and other bonding materials in mortar form.

The core material in slurry state is pushed under pressure into preset molds. Once set, it shall be moved for curing and ready for use with RCC or steel support structure beams and columns. These panels are primarily used as walling material but can also be used as floor and roof panels. These are non-load bearing panels to be used with structural support frame only. However, if used in G+1 structure, these can be used as load bearing panels.

Size and Type of Panels

Size : Panels are normally produced in sizes and dimensions as given below:

Length : 2440 mm (may be increased up to 3000 mm)

Width : 610 mm (may be altered as per requirement but should not be too wide since handling of the panels become difficult)

Thickness : 50-250 mm. Dimensions are shown in Fig. 1.

Panels are produced in 4 types i.e. Pole holes, Solid heart, Rod holes and Block hole. These four types of panels have different applications depending on the requirements e.g. Solid heart should be used as walling material in any type of construction and pole, rod and block hole may be used where different types of inserts are used like iron rods or wires for security etc.

Fig.8: Placement of Prefabricated Sandwich Panels in Steel Structure Frame

In steel structure frame, panels can be fixed with either with steel clips or U type channels to hold the panels with the structure. Clips should be welded with the frame pillars or beams to hold the clips / U cannel firmly with the pillars /beans and floor. Then only the panels should be inserted into the U channels. There after PU glue should be applied to hold the panels firmly. The thickness of the panels shall determine the size of U channel. After installation of the panels in both the above systems, all gaps should be checked and filled with additives, PU and cement mixers and later thin putty should be applied to give uniform smooth surface ready for paint.

Light House Project at Lucknow, Uttar Pradesh

Project Brief:

- No. of Dwelling Units : 1040 Nos. (S+13)
- No. of Block / Tower : 4 Blocks
- Units in each Block / Tower : A(494), B(130), C(208) & D(208)
- Technology Used: Stay in-place PVC Formwork with Pre-Engineered Steel Structural System

Technology Details:

- Over the RCC foundation up to plinth level factory-made hot rolled steel columns and beams are erected, aligned and assembled to form structural skeleton frame
- Subsequently, deck slabs are laid with in-situ concrete screed for floors
- The pre-finished PVC wall forms are then erected and filled with light weight concrete to construct walls
- While laying walls the service lines i.e. electrical, plumbing are also installed
- Once the structure is finished, finishing items are installed

About the Stay in-place PVC Formwork with Pre-Engineered Steel Structural System

Fig.11: Completed buildings of Light House Project at Lucknow

The rigid poly-vinyl chloride (PVC) based form work system serve as a permanent stay-in-place durable finished form-work for concrete walls. The extruded components slide and interlock together to create continuous formwork with the two faces of the wall connected together by continuous web members forming hollow rectangular components. The web members are punched with oval-shaped cores to allow easy flow of the poured concrete between the components. The hollow Novel Wall components are erected and filled with concrete, in situ, to provide a monolithic concrete wall with enhanced curing capacity due to water entrapment, as the polymer encasement does not allow the concrete to dry prematurely with only the top surface of the wall being exposed to potential drying. The polymer encasement provides crack control vertically and horizontally for the concrete, and provides vertical tension reinforcement thus increasing the structural strength of the wall. The resulting system is unique and provides substantial advantages in terms of structural strength, durability enhancement, weather resistance, seismic resistance, design flexibility, and ease of construction. Steel dowels are necessary to anchor the wall to the concrete foundation.

This System is suitable for residential and commercial buildings of any height from low rise to high rise. In order to achieve speedier construction, strength and resource efficiency, the composite structure with Pre-Engineered Steel Structural System as structural members is being used in the present project.

Fig.10: Placement of PVC Wall Form Panels in Steel Structure Frame

Size of Panels

PVC Wall Forms have been developed in various cross-sectional sizes as per project requirement. The common sizes are 64mm, 126mm, 166mm & 206mm.

- N64 walls are erected individually and not preassembled, except for headers and sills.
- Pre-assembled walls sections are used for walls over 4300 mm (14') high
- The height of walls made with the Formwork vary according to the requirement.
- N126 walls less than 4300 mm (14') high are erected individually except for walls of unique projects and for headers and sills.

Manufacturing Process in the Plant

The formwork Components are manufactured from extruded polyvinyl chloride (PVC). The extrusions consist of two layers, the substrate (inner) and Modifier (outer). The two layers are co- extruded during the manufacturing process to create a solid profile. The raw material is fed into the screw barrels of the extruders & heated in the barrels to molten form, where the temperature is electronically controlled. The extruded profile is cut to designed length, labelling of the components takes place in the coring, cutting, foaming or assembly areas, and the stay in place sections are ready to move for erection at site.

Light House Project at Ranchi, Jharkhand

Project Brief:

- No. of Dwelling Units : 1008 Nos. (G+8)
- No. of Block / Tower : 7 Blocks
- Units in each Block / Tower : 144 Nos.
- Technology Used: Precast Concrete Construction System – 3D Volumetric

Technology Details:

- The building units are manufactured like Lego blocks in the casting yard in complete form including finishes
- These blocks are then transported, aligned and erected over the already laid RCC foundation to construct the entire structure
- These building units are also finished with services in the casting yard
- The building units are connected horizontally and vertically with proper jointing arrangements using base-plates, mechanical fasteners, nut bolts and concrete grouting.

About the Precast Concrete Construction System – 3D Volumetric

An already established System for building construction in Europe, Singapore, Japan & Australia, this 3D Volumetric concrete construction is the modern method of building by which solid precast concrete structural modules like room, toilet, kitchen, bathroom, stairs etc. & any combination of these are cast monolithically in Plant or Casting yard in a controlled condition. These Modules termed as MagicPods are transported, erected & installed using cranes and push-pull

Fig.9: Completed Light House Project at Indore

Fig.14: Finishing work in progress at Light House Project, Ranchi

jacks and are integrated together in the form of complete building unit. Subject to the hoisting capacity, building of any height can be constructed using the technology.

Manufacturing process of the Building Modules/ MagicPods

- 3D Steel moulds are created as suiting to various sizes of building Units
- High strength steel as per the structural design is placed inside 3D moulds
- Electrical and plumbing lines are set up. Block outs for doors and windows are also set up at the same time.
- The pods are cast into their final shape using high-performance concrete.
- Stringent quality checks is taken for each pod before they are packed for shipping, which ensures that the construction project adheres to strict quality standards.
- The pods are then loaded and shipped. Care is taken to ensure that the shipping is done as per the sequence of erection at the site.

Fig.12: Placement of MagicPods

Construction & Installation Process

Sequential construction in the project here begins with keeping the designed foundation of the building ready, while manufacturing of precast concrete structural modules are taking place at the factory. Factory finished building units/modules are then installed at the site with the help of tower cranes. Gable end walls are positioned to terminate the sides of building. Pre stressed slabs are then installed as flooring elements. Rebar mesh is finally placed for structural screed thereby connecting all the elements together. Consecutive floors are built in similar manner to complete the structure.

Light House Project at Agartala, Tripura

Project Brief:

- No. of Dwelling Units : 1000 Nos. (G+6)
- No. of Block / Tower : 7 Blocks
- Units in each Block / Tower : A(112), B(154), C(118), D(168), E(168), F(168) & G(112)
- Technology Used: Light Gauge Steel Framed (LGSF) System with Pre-engineered Steel Structural System

Technology Details:

- Over the RCC foundation up to plinth level hot rolled steel columns and beams are erected, aligned and assembled to form structural skeleton frame. Subsequently, deck slabs are laid with in-situ concrete screed for floors.
- The factory-made Light Gauge Steel Panels (cold formed steel panels) are then erected to form wall panel and connected with the structural frame using self-driven metal screws.
- The Light Gauge wall panels are later covered with thin precast concrete panels (which are cast at site), and the hollow space between the panels is filled with light weight concrete.
- While laying walls, the service lines i.e. electrical, plumbing are also installed
- Once the structure is finished, finishing items are installed.

About the Light Gauge Steel Framed (LGSF) System with Pre-engineered Steel Structural System

Light Gauge Steel Framed Structure with Infill Concrete Panels (LGSFS-ICP) Technology is an innovative emerging building and construction technology using factory made Light Gauge Steel Framed Structure (LGSFS), light weight concrete and precast panels. The LGS frame is a "C" cross-section with built in notch, dimpling, slots, service holes etc. produced by computerized roll forming machine. These frames are assembled using metal screws to form into LGSF wall and roof structures of a building. Provisions for doors, windows, ventilators and other cutouts as required are incorporated in the LGSFS.

The LGS frames are manufactured in a factory and assembled in to LGSF wall structures and then transported to the construction site and erected wall by wall on a pre-built concrete floor as per the floor plan of the building. Steel reinforced concrete panels of size 800mm X300mm X20mm thick are manufactured at factory and transported to site. These panels are fixed on either side of the LGSFS wall using self-drilling/tapping screws to act as outer and inner faces of the wall leaving a gap between them. This gap is then filled with light weight concrete using a special mixing and pumping machine. Electrical and plumbing pipes/conduits are provided in the service holes of the LGSFS before concreting is done. Self-compacting concrete is mixed and pumped into the gaps between two panels. The concrete flows and fills the gap and provides adequate cover to the LGS frames and joints. The concrete shall also adhere to the concrete panels. After curing, LGSFS with in-fill concrete and panels (LGSFS-ICP) forms a monolithic sandwich composite wall structure with thermal and sound insulation properties.

The roof structure of LGSFS-ICP building is constructed using metal/plastic formwork system with steel reinforced concrete as per structural design. Standard procedures are employed to concrete the roof slab. After curing for 96 h, the formwork is demoulded and the wall and roof are putty finished. Door and window frames are fixed to the LGS frames and shutters fixed with necessary accessories. Finishing work such as laying floor tiles, fixing electrical and sanitary fixtures and painting is carried out using standard conventional

Fig.15: Placement of LGS frames in Steel Structure System

Fig.13: Placement of Walls

methods.

After completion of ground floor, first, second and third floors of the building is constructed using the same procedure that of the ground floor. The staircase, chajja and parapet walls of the building are also constructed using LGSFS-ICP Technology.

Epilogue

The Ministry of Housing & Urban Affair and BMTPC have been advocating use of fast track construction technologies for housing and it is more apt now since India is committed to climate change mitigation, reduction of carbon foot print, resource-efficient & environment-responsive clean technologies. Introduction of the identified construction systems will bring not only paradigm shift in construction sector but also bring cost-effective systems, better environment, enhanced building marketability, reduced liability, improved health & productivity, low life cycle cost. Already, a sizeable number of companies have set up plants for manufacturing customized building components in India. It is required to give them little push/ incentive and create an enabling eco-system which facilitates use of these systems through our procurement methodologies. The day is not far when India will start manufacturing buildings.

Fig.16: Placement of Precast Concrete Panels filled with Light Weight Concrete in LGS frames

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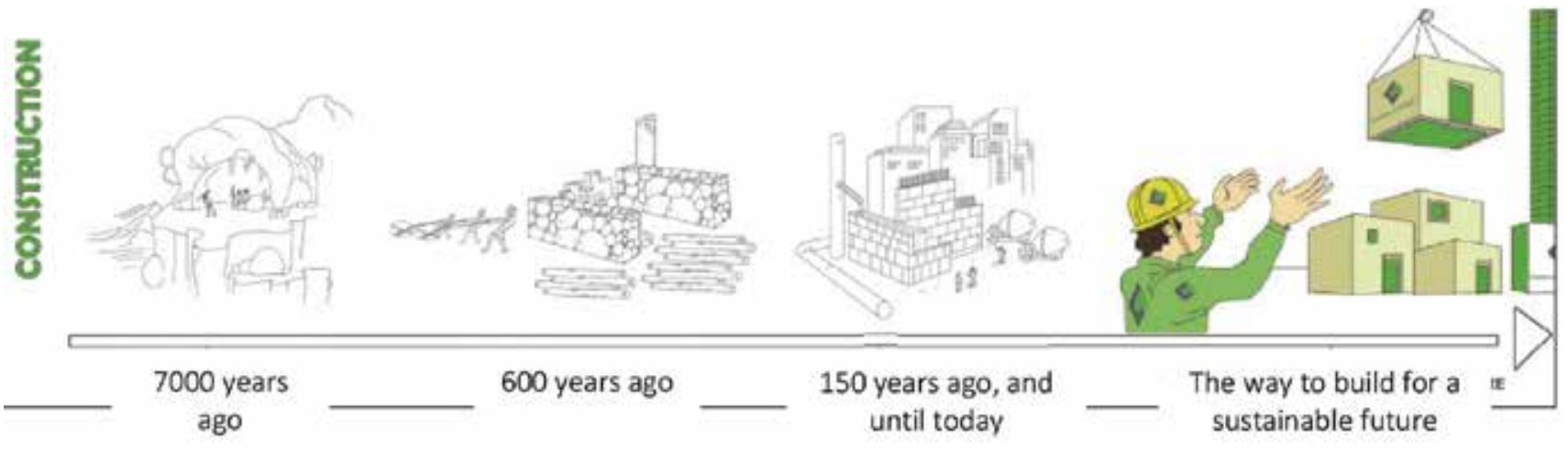
The 3D Monolithic Volumetric Precast

EVOLUTION OF THE CONSTRUCTION INDUSTRY

Unlike other industries, the Construction Industry has been stagnant and slow to adopt new technologies and has never undergone a major transformation. As a result, productivity has stagnated over the years, or in some cases, even declined. The image below depicts the evolution of the Construction Industry



The construction industry is buoyed by predicted growth and expansion, however, it continues to underperform in four strategic areas: Productivity, Certainty in Delivery, Skills Shortage, and Data Transparency. Poor productivity and project uncertainty can be countered by introducing technology into construction. The right technology would ensure reduction in the project development cycle and reduction in labour.

Construction Industry Globally

Smaller but advanced countries like Singapore as well as larger but thinly populated continents like Australia have been developing and deploying construction technologies and methodologies for decades. These have been tried, tested and proven, and can be the solution to the challenges faced in housing for the billion+ Indians.

Construction of the built environment has continually been adopting “increasing levels of manufacturing” as the solution to address the challenges relating to:

1. Speed of Construction
2. Quality of Construction
3. Reduction in Wastage
4. Productivity in Construction
5. Dwindling number of Construction Workers/ Labourers
6. Health Safety and Environment Issues of Construction
7. Efficiency of Resources in Construction

The chart below summarizes the decades long path from material-based construction to the current manufacturing of buildings as modules, assembling them into pre-finished transportable Volumetric Modules for installation as Built Environment.

Indian Construction Industry

The surging construction activity in Infrastructure and Buildings coupled with rapidly diminishing labour pool has already pushed the leading players to adopt mechanized and precast methods of construction, be it for bridges or flyovers or metros or even roads, canals, waterlines, airports, seaports et al.

Formwork-based cast-insitu construction while accelerating the speed of building has also increased demand of skilled labour, and safety issues of handling the formwork at increasing height by the multitude of workers.

In July 2017, the Prime Minister of India also directed the use of 3D Technology to speed up housing construction in India. India needs the highest number of houses of possibly at the lowest price point and also in the shortest timeframe.

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India has increasingly been adopting different levels of machine-driven construction. The cast-insitu construction using conventional and newer formworks is being replaced by offsite manufacturing / precast of the elements of the built environment as 2D or planar elements. As shown in the diagram above, India by doing this would still be stuck in Stage 3 of the construction evolution.

Stage 3 of construction should be by manufacturing the houses not as components, not as just 2D elements but as modules that deliver a room or more from each precast as 3-Dimensional Monolithic Modular Volumetric Precast.

Construction Methods Currently Prevalent in India

Indian construction activity has increasingly been moving away from conventional column, beam, slab-based construction to formwork-based cast insitu shear wall construction during the past decade. The newer types of skills required to efficiently execute the formwork-based construction be it with MIVAN or with ALUFORM or with JUMPFORM or with TUNNEL FORM have all been struggling to cope with the rapidly diminishing quantity of construction workers and more so by the miniscule of fitters and formwork handling workforce.

2D Precast

A spurt in Affordable and other Social Housing requirements have led to the developers establishing their own 2D Precast Panel Production facilities as captive plants in Delhi, NCR, Bangalore and a few other cities.

Third Party manufacturers of 2D Precast Panels in the offsite factories are transporting a multitude of panels to building sites and erecting them with equipment and a large number of installation crew in Bangalore, Hyderabad, Vizag, Gurgaon, Mumbai, Pune etc.

Most of these 2D plants are designed and configured to Precast Columns, Beams, Hollow Core or Solid Slabs and Wall Panels as disparate elements in the dimensions of Commercial, Retail and Institutional Buildings as well as Multi Level Car Parking facilities.

However, offsite production of 2D elements, their transportation to building sites, erecting them, aligning them for plum and level, jointing the multiple pieces to secure the targeted strength and shape, and sealing the numerous joints, etc, still pose significant and critical challenges when it comes to building apartments or individual houses. Because of the fragmented nature of manufacturing in the 2D Precast panels, the installation of services like plumbing, electrical wiring, air-conditioning etc. pose additional constraints and are not able to shrink the timelines of construction.

Grinding the misalignments between panels as well as treating the numerous joints between the columns, wall panels, slab panels and beams is also tedious and demands skilled workforce, expensive material like grouts and PU sealants, but still remain vulnerable to leakages and seepages since these are not made as monolithic.

3D Monolithic Modular Volumetric Precast

3D Modular Volumetric Precast (Onsite / Offsite) construction is an alternative to this current construction status-quo by promising transformative improvements in Time, Cost, Quality, Health and Safety. And most importantly, it offers predictability.

The 3D Monolithic Volumetric Precast eliminates the problems inherent in 2D Panel-based construction, and employs the least possible number of qualified engineers and trained technicians without leaving the construction to unskilled labour.

3D Monolithic Volumetric construction (also known as modular construction) involves production of three-dimensional modular units in controlled factory conditions prior to transportation to site. Modules can be brought to site either as a basic structure or with all internal and external finishes and services installed, and ready for assembly.

This unique method of construction offers the inherent benefits of concrete such as thermal mass, sound and fire resistance, as well as factory quality and accuracy, together with speed of erection on-site.

The 3D Volumetric Construction offers schedule benefits as most of the activities are undertaken away from the building site with minimal work at the building site. This enables taking some activities off the critical path and bringing certainty in the delivery of the project.

Key Advantages of Modular Construction

- Achieves superior quality through factory-based quality control
- Standardized design details for modular buildings simplify and reduce need for continued design inputs
- Reduced site labour: erection and finishing teams that install and complete modular buildings involve less workers on site than conventional buildings or 2D Precast
- Improved site productivity
- Reduced wastage during manufacture and on-site installation
- Greater reliability and quality as it is a monolithic structure with no, or minimal vertical joints
- Greater certainty of completion on time and on budget
- Modular construction sites have proved to be significantly safer than conventional construction methods.

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3DMVP Process

This technology is unlike the conventional and 2D Precast methods and is cast complete with window and door frames, electrical and plumbing conduits already inlaid. A brief write-up of the process is illustrated below:

- The modules casts five sides in a single pour, or a three-dimensional shape creating a pre-designed shaped room or multiple rooms.
- The moulds are customizable during the modules' design process. All openings - doors and windows, access points—piping and conduit and insulation are designed into the mould.
- Building all the features into the mould's design reduces project turnaround time and costs.
- The openings for Windows, doors and so precise that they can be ordered straight from the drawings.
- The first fix MEP is installed at the time of casting thus reducing the time and labour required for chasing the walls, fixing the conduits and plastering the walls.
- This method is replicated and the modules are fitted together—side-by-side or atop of each other. This allows the roof of the first module to become the floor of the second module as they are vertically stacked, similar to Lego blocks or bricks. This ability to fit the modules together reduces construction time.

MOULD
Remote Operated Fully Automated 3D Mould

REINFORCEMENT CAGE
3D Re-bar Cage lowered in the Mould

CONCRETE POUR
M40 grade concrete poured after all conduits are in place

DEMOULDING
Modulle demoulded after about 12 hours from concrete pour

TRANSPORTATION
Modules transported from Casting site to Intallation site on regular 40 F trailer

INSTALLATION
Modules installed using a Hydraulic Crane

COMPLETE BUUILDING IN 23 DAYS
G+4 storey building casting and installation

India's first 3DMVP Project

The application of the 3DMVP technology was developed and optimized to meet the demands of Indian Market. In addition, recruitment and training of the Engineers in 3DMVP, its transportation and installation was undertaken. Armed with the above and with the personal presence and guidance of the technology owner from Australia, construction of a Pilot Building for Tata Housing was undertaken with 3DMVP.

A five-storey building with 20 apartments was manufactured and installed in 33 working days.

The images of the Casting, Transportation and Installation of the Tata's Boisar Project is presented here:

For further details, please contact:
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Casting & Stacking of Modules in the Casting Yard

Transportation of Modules to Installation Site

Installation at Site

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