

# Steel SCENARIO

A JOURNAL ON FERROUS AND ALLIED SECTORS



INFRABUILD 2022

## Sustainable Infrastructure: Building the Nation Greener

October 2022

### Improved Safety Via Accident Prevention Module:

- Lining Thickness & Health Detection System
- Online Bottom Earth leakage Detection System (ON-BELD)



GREEN FURNACE



Scan to know more on  
JSW Cement Sustainability

# World's #1 eco-friendly cement company

## Net Scope-1 Emissions Intensity Comparison



Source: GCCA GNR Data 2019 - <https://gccassociation.org/gnr/>  
Externally verified GHG statement

\*Year 2019  
\*\*Year 2020-21

The content of this advert is based on the reports by GCCA GNR Data 2019 and externally verified, which can be viewed on [gccassociation.org/gnr/](https://gccassociation.org/gnr/). While efforts are made to keep the information in this advertisement accurate and timely, the same should not be construed as fact. The contents of this advertisement are subject to change without notice.

**SECTION: EDITORIAL**

Aspirations for Sustainable Infra Development 2

**SECTION : SEMINAR**

INFRABUILD 2022 seeks to search sustainable solutions to key Infra issues 3  
By Ritwik Mukherjee

**SECTION : INFRABUILD 2022**

SNAPSHOTS 6

**SECTION : ARTICLE**

Better today Stronger tomorrow 8  
By JSW Steel

Tata Steel has presence in Indian Construction Industry across multiple segments through wide range of products and solution 13  
By Tata Structura

JSW Sustainable Products for Strong, Durable, Sustainable & Green Concrete Construction 19  
By JSW Cement

Journey of Tiscon reinforcement related products 26  
By Tata Tiscon

Blue-Green Infrastructure: Key to Sustainable Urbanisation 35  
By SERC Bureau

**SECTION : REPORT**

Financing Green Urban Infrastructure 44  
By SERC Bureau

BSE Sufi Steel Billets Futures - The perfect hedge for all Steel Variants 47  
By Shri Sameer Patil, Chief Business Officer, BSE

**SECTION : DATA BANK**

Steel Market Price 48

**Founder Chief Editor**

Late Dr. Monoj Chatterjee

**Editor & Publisher**

Sakuntala Chatterjee Chanda

**Content & Marketing Executive**

Joyanta Mani

**Accounts & Admin**

Gobinda Roy

**Design & Layout**

SERC

**Representative in Bangladesh**

Rifat Mahmood

+88-01911394324

serc.events@gmail.com

**EDITORIAL ADVISORY BOARD**

- ▲ Dr. Narendra Kumar Nanda, M.Tech, Ph.D
- ▲ Sushim Banerjee, Director & CEO (Hony.), IIS SSC
- ▲ Nirmal Chand Mathur, Stainless Steel Expert
- ▲ Dr. Shoeb Ahmed, Ex-Director Commercial - Steel Authority of India Limited
- ▲ Pritish Kumar Sen, Ex-Tata Steel
- ▲ Debashish Dutta, Ex-General Manager - Institute of Steel Development & Growth
- ▲ Ishwar Chandra Sahu, Ex-Executive Director I/c SAIL, IISCO Burnpur
- ▲ Rakesh Kumar Singhal, Consultant - Steel Research Technology Mission of India
- ▲ Abhijeet Sinha, National Program Director- ASSAR
- ▲ Divya Kush, President of The Indian Institute of Architects Member (Alt.), Council of Union of International Architects
- ▲ Rajesh Nath, Managing Director, VDMA India
- ▲ Nikunj Turakhia- President, Steel Users Federation of India
- ▲ Sanat Bhaumik, Director - Sales & Marketing, Steel Plantech India Private Ltd.

**Spark Economy Research Centre**

46CD, Binodini Bhavan, Sammillani Park, East Rajapur, Santoshpur, Kolkata - 700075  
Email: info@steelscenario.com / editor@steelscenario.com | Web: www.serc.org.in

**ATTENTION SUBSCRIBERS**

Any complain of non-receipt of journal should reach 'Steel Scenario' office at Kolkata latest within a month of publication.

- Publisher

Printed and Published by Ms. Sakuntala C. Chanda on behalf of Spark Economy Research Centre at SERC.

The views and data given by the authors are their own and Steel Scenario Journal is not responsible for their authenticity



Sakuntala, Editor & Publisher

## Aspirations for Sustainable Infra Development

Infrastructure forms the backbone of a functioning society. From connectivity to migration to climate change, infrastructure touches every aspect of human life. Infrastructure affects 92% of targets across all the Sustainable Development Goals. It connects populations with education and job opportunities. It drives economic growth and job creation. And it can help to reduce inequality and extend an inclusive societal development.

Rooted in the belief that infrastructure is more than just roads and buildings, we view infrastructure as an interconnected system that together has great potential to drive progress towards the global goals.

Steel Scenario has been taking the initiative with its partners to plan, design, construct, and maintain a wide range of sustainable, resilient, and inclusive infrastructure solutions across the country. Across the country, it is possible that by enhancing transportation, renewable energy, and infrastructure, we can suggest to the governments in state and central various ways to make infrastructure more effective. Together, we can help improve the outcomes of investments in

infrastructure – making a positive impact for years to come.

India plans to spend US\$ 1.4 trillion on infrastructure through the 'National Infrastructure Pipeline' in the next five years. In FY21, infrastructure activities accounted for 13% of the total FDI inflows of US\$ 81.72 billion. India will need to construct 43,000 houses every day until 2022 to achieve the vision of all for all by 2022. Hundreds of new cities need to be developed. India's cities will account for nearly 40% of our population by 2030. India will have 68 cities with a population of more than 1 million; up from 42 today. India's required annual spending on infrastructure will touch 7-8% of its GDP.

challenges in climate and sustainability. India ranks third, after the US and China, among the top 15 CO2 emitting nations. Even though India ranks 3rd among the top 10 countries in the LEED Green Building rankings, only around 87 million sq. ft. commercial space in India is LEED certified, consisting of 19% LEED Platinum, 63% LEED Gold and 16% LEED Silver certifications. By 2030, residential real estate has

the potential to almost double from the current stock of **1.5 million units** in key cities. By 2030, the number of households will touch **386 million** and almost 40% of Indians will be urban residents.

Cold storage is expected to add an incremental of **~10 million tonnes** by 2023; potential to almost double from its existing capacity of 37-39 MT. Improving connectivity-upcoming infrastructure initiatives in India are the key features of infrastructure development in a sustainable manner to keep Co2 emissions at a minimum. In urban areas, exposure to climate and geophysical hazards, such as earthquakes and volcanic eruptions, is already widespread across Asia and the Pacific.

**It is time governments consider the direct and indirect benefits of resilient infrastructure, including losses avoided and economic and development benefits even when disaster doesn't strike.** For Asia and the Pacific to achieve their sustainable development aspirations, it's time to rethink the current approach to infrastructure. The unfortunate incident in Gujarat, along with many across the country, where we have lost lives and limbs due to the disintegration of infrastructure. This is totally unacceptable.

Integrating disaster and climate resilience into infrastructure planning enables decision makers to take a broader view of how disaster risk and climate change will affect future infrastructure needs. For Asia and the Pacific to achieve their sustainable development aspirations, it's time to rethink the current approach to infrastructure. This requires greater consideration of the direct and indirect benefits of resilient infrastructure in planning and investment decisions, factoring in avoided losses after a disaster, as well as economic and development co-benefits that occur in the absence of a disaster.

Industries across the world are talking about sustainable initiatives, whereas the Indian real estate industry is yet to grasp how green buildings can positively affect the value of their properties. While India is slowly beginning to resume its economic activities, many developers see this as an opportunity to shift their design and development strategies.

As per industry estimates, for new buildings, India's green building market is projected to be in the range of US\$ 30 Billion to US\$ 40 Billion. Almost three-fourths of the buildings to be constructed in India by 2030 are yet to be built. The tangible benefits from green building projects might not be easily recognisable, but they pay off only if you have a long-term perspective.

Through this issue, we will try to highlight the need to advance practical and risk-informed solutions to strengthen resilience across the infrastructure cycle, from planning and designing, to financing, operation and maintenance, and scalability. There is a clear gap between the 'global' case for resilient infrastructure and the realities at the local level. Insufficient data and a limited understanding of current and future risk can result in an under-investment in resilience, where higher capital or operational costs are perceived to exceed the intangible, long-term, and uncertain benefits of infrastructure that is resilient to disasters. Enhanced decision making requires more spatially granular information on risk, accounting for future demographic, economic, and climate scenarios, and expressed in relevant socio-economic terms.

“ It is time governments consider the direct and indirect benefits of resilient infrastructure, including losses avoided and economic and development benefits even when disaster doesn't strike. ”

S. Chanda

Sakuntala Chanda

# INFRABUILD 2022 seeks to search sustainable solutions to key Infra issues

By Ritwik Mukherjee

It was a search for the right linkages between sustainable urbanisation and rural infrastructure and a search for right infrastructure options that will have substantial impact on the society. The recent INFRABUILD 2022 Summit in Kolkata advocated the need for promoting sustainable infrastructure development in more ways than one, which in turn, will contribute to achieving the overall Sustainable Development Goals (SDGs) by simultaneously ensuring inclusive growth, climate-friendliness, environmental consciousness and social sustainability.

There is no doubt that the government -be it at the Centre or at the state levels -has a critical role to play in all these, other stakeholders like private players from across industry will have an equally important role.

Consider these.

The Mamata Banerjee-led West Bengal government is in the process of introducing stricter pollution norms for vehicles and may raise penalty limits by one and half time for failing to comply with the pollution norms, said West Bengal transport minister, Snehashis Chakraborty. Significantly, Kolkata is the second most polluted city in the world, according to a recent report of HEI SoGA, second after the national capital Delhi. In the report, based on the quantity of PM2.5 and nitrogen dioxide in the air, it has been said that population congestion in these two cities has been the major contributing factor behind India's two top cities figuring in this negative-quality list. Besides population there are other factors contributing to this high air pollution rate in Kolkata, the foremost of which is the automobile fuel emission, which contributes 60 per cent to the pollution.

"This is not to harass the passengers and car owners. But there will be zero compromise on aspects of environment and pollution. We need to turn the city and the state into a pollution free city and state. There are no two ways about it," said the minister, while speaking at INFRABUILD 2022, an interactive session on: "Sustainable Infrastructure: Building the Nation Greener" organised by Spark Economy Research Centre in Kolkata.

Admitting that automobile fuel emission continues to

be the most dominant factor in this high rate of air pollution in the city besides population congestion, Chakraborty said that the Bengal government under the stewardship of Mamata Banerjee had set more precedence and examples than one and in this area also, Bengal will show to the world how pollution level can be brought down as far as practicable despite being a densely populated city.

On automobile emissions, the minister felt that the only alternative is fast replacement of at least the diesel-driven commercial and public transport vehicles with CNG or electric vehicles. Even in the case of the diesel-driven goods vehicles, they should be kept out of the city limits as far as possible. This will reduce the emission of air pollutants to a great extent. Recently, the state transport department launched a number of e-buses under the West Bengal State Transport Corporation (WBSTC) and moves are afoot to replace all the passenger vehicles of WBSTC with e-buses in a gradual and phased manner. The government is also working on an ambitious plan of setting up sufficient number of charging stations across the state in a time-bound manner.

"We cannot have charging stations and not sufficient number of e-vehicles. Similarly, we cannot have a situation, where we have e-vehicles but not enough charging stations. Therefore we are working on a well structured plan to have sufficient number of e-vehicles and charging stations simultaneously," the minister said.

The state government has lined up plans to set up world class bus terminus like airport terminals all across the state, increase road connectivity, strengthen and promote on-road travels, by improving the quality of road travels by all means and also by bringing down instances of road accidents, the minister said.

Debashis Sen, Managing Director, West Bengal Housing Development Corporation and Chairman, New Kolkata Development Authority (NKDA), on his parts, said that NKDA was also taking a number of initiatives to propagate and promote the causes of green living, which include having separate cycle and walkways and encouraging cycling and walking, among others.

Various other topical and crucial issues were also discussed threadbare at different sessions. For instance, the opening up of the Padma Setu (Bridge), Bangladeshi Prime Minister Sk Hasina's India visit, signing of as many as seven MoUs between India and Bangladesh will all open new vistas in strengthening Indo-Bangla trade and also operationalisation of international waterways via Indo-Bangla river route. That's what Samrat Rahi, Deputy Chairman, Shyama Prasad Mookherjee Port (formerly Kolkata Port Trust) feels.

"Already there is a great relationship between the two countries-India and Bangladesh. Indo-Bangla Protocol is already there. The new initiative which is taking shape is connecting north eastern states of India-- Assam, Meghalaya and Tripura with the Calcutta Port via Mongla and Chittagong (Chattagram) port in Bangladesh. Very recently we sent a cargo to Monglo in Bangladesh and from there to Meghalaya and Tripura. Some days ago we had sent steel bars from Tata Steel to Chattagram. From Chattagram it went go to Shilchar in Assam and while returning it brought tea from Assam to Kolkata via Chattagram," said Rahi.

He said that going by their estimations, the new initiatives will reduce the cost by 30 per cent and transit time by 40 per cent. So it's a win win situation for both the countries and it will provide an alternative to the chicken neck. Besides reducing cost and transit time, the new moves will create employment opportunities in ports, trucking facilities and other related areas in both the countries.

Amit Santra, Head-Business Development (Structura), Tata Steel, Aniruddh Ulabhaje, Senior Vice President, New Business Development, JSW Steel also admitted that in the wake of the opening up of the Padma Setu (bridge), Mongla port in Bangladesh has become very critical. The transit time via Dhaka is expected to become much less and it is much more economical now. Therefore one sees lots of growth opportunities on this front.

Steel company officials were of the view that while there is no alternative to multimodal transport system, one has to be very particular about the optimum and the best mix of different modes of transportation, in one's endeavour to move towards the goal of a sustainable and green transport infrastructure.

### In Memory Of....



#### The Steel Man of India Dr. Jamshed J Irani passes away

The Steel Man of India Padma Bhushan Dr. Jamshed J Irani has passed away on October 31, 2022 at 10 PM at TMH, Jamshedpur. Dr. Irani was associated with Tata Steel for over four decades. He retired from the board of Tata Steel in June 2011, leaving behind a legacy of 43 years, which won him and the Company international acclaim in various fields.

Born on June 2, 1936 at Nagpur to Jiji Irani and Khorshed Irani, Dr Irani completed his Bachelor of Science degree from Science College, Nagpur in 1956 and Master of Science degree in Geology from the Nagpur University in 1958. He then went to the University of Sheffield in UK as a J N Tata scholar where he secured a Masters in Metallurgy in 1960 and a PhD in Metallurgy in 1963.

He started his professional career with the British Iron and Steel Research Association in Sheffield in 1963 but always yearned to contribute to the Nation's progress and returned to India to join the then The Tata Iron and Steel Company (now Tata Steel) in 1968, as Assistant to the Director in-charge of Research and Development. He went on to become General Superintendent in 1978, General Manager in 1979, and President of Tata Steel in 1985. He then became Joint Managing Director of Tata Steel in 1988, Managing Director in 1992 before retiring in 2001. He joined the Board of Tata Steel in 1981 and was also a Non-Executive Director from 2001 for a decade. Besides Tata Steel and Tata Sons, Dr Irani also served as a Director of several Tata Group companies, including Tata Motors and Tata Teleservices. Dr. Irani was the National President of the Confederation of Indian Industry (CII) for 1992-93. He was conferred several honours, including his appointment as International Fellow of the Royal Academy of Engineering in 1996 and an Honorary Knighthood by Queen Elizabeth II in 1997 for his contributions to Indo-British Trade and Co-operation. In 2004, the Government of India appointed Dr. Irani as the Chairman of the Expert Committee for formation of the new Companies Act of India. He was conferred the Padma Bhushan in 2007 for his contribution to industry. He was the recipient of the Lifetime Achievement Award by the Government of India in 2008 as acknowledgement to his services in the area of metallurgy.

He will be fondly remembered as a visionary leader who led Tata Steel from the forefront during India's economic liberalisation in the early 1990's and immensely contributed to the growth and development of the steel industry in India.

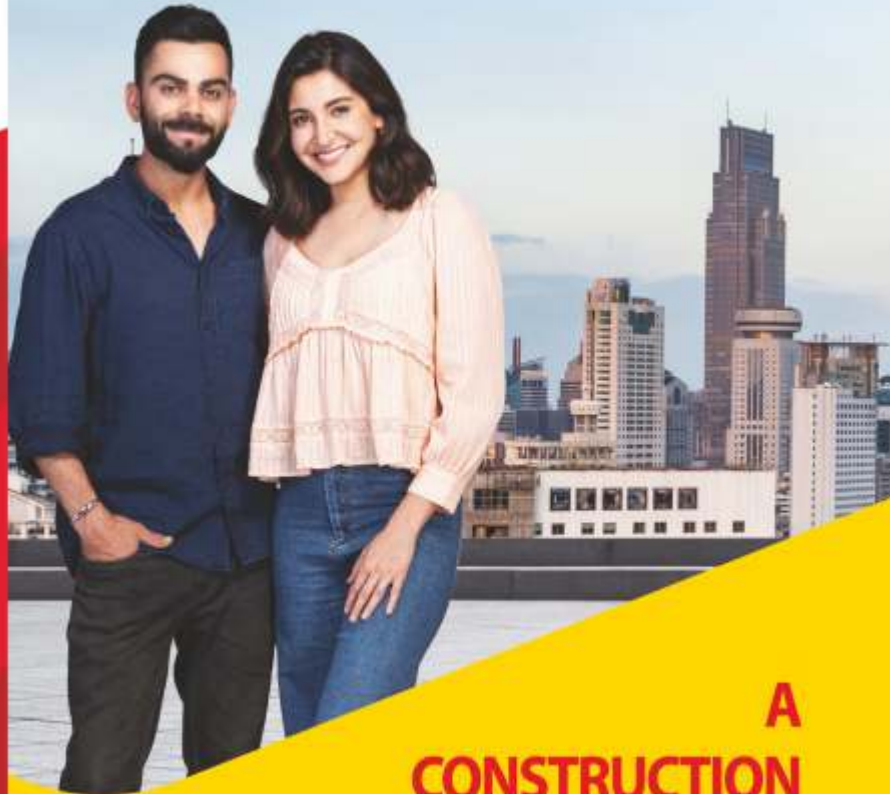
Dr. Irani was the earliest leaders of the quality movement in India. He enabled Tata Steel to reinvent itself with a focus on quality and customer satisfaction, while becoming the lowest-cost steel producer in the world with quality that could compete in the international market. He was instrumental in starting the Tata Education Excellence Program in 2003 to improve the quality of academic facilitation through a calibrated approach adopted from the renowned Malcolm Baldrige Performance Excellence criteria. He was a keen sportsman who played and followed cricket till his last and had a passion for stamp and coin collection. Being a metallurgist, his interest in the research, development and collection of metals and minerals is celebrated. His love for the city of Jamshedpur has led to several key developments that will continue to benefit its citizens. His active public life will forever inspire generations.

Dr. Irani is survived by his wife Daisy Irani and his three children, Zubin, Niloufer and Tanaaz



# SHYAM STEEL

**flexi** STRONG TMT REBAR



## A CONSTRUCTION LASTS LONG ONLY WHEN IT IS FLEXI-STRONG

Shyam Steel Flexi-Strong TMT Rebar, which is the ideal choice for construction. It has the perfect balance of strength and flexibility that will protect your structure for generations to come. So, if you're planning to build an everlasting structure, choose **Shyam Steel**, because only Flexi-Strong can last truly long.

### A Mark of **TRUST**

**SHYAM** 500D a sign of authenticity that promises strength and quality

Follow Shyam Steel India @     

✉ enquiry@shyamsteel.com

📍 Shyam Steel Industries Ltd., Shyam Tower, Plot No.- 03-319 (DH- 6/11),  
Street No - 319, New Town, Rajarhat, Kolkata - 700 156



# INFRABUILD 2022 - SNAPSHOTS



Ms. Sakuntala, Editor & Publisher, Steel Scenario Journal delivering the welcome address



Chief Guest Mr. Snehasish Chakraborty, Hon'ble Minister of Transport, Govt. of India



Mr. Samrat Rahi, Dy. Chairman, Syama Prasad Mookerjee Port, Kolkata



Mr. Aniruddha Ulabhaje, Sr. Vice President - New Business Development, JSW Steel



Mr. Anuj Saini, GM - Business Development, Construction & Infrastructure, JSW Steel



Mr. Amit Santra, Head - Business Development (Structura), Tubes SBU, Tata Steel



Mr. A. K. Sinha, GM (Civil), IRCON International Limited



Mr. R. S. Rajhans, Traffic Manager, Syama Prasad Mookerjee Port, Kolkata



Mr. Shantanu Mitra, Dy. Chief Engineer, Syama Prasad Mookerjee Port, Kolkata



Dr. Manjunatha. L. R., Vice President, Direct Sales & Sustainability Initiatives, JSW Cement



# INFRABUILD 2022 - SNAPSHOTS



Mr. Manas Ghosh, Consultant, INSDAG



Dr. Saroj Mandal, Professor & Ex-HOD, Civil Engg. Dept., Jadavpur University, Kolkata



Mr. Debashis Dutta, Managing Partner, Bestech Consultant Engineer



Dr. Debashis Sen, Chairman - NKDA, MD - HIDCO



Arc. Monolita Chatterjee, Partner, Design Combine Architecture and Designers



Mr. Anirban Gupta, Managing Director - East India, Colliers



L-R: Mr. Prashant Kumar, Head - Downstream Business, TMT Projects & Solutions & Mr. Piyush Mahapatra, Manager - Business Development, TMT Projects & Solutions, Tata Steel



Mr. Mainak Gantait, Scientist - C & Deputy Director, BIS Kolkata



Arc. Sukanya Dasgupta, Partner, Sukanya & Associates



Dr. Himadri Guha, Consultant

# Better today Stronger tomorrow

By JSW Steel

## JSW Group – Overview

### Steel

- India's leading integrated steel producer
- Installed crude steel capacity of 28 mtpa, growing to **37.5 mtpa**

### Energy

- Power producer with installed capacity of 4.6 GW (Hydro, Renewable and Thermal)
- Growing to 10 GW in medium-term with **70% renewable portfolio**

### Infrastructure

- Engaged in development and operations of ports
- Operational capacity **110 mtpa**
- Operations across East, West & Southern coasts of India

### Paints

- Commenced operations in March 2019
- Annual operating capacity of **130,000 KL**
- Fully automated coil coating capacity
- Only fully-automated, water-based plant in India

### Cement

- Manufacturer of Portland Slag Cement (PSC), Ordinary Portland Cement (OPC) and Ground Granulated Blast Furnace Slag (GGBS)
- Operational capacity of 14 mtpa, growing to **25 mtpa**

## Among India's Leading Steel Manufacturers

### One of the leading steel players in India

- Most geographically diversified steel company in India
- Sustainability and Governance at the core of the enterprise, with a strong board.
- Actively pursuing climate change agenda

### Diversified product portfolio

- Extensive portfolio of products – Hot rolled coil, cold rolled coil, galvanneal, galvanized/ galvalume, pre-painted, tinplate, electrical steel (CRNO), TMT bar, wire rod, rails, special steel bars, rounds and blooms, grinding balls

**Integrated manufacturing process** • Integrated steel manufacturing facilities – from raw material processing

plants to downstream value-added product capacities

### Technological competence

- Combination of state-of-the-art steel making technologies: Corex, DRI, Conarc, Blast Furnace, BOF

### Global presence

- International presence in Steel making (US), Value-added facilities (US, Italy)

### Strong distribution network and export presence

- Pan India marketing and distribution network, export footprint over c.100 countries across 5 continents

### Solid presence across Multiple Customer Segments



### Construction, Infra & OEMs

Well established relationship with leading customers in construction, infrastructure and other sectors

### Automotive & White Goods OEMs

Leading supplier to major global and domestic auto and appliance OEMs present in India

### MSMEs

Focused platforms to target large pool of MSMEs c.12,000

### Retail

Footprint of over c.16,000 exclusive and non-exclusive retail outlets across 602 districts.

Strong distribution channel of 1,135 points

*A technology-based platform to create an omni-channel experience for MSMEs, influencers and individual home builders.*

### Exports

One of the largest exporters of steel products from India with export footprint over 100 countries

**Vast Product Portfolio including Downstream Value-Added and Special Products**



**Colour Coated Product Basket of JSW Coated Steel**



**JSW NeoSteel (TMT Bars) – GreenPro Certified**



**JSW Steel Mumbai – Examples of Steel Structures**



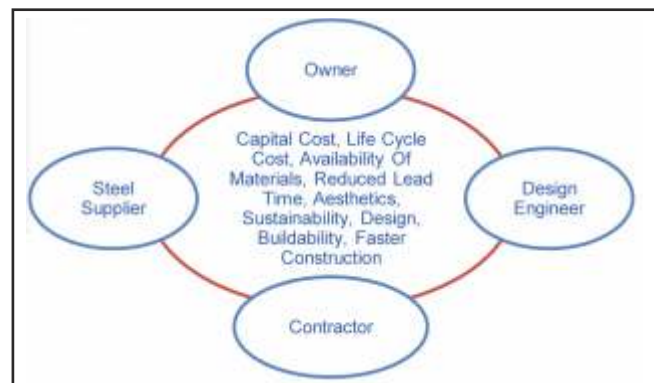
**Ecosystem Development : Adoption of Steel Structure**

**Concept Promotion**

- Integration with Education
- Knowledge Sharing Forum
- Awareness Campaign
- Software based holistic evaluation tool
- Policy Advocacy

**Standardization**

- Approved Design Repository
- Digital Design & Validation Software
- Maintenance Guidelines
- \* Standardisation of design as per local codes for mass production.
- \* Approval of design by government agencies so that designers can select from approved library of design.
- \* Detail design software as per design codes for ease of adoption as per local standard.
- \* Guidelines for maintenance of steel structures.



**JSW SEVERFIELD STRUCTURES LTD (JSSL)**

- (JSSL) is a 50:50 JV between JSW Steel Ltd. and Severfield PLC. Formed in Nov 2008 with commercial Production Starting in Nov 2010.
- JSSL has the capability to execute Design, Fabrication & Erection of Structural Steelwork solutions across sectors of Commercial Hi-Rise, Industrial Structures, Power Plants, Data Centers, Airports and other Infrastructure Buildings.
- With a current capacity of 100k MT per annum from our plant in Bellary and 50k MT per annum from our accredited partners, JSSL is India's largest steel fabricator.



**JSSL Service Offerings**

**Pre Planning**

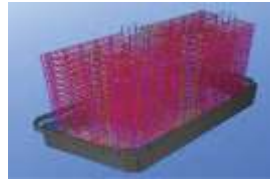
- Value added option
- Accurate estimation



- Projecting appropriate timelines
- Site and resources

**Design**

- Design & Build
- Value Engineering
- 3-D Modeling
- Connection Designs
- Detailed Drawings



**Manufacturing**

- Fabrication
- Blast Cleaning
- Surface Protection
- QA & QC
- Metal Decking



**Erection**

- Erection Scheme & Lifting Study
- Steel, Metal Decking, Fire Protection
- Plant & Machinery
- QA & QC



**Safety**

- Proactive approach
- Site specific safety manager/ team
- Training and Drills
- Compliance to norms



**JSSS - Advantage**

- Best in class fabrication unit. Completely automated
- Completed over 130 projects in India

- Large installed capacity of 100,000mt
- In-house Erection team. Highly trained workforce
- Committed high grade steel supply from the Jindal Group
- In-house metal decking line



- Only manufacturer of a true composite deck profile in India which can resist upto 4 hours of fire. Full scale fire tests have been conducted in accredited laboratories in the UK.
- In-house Design + Detailing
- Propriety design programs developed for composite slab and beam design.
- Fully TEKLA integrated – Design, Fabrication & Erection
- Exemplary Safety record in India. Better than UK.

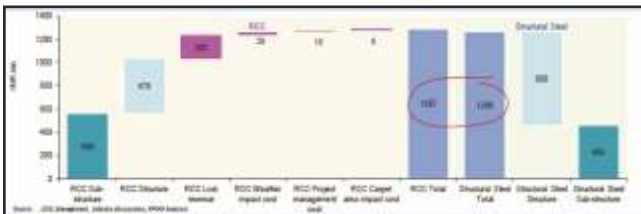


**PRECISION FACTORY OPERATIONS**



**Reduced Construction Period**

- Steel frames can be much faster. Almost 50% or more
- Earlier revenue generation
- Reduction in financing costs
- Earlier return on investment (ROI)
- Faster speed to market



**Column Sizes and Carpet Area**

- More useable or "carpet" area owing to the smaller size of steel columns
- The additional floor area available, can be rented or sold



**Lesser Building Weight and Foundation Loads**

- Upto 40% lighter than concrete frames
- Upto 70% less concrete in the foundations
- Reduction the overall construction period
- Reduction in Excavation depth and rebar quantity in foundations



**Less Labour**

- Steel construction requires less labours at site. About 70% less in most cases. Skilled and trained people are only required.

- Less labour means fewer accidents at site and less disturbance to neighbourhood.
- Construction in steelwork is much safer than reinforced concrete.



**Steel Framed Office Buildings**



**Steel Framed Data Centers**



**Steel Composite Residential Projects**



# ALL CONSTRUCTION MATERIALS UNDER ONE ROOF



## ABOUT US

ZHuzoor Infratech Private Limited is a new-age marketplace for construction materials, which takes orders from all business customers (infrastructure contractors, builders etc.) for all construction materials etc. of any brand and fulfils it by sourcing from suitable manufacturers. ZHuzoor aims to revolutionize the construction market by providing materials at best quality and at best possible rate under one roof along with frictionless logistics, flexible financing terms.



## PRODUCTS & SERVICES

TMT Bars

Structural Steel

Pipes & Tubes

Metal Beam  
Crash Barrier

Scaffolding &  
Shuttering Material

Poles & Towers

Fabrications

Construction  
Chemicals

Bitumen & Fly Ash

Construction  
Equipment

Construction Related  
Hardware & Software

Inspection &  
Testing services

Plot No 03-319 (DH-6/11), Street No - 319,  
New Town, Rajarhat, Kolkata 700156

+91-8100203758

enquiry@zhuzoor.com [www.zhuzoor.com](http://www.zhuzoor.com)



# Tata Steel has presence in Indian Construction Industry across multiple segments through wide range of products and solution

By Tata Structura

Products for Construction across categories such as TMT, HR, CR, GP, GC, Galv, PPGL/PPGI, Tubes, Wires :



Solutions across various construction applications :



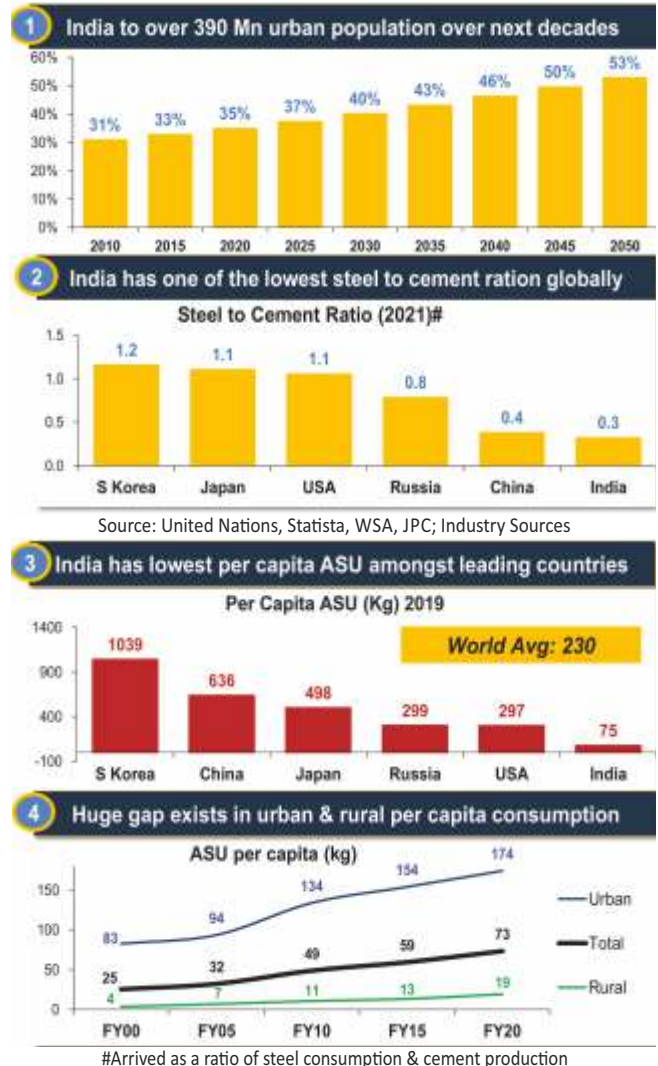
Presence across multiple sub segments and some projects of national importance

- Contributed in construction of more than 50 airports through Tata Structure (more than 60kt volume)
- Contributed for construction of 160mn sqft of PEB structures
- Metro Station constructions – Mumbai, Delhi, Nagpur, Hyderabad, Chennai etc
- Contributed in building 5.35 GW of Solar energy
- Contributed in building ~2000 Km of Crash Barrier
- Contributed in building ~7000+ Km of Cross Country & City Gas Distribution Network

Key recent marquee projects where flat products have been supplied :



Construction Sector Opportunity: India is uniquely placed as rising urbanization will lead to higher construction activity; however, rural per capita ASU and steel-cement ration need to be enhanced



## ABOUT TATA STEEL TUBES SBU

- One of the Largest Tube Manufacturers in the Country.
- Pan India Distribution network reaching 522 districts across the country.
- We are a 1.3 Million Ton player addressing all key segments of welded tube industry.
- 4 main Lines of Business. (LoB)



LoB	Applications
• Conveyance Tubes (Tata Pipe)	• FF/HVAC/Industrial
• Structural Tubes (Tata Structura)	• Load bearing & Aesthetics
• Precision Tubes	• Auto, Boiler & GE
• Oil & Gas	• O&G Pipelines

All over the modern world, Hollow Sections are used for Faster & Economical construction that needs to be strong, durable and contemporary in look...

- High Strength to Weight Ratio
- Large Span Applications
- Faster & Economical Construction
- Aesthetics
- Low Wastage & Sustainable
- Less Maintenance



Milan Mela & the Tower : Tata Structura 1400 MT.

Organized into market focused verticals



Alipore Auditorium, Capacity 2400 people : with 1100 MT of Tata Structura

Tubes B2B/B2ECA/B2G: Journey from Product focused to micro-segment driven business



Solar Dome, New Town : 2000 Solar Panel : 180 MT of Tata Structura used

- The basic dome's diameter is 45 meters.
- 2000 active solar panels which are grid-connected and will generate 180 kilowatts of electricity



- The 350 tons inner frame is made up of a combination of built-up box members and rectangular/square hollow sections from SAIL and TATA Structura.
- The 100 tons outer frame of the dome is purely made up of rectangular/square hollow sections from TATA Structura.



**AIIMS DELHI – FIRE ESCAPE RAMP Building.  
First project with 400x400 Tata Structura columns**

- G+7 Fire Escape Ramp was constructed for faster evacuation from Main Hospital building, according to new fire norms.
- First Project with Steel Column of SHS 400x400x16 mm Tata Structura, first time in India with ERW Tubes.
- Avoided heavy site fabrication at hospital premises as per guideline of AIIMS Authority.
- Saved construction time by around 10% of total project duration.



**Honourable PM inaugurated  
Sir M. Visvesvaraya Railway Terminal.**

- Prime Minister Narendra Modi has inaugurated the Sir M Visvesvaraya Railway Terminal in Bengaluru on 20th June, 2022. This is India's first completely Air-Conditioned Railway Terminal with Airport like facilities and Tubes Division has supplied around 450 MT of Tata Structura in the construction of this marquee project

i.e. 50% of the total requirement. Further to this, the team has bagged 2200 MT of hollow section orders for railway station development projects in Maharashtra in the last two months.



**Gandhinagar railway station re-development-  
350 MT pipes supplied by Tube SBU, Tata Steel Ltd**

- Gandhinagar is the 1st railway station redeveloped under this mission. It was inaugurated by honorable PM on 16th July
- Tata Steel is proud to supply "Tata Pipes" for 100% firefighting application (50 MT) and "Tata Structura" for 40% of structural hollow section requirement (300 MT) for Gandhinagar railway station redevelopment project.
- SHS 180x180 section has been incorporated in the roof structure.
- Tata Steel BDP executed entire firefighting system for railway station.

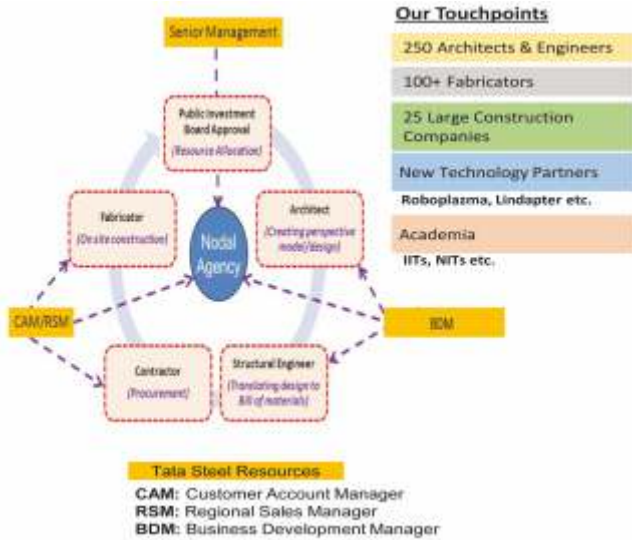


**Habibganj Railway Station - Bhopal**

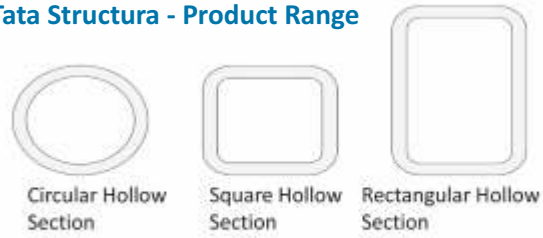
- 875mt of Hollow sections were used for cover over platform shelters, overall steel consumption reduced
- The Roof covering of New West Building is in Barrel Shape with a clear height of 36m above platform level and is made up of structural steel



### Tata Structura deploys a unique influencer engagement model for the B2B segment



### Tata Structura - Product Range



Section Type	Product Capability	Thickness
Circular Hollow Sections	25NB (OD 33mm) to 600NB (OD 609mm)	Min 2.6mm to Max 20mm
Square Hollow Sections	25x25 to 400x400	Min 2.6mm to Max 16mm
Rectangular Hollow Sections	50x25 to 400x200	Min 2.6mm to Max 14mm

Grade of Material – Yst 355, Yst 310

IS:1161 – Circular Hollow sections

IS:4923 – Rect & Square Hollow Sections

#### Large Dia Circular Hollow Sections

Nominal Bore (NB)	Outside Diameter (OD)	Thickness (t)	Weight	Area of Cross Section	Moment of Inertia	Section Modulus	Radius of Gyration	Outer Surface Area/M	Nominal Length per tonne
mm	mm	mm	kg/m	cm <sup>2</sup>	cm <sup>4</sup>	cm <sup>3</sup>	cm	cm <sup>2</sup> / m	m
450	457.2	8	83.19	76.08	19927.27	885.96	16.67	16.67	16.8
		9	86.79	85.06	21916.95	947.71	17.98	16.82	16.9
		10	89.66	112.94	26405.85	1246.54	19.88	16.88	17.1
		12	100.33	143.56	38152.89	1937.73	26.69	16.95	17.3
		15	115.18	273.36	54024.91	3284.59	39.81	17.11	17.5
500	508	8	124.37	84.96	29213.93	1134.10	17.75	17.75	17.8
		9	86.69	125.71	36256.71	1547.26	17.89	17.89	18.1
		10	122.58	180.51	48139.76	1911.31	17.81	17.81	18.3
		12	140.64	187.98	57829.24	2288.11	17.54	17.54	18.5
		15	196.71	247.21	74378.79	2992.36	17.42	17.42	18.7
550	556.8	8	81.03	104.24	38213.80	1425.33	19.55	19.55	19.2
		9	105.71	135.49	52528.87	1950.00	19.42	19.42	19.4
		10	135.42	172.46	69658.26	2524.25	19.41	19.41	19.6
		12	161.88	209.22	77108.97	2759.84	19.34	19.34	19.8
		15	214.27	272.25	10012.4	3001.20	19.20	19.20	20.0
600	606.6	8	89.58	113.82	51641.4	1765.23	21.34	21.34	21.2
		9	115.74	151.26	68463.4	2245.48	21.27	21.27	21.4
		10	147.65	189.48	84711.1	2779.24	21.23	21.23	21.6
		12	176.62	225.36	106652.1	3362.23	21.13	21.13	21.8
		15	234.25	289.50	131588.4	4318.35	20.99	20.99	22.0
20	302.12	354.66	148832.89	4885.16	20.83	20.83	22.2		
25	390.01	433.61	161206.53	5289.58	20.86	20.86	22.4		

Higher Grades such as Yst 410 can also be produced as per customer's requirement.

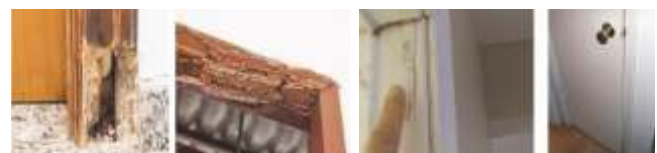
Length: **6.0m±0.05m** customized length ranging from 6m to 12m can be supplied Tata Structura HS in customized size, grade, length, surface & end finish may be delivered as per agreed supply conditions.

### Tata Ezyfit - Profiled Steel Tubular Sections



### Wood is a commonly used material in Door & Window Framing

In today's age, the deterioration in wood quality is affecting home builders



Wood is prone to termite attack

Wood expands in presence of humidity affecting fitment

#### Notions of India: International design competition for the AEC community

**Objective:**

- To build iconic steel structures to celebrate the versatility & aesthetic appeal of steel.
- To engage with the Architects, Engineers & Consultants' community who are the key influencers in Construction & infrastructure.
- To engage student community who shall become the influencers & leaders of tomorrow.

**THE IDEA**

The Product: TATA STRUCTURA + The Potential: INDIA'S POTENTIAL TO BE A WORLD LEADER + Occasion: 75th Anniversary of India's Independence = **NOTIONS OF INDIA**

**THE PROCESS**

**ENGAGEMENT WITH AEC COMMUNITY**

**Impact:** 5200+ registrations | 575 submissions | Participation from 13 countries

**JULY**

**WINNING DESIGNS**

#### JOURNEY OF TATA STRUCTURA

#### Updates- Tata Structura

**Product:** Large Size Structural Tubes 400x400, 400x200, 410x410. Grades produced: Yst 355 & Yst 410. Door/Window frame Tube. Green pipe (timberless).

**Segments & Applications:** Port Infra, Bullet Train Project, Data Centre, Airports, Mall/Kar.

**Initiatives:** NOTIONS OF INDIA, 5 Star Resource, Technical Support, EPD.

**How to make an Ezyfit Frame ?**



**Innovative Steel Sections for Door & Window Framing**



**A few applications across the country...**



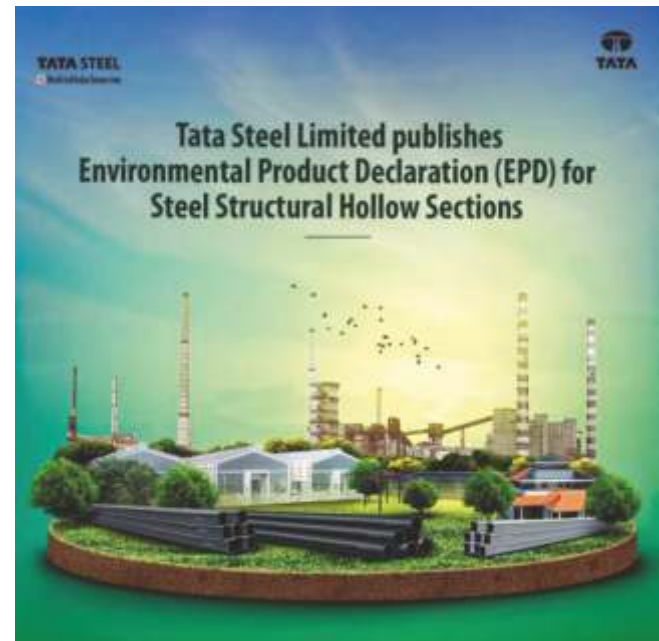
**Tata Ezyfit - Innovative Solution for Window & Door Framing**




-  Engineered for perfect fitment
-  Innovative & Aesthetic Design
-  Robust & Secure
-  Better Durability than Wooden Frames
-  Sustainable home building

**Tata Structura : First Steel Hollow Section with EPD (Environmental Product Declaration)**

An EPD (Environmental Product Declaration) reports a specific set of environmental results, which can only be created after a full LCA is conducted. Common impact categories include global warming potential (GWP), ozone depletion potential, acidification potential, eutrophication potential, smog formation potential, and primary energy use



(Link - <https://www.environdec.com/library/epd5020>).

- Green Building Certification (for global certifications e.g., US LEED, UK BREEAM etc.)
- It can also be used in prioritizing products based on green public procurement policies.
- This is a valid transparent document certified by a third party following a common global methodology, which will help to increase acceptability of the product.
- This will help in exports as increasingly EU and UK customers will not buy without EPD declarations.

# Where there's steel, there's JSW.



The flagship company of the US\$ 22 billion JSW Group, JSW Steel is one of India's leading integrated steel manufacturer. A diverse product portfolio enables our customers to use our steel in a plethora of applications, making JSW Steel an integral part of everything around us.

Scan to Watch



[www.jswsteel.in](http://www.jswsteel.in)  
Toll-free No: 1800-225-225

**JSW** Steel  
Always Around

# JSW Sustainable Products for Strong, Durable, Sustainable & Green Concrete Construction

By JSW Cement

## ABOUT THE GROUP...

22 billion US \$ Conglomerate-One of the largest Industrial House in India



## JSW Cement : Product Portfolio



## JSW CONSTRUCTION CHEMICALS



Innovative products for Speedy, Sustainable & Durable constructions

## The Climate Change Challenges for the Future World By 2050 10 billion people on the planet

- 80% of that will live in urban environment
- Majority live on coastal area
- Leading to development of massive urban infrastructure

### More concrete jungles

- Urban floods
- Urban heat high lands
- powerful typhoons

### Considerable damage to the lives of people

- Impact on social and Environment conditions
- Global warming

Call for achieving Global sustainability

### BACK GROUND TO PRODUCE 1 MT CEMENT

- Lime stone : 1.5 MT
- Coal : 0.22 – 0.25 MT
- Electricity : 70-98 units
- CO<sub>2</sub> emission : 0.8 to 1 MT

### Hazards Associated with Portland Cement

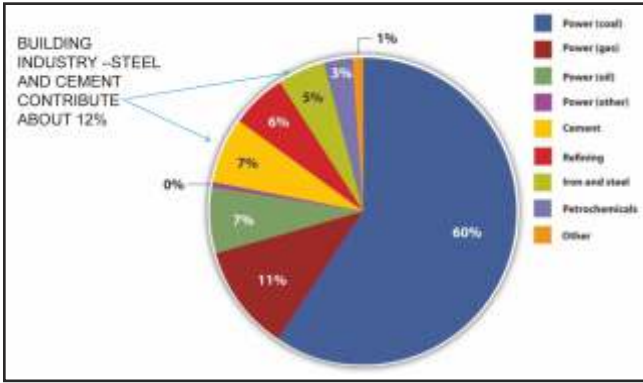
- At every stage of its production, the environment is affected in one way or another.
- Depletion of Natural Resources (Lime stone)
- Carbon emissions,
- water pollution,
- release of heavy metals in the air
- Portland cement production accounts for 5% of global CO<sub>2</sub> Emissions



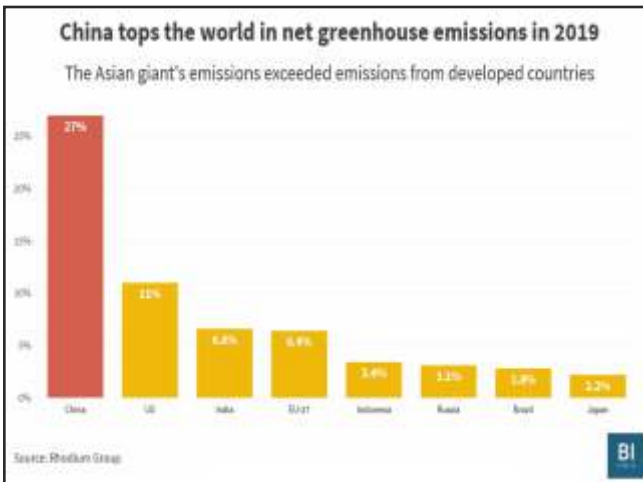
## Sustainability Needs Impacts of Construction



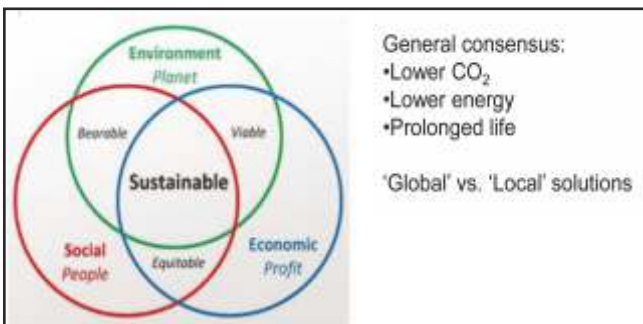
**Sector wise CO<sub>2</sub> Emissions**



**Highest CO<sub>2</sub> Emitting Countries in the World**



**Sustainability cycle**

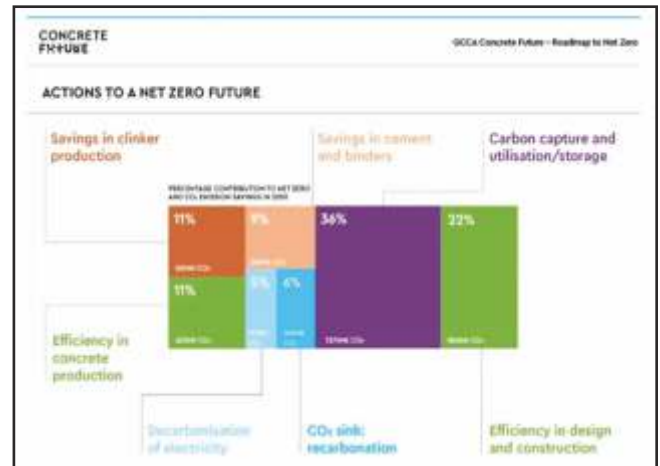


**Being civil Engineers**

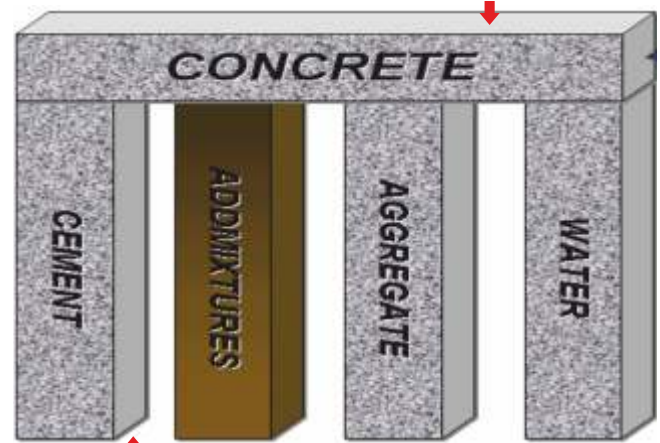
**Our role is to make the construction sustainable!**



**Global Cement & Concrete Association-GCCA, Net Zero Road Map-Source GCCA Website**



**Concrete Composition**



"Concrete is an artificial stone and is produced from a mixture of Cement, Mineral Admixture, Aggregates (Gravel and Sand) and water-usually also with chemical admixtures

**Sustainable concretes**



**Sustainability in Concrete making**

• Various ways to implement sustainability in concrete:

Ingredients	Approach
Cement	Reduce consumption of OPC per cum by replacing with supplementary cementitious materials-Flyash /slag
Aggregates	Recycle – fresh Concrete / Demolished waste-substitute of recycled for virgin materials
Fine Aggregates	Reduce River sand use – Alternate CSS/Slag sand
Water	Recycle water, Recharge Ground water
Improved durability	By doubling the service life of structure brings down half the amount of materials needed for replacement.
Doubling the concrete strength for strength controlled members	Brings down the requirement of materials

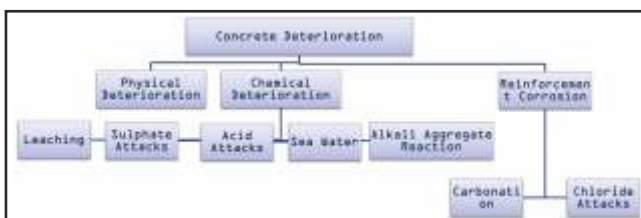
**IS 456: 2000 RECOMMENDS THE USE OF BLENDED CEMENT AT DIFFERENT CONDITIONS.**

S.No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement (kg/m <sup>3</sup> )	Minimum Free W/C Ratio	Maximum Coarse Aggregate (mm)	Minimum Cement (kg/m <sup>3</sup> )	Minimum Free W/C Ratio	Maximum Coarse Aggregate (mm)
(i)	(a)	110	0.40	20	110	0.45	20
(i)	(b)	220	0.40	—	220	0.25	M20
(ii)	Moderate	240	0.40	M10	300	0.50	M25
(iii)	Severe	270	0.50	M20	320	0.45	M30
(iv)	Very severe	280	0.45	M20	340	0.45	M35
(v)	Extreme	280	0.40	M25	360	0.40	M40

*Note:*  
1. Cement content prescribed in this table is irrespective of the grades of cement and it is inclusive of additions mentioned in 5.2. The additions such as fly ash or Ground Granulated Blast Furnace Slag may be taken into account in the concrete composition with respect to the cement content and water-cement ratio if the suitability is established & As Long As The Maximum Amounts Taken Into Account Do Not Exceed The Limit Of Proportions And Slag Specified in IS 5404 (Part 1) & IS 485 Respectively.  
2. Minimum grade for plain concrete under mild exposure condition is not specified

**Concrete Durability**

- Durability may be defined as “Consistent performance of the structures during its expected life time conforming to the predetermined set parameters and under prevailing conditions without resorting to maintenance”.
- The durability of any structure is affected by loading and environmental conditions, and natural phenomena such as rain, snow fall, floods, fire, etc
- The selection of cementitious material should be based on the durability requirements.
- Strong Concrete is not always a Durable Concrete.
- Environmental Condition has become an important factor for durability, especially in Cities like Mumbai

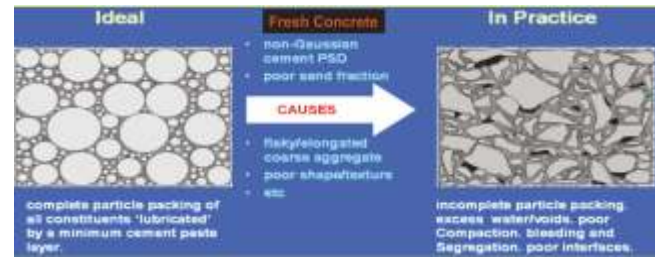


**What we want from concrete ?**

**Normally Desired Properties:**

- Workability: Pumpability, Transportability, Reaching Heights, Rheology, Concreting without Vibrator
- Compressive strength : Moderate to High Compressive Strengths at a cheaper cost.
- Flexural strength : Moderate Flexural Strengths
- Durability : Low Shrinkage (No-Shrinkage)
- Low Creep

**Challenges in handling Fresh concrete**



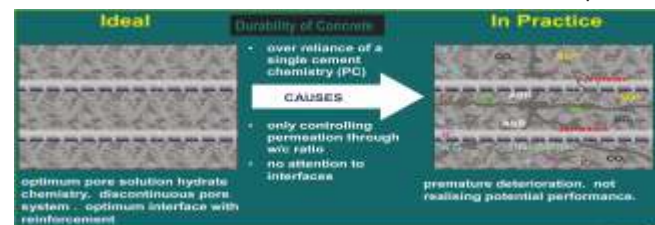
**Hardened Concrete Ideal Condition vs in Practice**



**Enemies of Concrete**

Prevent penetration of aggressive chemicals or their combination into the concrete structure

- Water/Moisture • Chlorides • Carbon Dioxide • Sulphates



**Concrete Durability**

- In mix design we give importance to packing of course materials we should give importance to particle packing of materials in the binders
- To keep the water/binder ratio as low as possible.
- Should use good quality fine materials like slag, fly ash etc.
- GONE ARE THE DAYS OF EXCESSIVE USE OF OPC & WATER HOWEVER CURING IS VERY VERY IMPORTANT

**New Generation Green Materials For Constructions**

- Mineral admixtures
- Chemical admixtures
- Alternative to river sands
- Alternatives to coarse aggregates

**Mineral admixtures – (IS 456:2000, clause 5.2)**



SCM - A material that, when used in conjunction with Portland cement, contributes to the properties of the hardened concrete through hydraulic or pozzolanic activity or both (CSA A 3001, 2003)

#### Superiority of Concrete with Cementitious Materials

- Increases the later age strengths by 25 - 40%
- Reduces the heat of hydration by 35%
- Reduced pore volume in concrete by 60%
- Increased water tightness in concrete by 34%
- Resistance to Sulphate attack in concrete by 60%
- Resistance to Chloride attack in concrete by 90%
- Resistance to Alkali-Aggregate reaction in concrete by 86%

#### Using Cementitious Materials in Concrete will Enhance the following properties.

- Resistance to the Drying Shrinkage
- Reduction of Creep
- Increases the Flexural Strength
- Increases the Split-Tensile Strength
- Shrinkage reduction

#### Concrete developed with above minerals and Parameters are

- High Volume Fly-ash /GGBS concrete
- Light weight Concrete
- High-Density Concrete
- Sulphur-Infiltrated Concrete
- Fibre Reinforced concrete
- Polymer Concrete
- Roller compacted concrete
- Self Compacting Concrete
- Smart Dynamic Concrete
- Ultra High performance Concrete

#### From the House of JSW cement



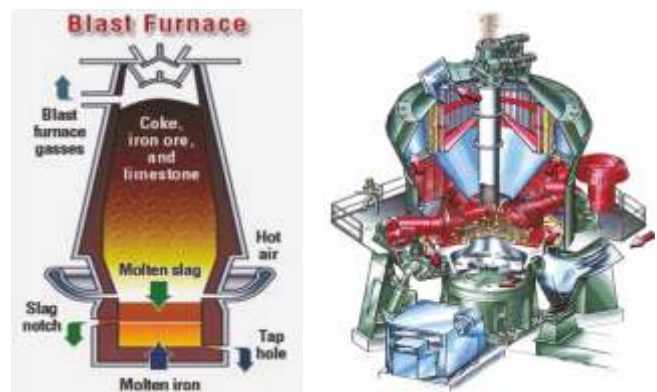
#### Ground Granulated Blast-furnace Slag-GGBS (is 16714)



#### GROUND GRANULATED BLAST FURNACE SLAG

• Granulated Blast Furnace Slag is obtained by rapidly chilling (quenching) the molten Slag from the furnace with the help of water. During this process, the slag gets fragmented and transformed into amorphous granules (glass), meeting the requirement of IS 12089:1987 (manufacturing specification for granulated slag used in Portland Slag Cement). The granulated slag is ground to desired fineness for producing GGBS.

- Non metallic product.
- Consisting of glass containing silicates and aluminates of lime.
- Developed simultaneously with iron in GGBS and Fly Ash are used as a replacement for a portion of the Portland cement. Slag replaces as much as 50 percent in normal concrete and up to 70 percent in special applications such as mass concrete



#### GGBS ADVANTAGES OVER FLY ASH

Fly-Ash is usually limited to 20 or 30 percent.

"Slag is the co-product of a controlled process of iron production, which results in a very uniform composition from source to source".

Oxides	Cement Clinker (%)	GGBS (%)	Fly Ash (%)
CaO	62	40	< 2
SiO <sub>2</sub>	22	35	55
Al <sub>2</sub> O <sub>3</sub>	5	14	30
MgO	3	8	< 1
Fe <sub>2</sub> O <sub>3</sub>	4	0.5	6

#### ON THE BASIS OF PRODUCT CONSISTENCY

• Slag is By-product of Controlled process from Iron Production ie uniform composition from source to source. Fly Ash is a By Product of Electric Power Generation that varies from source to source and is highly dependent on Source of Coal.



- Indian Fly ash contains about 55% SiO<sub>2</sub>, out of which only 20 to 25% are in glassy form. Hence, addition of 100 kg of fly ash (that is, 25 percent of OPC), will consume only about 14% of Ca(OH)<sub>2</sub> and 86% will remain unconsumed. This calculation is in line with the fact that all of Ca(OH)<sub>2</sub> in concrete was shown to be consumed only when 50% of GGBS was used.
- Fly Ash is a Non Hydraulic Material and does not sets on its own with addition of Water.

**ON THE BASIS OF REPLACEMENT LEVELS**

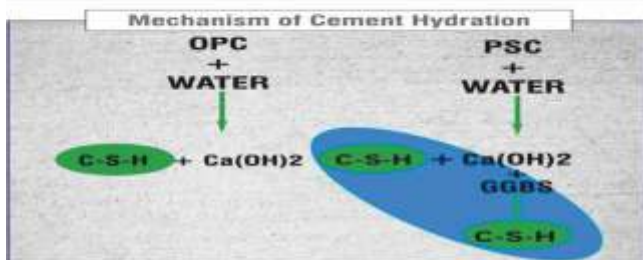
- The permitted replacement ratio of Fly Ash in OPC is 15-35% (IS 1489 Part-1), but it's usually no more than 30% in concrete. On the other hand, the permitted replacement ratio of GGBS in OPC or concrete is 25-70% (IS 455). It could even be replaced up to 85% in some of the European countries.

**ON THE BASIS OF CONCRETE PERFORMANCE**

- Concrete containing GGBS cement has a higher ultimate strength than concrete that uses 100% Portland cement or Blended with PFA.
- Having very low RCPT and Water penetration readings as compared to PFA mixes with same Cementitious Content.
- For Concrete Pavements, its observed that GGBS mixes provide much higher Flexural Strengths over that of PFA mixes.
- Concrete made with GGBS are much less prone to cracking due to reduced OPC53 and thus reduced Heat of Hydration.

**Replacement levels of OPC with GGBS in Concrete.**

Application	GGBS replacement %
On the ground concrete structures with higher early age strength requirement	25-35%
Underground concrete structures with average strength requirement	35-50%
Mass Concrete or concrete structures with strict temperature control requirement	50-85%
Speciality concrete structures with higher requirement on durability i.e. Corrosion resistant marine structures, sewerage treatment plants, etc.	50-70%



**Superiority of Concrete with Cementitious Materials**

- Increases the later age strengths by 25 - 40%
- Reduces the heat of hydration by 35%
- Reduced pore volume in concrete by 60%
- Increased water tightness in concrete by 34%
- Resistance to Sulphate attack in concrete by 60%
- Resistance to Chloride attack in concrete by 90%
- Resistance to Alkali-Aggregate reaction in concrete by 86%

**JSW Portland Slag Cement**

JSW PSC is a blended cement, wherein some portion of OPC is replaced with Ground granulated blast furnace slag (GGBFS), to make the structures long lasting & durable.

GGBFS present in PSC helps in secondary hydration, producing more C-S-H gel in system for improved performance of concrete.

It conforms to IS: 455 - 2015.

**ADVANTAGES OF CONCRETE WITH PSC/ OPC+GGBS**

- Green Product and Concrete made with using Eco Friendly Cementitious Material
- High Resistance to Chlorides & Sulphates
- Reduction in Heat of Hydration : Highly recommended for reducing Core vs Surface Temperature Gradient.
- Improved Ultimate Strength. In case of Concrete Pavements, improvement in Flexural Strength is observed.
- Particle Packing Effect : Dispersion of Cement Particles
- Improved Resistance to Corrosion.
- Improved Water Impermeability

**ONE CEMENT SIX STRENGTHS**

CONCREEL HD

HIGH EARLY STRENGTH, QUICK SETTING, SUPERIOR DURABILITY, MOST DURABLE, CORROSION RESISTANT, GREEN PRODUCT.

**We will offer you a cement that will challenge all the OPC & PPC players in the market**

Key Properties of OPC and PPC Cement	We Will Offer A Product With Additional Superior Properties
High early strength	Superior Long Term Strength
Quicker setting	Increased Durability
	Chemical Resistance
	Improved Cohesion

Therefore, Concreel HD is the best cement in the market, far better than any Category 'A' OPC and PPC cement

**Cement Comparison: Concreel HD vs. OPC & PPC**

	CONCREEL HD	OPC Cement	PPC Cement
High Initial Strength <sup>1</sup>	✓	✓	✗
High Final Strength <sup>2</sup>	✓	✗	✗
Quick Setting	✓	✓	✓
Chemical Resistant	✓	✗	✗
Increased Durability	✓	✗	✗
Superior Cohesion	✓	✗	✗
Green Product	✓	✗	✗

1) Based on 1 day strength  
2) Based on 28 day strength

Concreel HD is best suited for Concrete applications, specially slabs, beams, columns.

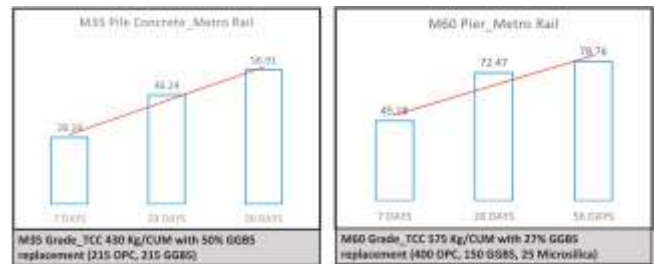


**CONSUMPTION AREAS & APPLICATIONS**

Globally, GGBS is a well established and proven Cement Replacement in Concrete mixes and have replaced upto 80% Cement in certain applications. GGBS is technically a more accepted Supplementary Cementitious Material (SCM) in comparison to other alternatives by virtue of its consistency in quality- GGBS raw material generation is from a high process controlled, Quality Intensive Production of Steel. Over the last few years, JSW GGBS has established its presence in almost all named commercial RMCs and also at onsite batching units for major prestigious projects. Furthermore has been extensively used in Cement Product Manufacturing units for manufacturing AAC Blocks, Roofing Sheets, Partition Boards, Mortars, Grouts etc.



**GGBS Mix Performance @ Metro Rail Projects**



**High Strength & Durable, Green & Sustainable Concrete Mixes @ Pune Metro Rail using JSW GGBS**



**Case Study 1: Underground Metro Rail, Mumbai**

Project	Mumbai Underground Metro Line III- Colaba to Seepz	
Contractor	Dagur- Sama JV	
Client	MMRCL	
PWC	Maple	
Grade of Concrete	M40 Grade Slab-Concrete	
Total Concrete Scope	Approx 3,00,000 CUM	
RCPT	1000 Coulombs (max)	
WPT	10 mm (max)	
Design Life	120 Years Service Life	

# WHAT MAKES **Sm@rtFAB** **FUTUREREADY** FOR YOUR CONSTRUCTIONS?



## **SAVE TIME**

- A prefabricated solution that reduces slab-to-slab casting time
- Ready-to-use materials delivered at site
- Valuable labour hours saved



## **REDUCES COST**

- Eliminate labor costs on cutting, bending and placing rebars
- Save cost of bending wire
- Reduce inventory costs and working capital



## **OPTIMISES DESIGN**

- Use any dia from 2-12 mm unlike rebars
- Optimized designs for reinforcement requirements
- Reduce overall steel requirement



## **HELPS WORK SMARTER**

- Easy tracking to minimize pilferage
- Easy inspection for structural consultants
- Perfect spacing through mechanised process

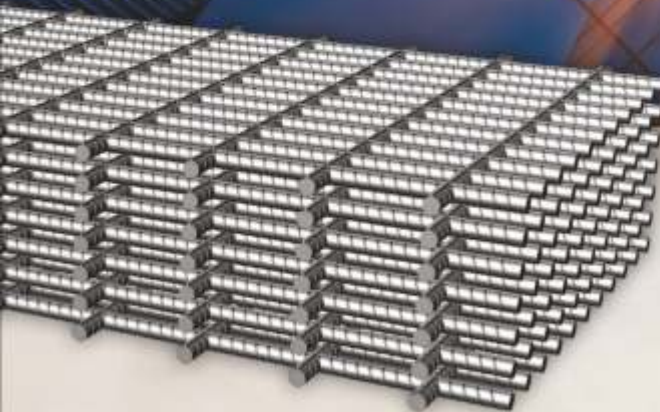


## **PROVIDES QUALITY ASSURANCE**

- All materials with Test Certificates
- Tata Steel assurance of good quality
- Manufactured with only Tata Steel wire rods

# **BUILD SMART BUILD EASY**

**INDIA'S FIRST BRANDED WELDED WIRE FABRIC**



**STEELING THE FUTURE**

# Journey of Tiscon reinforcement related products

By Tata Tiscon

## Service & Solutions

Continuously innovating in construction solutions



Then



Now

## Concrete... we upgraded

Hand mix concrete to mobile mixtures to Ready mix concrete plants.



## Masonry Work... we upgraded

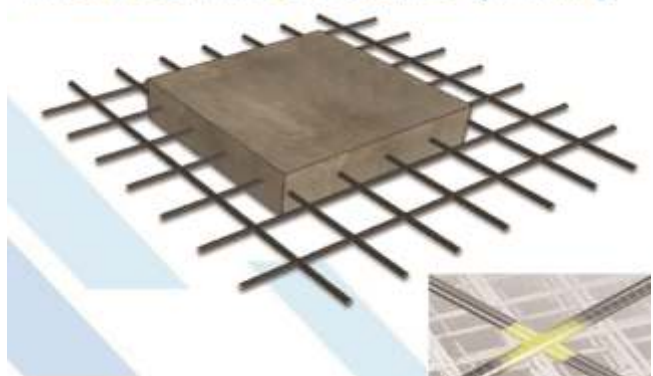
Red Clay bricks to Autoclaved aerated concrete blocks.



## Formwork.. We upgraded



## Welded Wire Fabric (WWF)



- Cold-drawn ribbed wire with electric resistance fusion welding
- In square or rectangular grids made from small diameter wires
- Bonding with concrete is by mechanical anchorage at each welded wire intersection plus anchorage due to ribbing.
- Standards : IS 1566-1982 Hard drawn steel wire fabric for concrete reinforcement with steel complying to IS 432 Part 2-1982

## Welded Wire Fabric (WWF) – Made from Wire not TMT



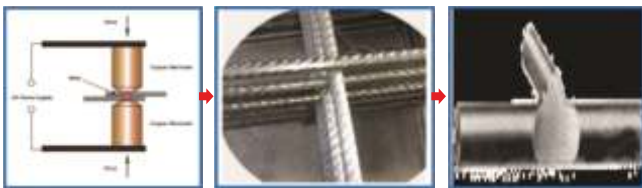
**Why not TMT**

TMT has dual core cross-section. The outer tempered martensite layer gives required tensile strength to the TMT while the inner ferrite –pearlite core give ductility property.

On welding the strong external layer of martensite loses its high strength.

**Why Wire Rods**

Wire Rods have uniform microstructure. It is further cold drawn by pulling through triplex sets of tungsten carbide rolls to increase the yield strength to the desired value. The process ensures proper weldability.



**Drawing:** Increases tensile strength with wire rods made of low carbon steel SAE1008 to 1015 (IS7887 Grade 3-7)

**Ribbing:** Better bond with concrete and controls cracks. Ribbing benefit is mostly for overhang regions of a weld mesh.

**Fabrication:** A semi-automatic and precise welding machine is capable of delivering welds at calculated joints with electrical resistance that generate ample amounts of heat to create the weld.

PACKAGING

**TATA STEEL** 09-10-2018  
**Sm@rtFAB**

**5/5/150/150**

Dim/Dc	5/5
Dimensions	3000x2100
Sm/Sc	150/150
Mo1/Mo2	150/150
Co1/Co2	125/125
Nm/Nc	13/18

Sheets: \_\_\_\_\_

ABC Company

N = Number of wires, D = Diameter of wires

Every bundle is provided with tags for easy identification and traceability. Each tag carries the Tata Steel and Sm@rtFAB logo and details and dimensions of the fabric

**Features of Sm@rtFAB**

**Available in:**

**a. Wire Diameter:** From 2mm to 12mm at an interval of 0.1mm

- i) From 2mm to 5 mm (plain WWF in roll form)
- ii) From 5mm to 12 mm (plain/ribbed WWF in flat customized shapes: 2.4 meter (width) x 6 meter (length))

**b. Spacing interval:**

- i) For wire dia 2mm to 5mm: In rectangular grids from 25mm to 600mm at spacing possible in multiples of 5mm.
- ii) For wire dia 5mm and more: In rectangular grids from 75mm to 600mm at spacing possible in multiples of 5mm.



**5.6 Reinforcement**

The reinforcement shall be any of the following:

- a) Mild steel and medium tensile steel bars conforming to IS 432 (Part 1).
- b) High strength deformed steel bars conforming to IS 1786.
- c) Hard-drawn steel wire fabric conforming to IS 1566.

**26.5.2.1 Minimum reinforcement**

The mild steel reinforcement in either direction in slabs shall not be less than 0.15 percent of the total cross-sectional area. However, this value can be reduced to 0.12 percent when high strength deformed bars or welded wire fabric are used.

**Features:**

**a. Better Concrete Bonding:** The mechanical anchorage at each welded wire intersection, and the ribbing pattern provide better bonding and stress transfer from concrete to steel.

**b. Better Crack Resistance:** The thinner wires with closer spacing ensure homogeneity in the section and eliminate the chance of displacement or omission of

steel bars during concreting, thereby enhancing the structural integrity.

**c. Quality Check:** Each batch of WWF goes through thorough scrutiny and tests and is certified with a Test Certificate.

**d. Controlled Manufacturing:** Our wide range of wire diameters and spacing between wires makes it possible to match the exact cross sectional steel area required, thereby allowing customization and flexibility to suit different structures.

**Splicing**

**Cross wire Pitch +100mm:** IS 456: 2000 (26.2.5.1 (f) at Page 45.)

**f) When splicing of welded wire fabric is to be carried out, lap splices of wires shall be made so that overlap measured between the extreme cross wires shall be not less than the spacing of cross wires plus 100 mm.**

**Weldability:**  
**+/- 1mm for Cross and Main wires**

**Bent Meshes for various ready to cast requirements.**

- Staircase stairs
- Trenches & drains
- Surface drains

**CHARACTERISTICS OF Sm@rtFAB**  
 Dimensional Configuration of Welded Wire Fabric

Type	Shape	Dimensions
Type A	Square	300mm x 300mm
Type B	Rectangular	300mm x 100mm
Type D	Small Square	150mm x 100mm
Type E	Square	150mm x 150mm

Splicing available at interval of 300mm.

Wire diameter available at an interval of 0.1 mm

Only 5mm and above in ribbed bars

**UNDERSTANDING Sm@rtFAB**

- Transverse Zone
- Transverse (Heat affected Zone)
- Welding Zone
- Longitudinal (Heat affected Zone)
- Longitudinal Zone

Superb Weld penetration: **10% to 15%**

**We are better...**

Relation to IS Code: Equivalent to Rebar Code IS:1786-2008 (Type: Superior Physical properties) Vs IS:1566-1982 & IS:432-1982 Part-2 (Welded wire mesh & Wire) Inferior Physical properties.

Properties	IS: 1786-2008 (Fe550)	IS: 1566-1982 referring IS:432 Part-2	Sm@rtFAB
Min. UTS (Mpa)	593	573	585
Min. YS (Mpa)	350	483	358
Min. %age elongation	18%	7.3%	10%
Weld shear strength		0.25 times value of Ys with test method of IS:432 Part 2	~0.43 times

... Properties of Rebar Fe550 with Sm@rtFAB **30% savings**

**Now...We are best!!!**

Development of New Product: Air-cooled route  
**Sm@rtFAB (Through Air-cooled route\*)**

Properties	IS: 1786-2008 (Fe550)	IS: 1566-1982 referring IS:432 Part-2	Sm@rtFAB
Min. UTS	586	573	585
Min. YS	356	483	358
Min. %age elongation	14.0%	7.5%	10%
Weld shear strength		0.25 times value of Ys with test method of IS:432 Part 2	~0.43 times

... Properties of Rebar Fe550SD with Sm@rtFAB **30% savings**

\*Available in 6mm, 7mm and 8mm meshes in form of sheets.

**Sm@rtFAB Segments & Micro Segments**

**BENEFITS OF Sm@rtFAB**

**MAN HOURS SAVINGS:**

- Lesser number of labours needed as no marking, spacing and cutting of bars at site
- Pre-fabricated mesh is delivered to site as per design leading to early completion of reinforcement work

**STEEL SAVINGS:**

- Clearer closer to design
- As per IS 456, Lap length is just spacing + 300 mm, compared to ~500 in rebar reinforcements
- Savings because of lesser consumption of bending wire

**EFFECTIVE SITE MANAGEMENT:**

- Reconciliation easier
- Zero wastage
- Simpler Stocking
- Reduced pileage
- Easier Inspection

**Benefit of Sm@rtFAB: Cost Saving**  
 ECONOMICS FOR ADOPTION OF Sm@rtFAB with 70,000 Rs/Ton Rebar Prices

All pool figs are indicative only

NOTE: Cost Savings - On basis of speed of construction has been considered leading to early completion of project benefits and reduction of interest expense cost. This 100% of cost savings has been considered under the 10% cost gain in arranging other factors necessary for expediting construction.

**Mesh In Typical Building**

**Actual supply images**



**DETAILS FOR CONSULTANTS**

Type	Wire Spacing (mm)		Wire Diameter (mm)		Cross-sectional Area (mm <sup>2</sup> /m)		Nominal Mass (kg/m <sup>2</sup> )	Steel
	Max.	Dist.	Max.	Dist.	Main	Dist.		
A	200	200	7	7	192	192	3.023	30.56% Savings in steel
	200	200	8	8	251	251	3.946	
B	100	200	7	7	385	192	4.531	23.4% Savings in steel
	100	200	8	8	503	251	5.919	
C	150	200	7	7	257	192	3.525	23.4% Savings in steel
	150	200	8	8	335	251	4.603	
D	100	100	7	7	385	385	6.042	23.4% Savings in steel
	100	100	8	8	503	503	7.862	
E	150	150	7	7	257	257	4.028	23.4% Savings in steel
	150	150	8	8	335	335	5.261	

**References in CPWD DSR 2021**

STEEL REINFORCEMENT			
5.22	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level.	kg	88.55
5.22.1	Mild steel and Medium Tensile steel bars	kg	87.50
5.22.2	Hard drawn steel wire	kg	88.65
5.22.3	Cold twisted bars	kg	88.65
5.22.4	Hot rolled deformed bars	kg	88.65
5.22.5	Hard drawn steel wire fabric	kg	94.10
5.22.6	Thermo Mechanically Treated bars of grade Fe 500D or more.	kg	89.65
5.22A	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level.	kg	88.55
5.22A.1	Mild steel and Medium Tensile steel bars	kg	87.50
5.22A.2	Hard drawn steel wire	kg	88.65
5.22A.3	Cold twisted bars	kg	88.65
5.22A.4	Hot rolled deformed bars	kg	88.65
5.22A.5	Hard drawn steel wire fabric	kg	94.10
5.22A.6	Thermo Mechanically Treated bars of grade Fe 500C or more.	kg	89.65

**Deliveries:**

**1. Savings calculations**

Project Name :  
Project No :  
Name of the Sheet : Typical Floor Slab  
Draw No :  
Conventional Grade of Concrete M30 Steel Fe-550  
Weldmesh Grade of Concrete M30 Steel Fe-550

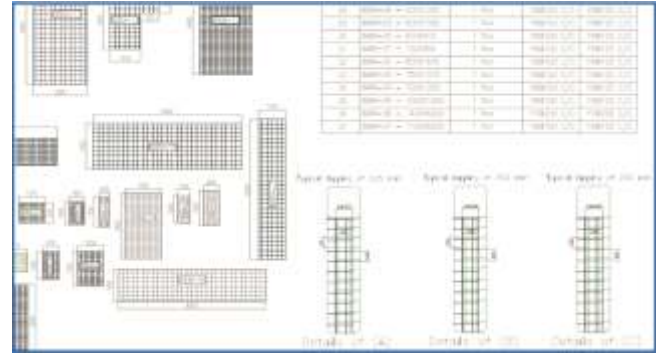
Sl No	Description of Item	Steel in MT
Grade Slab	Conventional	23.54
	Weldmesh	16.71
	Saving in MT	6.83
	Percentage of Saving	41%

Conventional | Weldmesh | Summary

**2. Mesh laying layout**

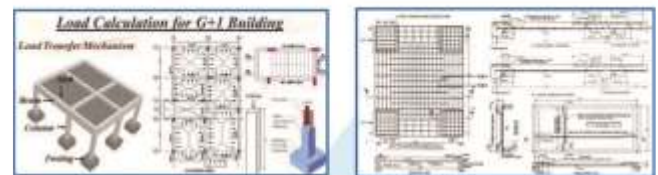


**3. Mesh schedule**



**Pre-requisite**

- GA (General Arrangement) Drawings - Architectural layout
- DBR (Design Basis report)
- Load details
- Current rebar details (if any, for comparison)



**PROJECT SNAPSHOT (Tunnels)**

**Project:** Chaardham Project, Uttarakhand.

**Tech Used:** Sm@rtFAB for shotcreting

**Benefits:**

- Better weld penetration> Superior Weld shear strength. Prevents damage at welding joints during shotcreting.
- Continuous reinforcement- Superior Flexural strength which prevents localized failure due to bending caused due to loose rocks.
- No damage to membranes provided on true tunnel surface.
- No Coagulation. Uniform concrete structure.



Package 2: 1200 MT, Package 4: 140 MT, Package 6: 120 MT

### PROJECT SNAPSHOT (Roads: CRCP)

Project: IIM Automobiles, Hotel Harjana, Consultants: MVMC  
Tech Used: Self-Healing CRCP  
Benefit: Max-hour - 77%, Material Savings - 32%

CRCP's Adv. Bets	Conventional TMT	Without Wire Fabric	Savings
No. of people	34	18	
Time in hrs.	15	4	74%
Man-Hrs.	510	72	86%
MT used	9	6	33%

### Safe Solution: EHS Risk Assessment

Risk Factor	L1		L2		L3	
	0	1	2	3	4	5
Material	0	1	2	3	4	5
Labour	0	1	2	3	4	5
Plant	0	1	2	3	4	5

Implementation of Construction Solutions:  
**Minimizes cyclone Risk and Rainfall Risk and will save under 13 & 15%**

### PROJECT SNAPSHOT (Flooring: VDF)

Project: Flyover Warehouse, Hapur, by AWS for TVS Logistics, Consulting Engineers: YCL  
Tech Used: Self-Healing Flooring  
Benefit: Max-hour - 77%, Material Savings - 32%

CRCP's Adv. Bets	Conventional TMT	Without Wire Fabric	Savings
No. of people	16	10	
Time in hrs.	8	3	64%
Man-Hrs.	128	30	77%
MT used	3.4	2.3	65%

### CONTRIBUTION TO OVER 30 MARQUEE PROJECT

### CONTRIBUTION TO OVER 30 MARQUEE PROJECT

### PROJECT SNAPSHOT (Drains & Canals)

Project: Transporter Shed along Harjana at IIM for IIT for GMU  
Tech Used: Self-Healing Flooring  
Benefit: Labour - 85%, Material Savings - 85%

CRCP's Adv. Bets	Conventional TMT	Without Wire Fabric	Savings
No. of people	14	10	
Time in hrs.	9	2.5	72.5%
Man-Hrs.	124	25	80%
MT used	8	6	25%

### TYPICAL PAIN POINTS

### PROJECT SNAPSHOT (R.T. Slabs)

Project: IITM - Vidyanagar Agronomy Government Building, Bangalore (12 x 10 x 2 Storeys)  
Tech Used: Self-Healing Precast Panels (Concrete Slabs and Reinforcement)  
Benefit: 24 hrs. (24) for casting concrete and reinforcement, 100% concrete and reinforcement

### PROJECT SNAPSHOT (Deck slabs)

Project: Sarda City - IT Park Tower, from Smart Building for Project IIT  
Tech Used: Self-Healing CRCP and Deck slabs - 12 hours - 82.5%  
Benefit: 30-40% time constraint

### PROJECT SNAPSHOT (Shear walls)

Project: Maruti Group of Projects, Bangalore  
Tech Used: Self-Healing CRCP with Tensar Reinforcement  
Benefit: Speed of construction, Sustainable construction

### 12 to 15% cost saving....

1. Wastage of 3% belongs to us. We charge you only for the finished products.
2. Wastage handling cost is saved.
3. Heavy Electricity charges (Unmanned running machines and Backup created due to DGs).
4. Establishment cost and cost on their utilities like electricity/water supply etc. due to Labour hutments is saved.
5. Labour compliance cost is saved.
6. Security charges are saved.
7. Yard storage is saved.



**12 to 15% cost saving....**

- 8. Easy Reconciliation.
- 9. Low operational cost.
- 10. Low inventory management cost.
- 11. Theft and pilferage is avoided.
- 12. No loss of steel in transit as no one gets opportunity to pull out straight bars.
- 13. No Loss of steel due to industry practiced weighing tolerances



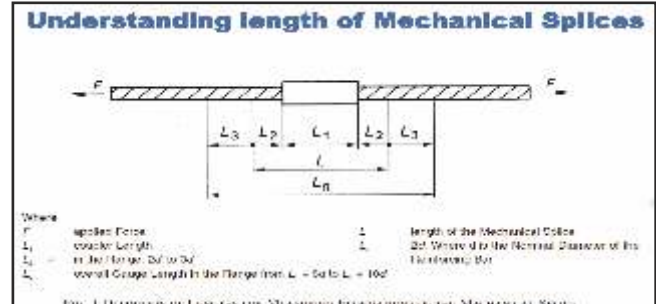
**Value addition through our package**

- 1. **Cost saving** due to above reasons.
- 2. **Quality Guaranteed:** Every Lot comes with material test certificate.
- 3. **Precision and Accuracy Guaranteed:** Zero manual interference, No chances of mistakes.
- 4. **Time saving** due to on time delivery and zero dependence on site labour.
- 5. **Fast construction:** Savings on interest and on time operation of facility.
- 6. **Safe practice:** Minimizing man machine interference.
- 7. **Zero stress level:** Less manpower to be handled.
- 8. **Systematic tagging:** based sorted material will be delivered.
- 9. **Pandemic proof solution.**
- 10. **Contribution to Environment ->** Better future
- 11. **GreenPro product:** offers points in Green building rating system -> Additional FAR up to 15%.



**Tata Steel Readybuild centres**

are located across India to enable JIT delivery and accelerated service



**Advantages of using Couplers**

**EASIER FUTURE INSTALLATIONS**

- Provisions for future installations
- No jutting out rebars and get a cleaner finish

**REDUCE REBAR USAGE**

- Avoid lapping and optimize rebar usage
- Avoid labour efforts and costs for lapping and binding

**FASTER CONSTRUCTION**

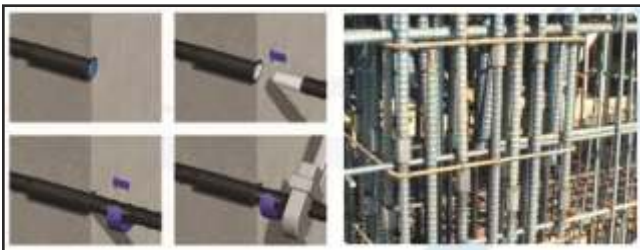
- Reduced handling and faster assembly ensures quicker installations

**HIGHER STRUCTURAL INTEGRITY**

- Direct (Axial) transfer for load

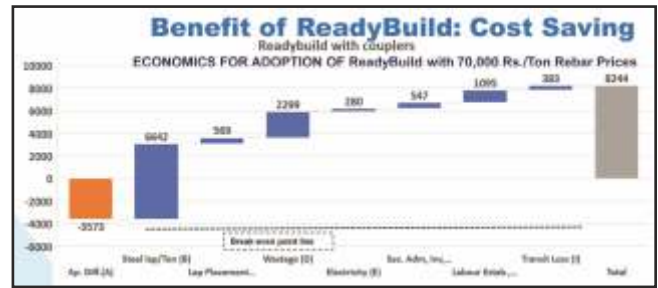
**REDUCE CONGESTION**

- Optimum concrete binding. Improved structural integrity
- Ideal steel ratio at structural member cross section



**Benefit of using Coupler over Lapping : Cost Saving**  
ECONOMICS FOR ADOPTION OF READY BUILD

LAPPING COST					COUPLING COST			BENEFIT	
BAR	NO. OF COUPLERS	UNIT PRICE	NO. OF COUPLERS	UNIT PRICE	SOFTENING COST	COST OF COUPLER	TOTAL	PERCENTAGE OF TIME SAVED	PERCENTAGE OF STEEL SAVED
10	2,452	1	2,452	250	61	61	122	50	1000
20	1,226	1.25	1,532	250	30	30	60	100	1000
30	817	1.5	1,226	250	20	20	40	100	1000



**Threading on rebar**

The ends of the rebar to be joined along with the couplers are first cut to the required length of the bar. The bar undergoes a four step process

**1. Cutting of rebar**

The end of the reinforcing bar is sawn square. Machinery that is required to do so is a band saw

**2. Cold Forging of rebar end**

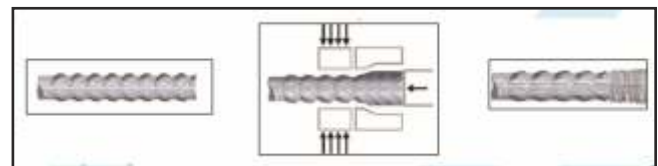
The sawn end is enlarged diametrically by cold forging/upsetting (using an upsetting press) The core diameter of the bar is increased to a pre-determined diameter

**3. Turning to remove the ribs.**

This process is used to remove the ribs and make the surface uniform.

**4. Threading of the upsetted end**

Thread is cut on the enlarged end of the bar (using threading machinery). The threaded bar is of the same diameter as that of the parent bar



**Trimble set to decrease Greenhouse Gas emissions to 50% by 2030**

Global construction technology leader Trimble has announced its commitment to reduce absolute scope 1 and 2 Greenhouse Gas (GHG) emissions 50 percent by 2030, with 2019 as the base year. This is in line with the ambitious goals of the Paris Agreement and a net-zero future to keep global temperature increase to 1.5°C.

Trimble also said that it is committing to achieve 100 percent annual sourcing of renewable electricity by 2025. The company added that it has received approval of its emissions reduction targets by the Science Based Targets initiative (SBTi), a coalition of the CDP, the United Nations Global Compact, World Resources Institute and the World Wide Fund for Nature, joining a growing number of companies taking urgent action on climate change.

“We are putting sustainability at the front and center of everything we do at Trimble. We are not only increasing sustainability in our operations and products but also enabling our customers to drive sustainability. Today, our customers in India and around the world are able to experience reduced environmental impact, lower operational costs, increased productivity and quality and improved safety and transparency, while maintaining regulatory compliance.”

“Since 1978, Trimble's industry-specific solutions have helped businesses accomplish more, while promising a lower environmental impact. As the need for sustainability becomes more urgent in the India and around the world, we are putting sustainability at the front and center of everything we do at Trimble. We remain committed to acting quickly to protect the environment and make society more resilient, productive, and connected. Our Sustainability Report details this vision, and our solutions meet the highest sustainability standards and help develop sustainable projects.” said Mr. Paul Wallett, Regional Director, Trimble Solutions, India and Middle East.

# TOUGHEST TERRAINS DESERVE THE TOUGHEST STEEL.

## BOGIBEEL BRIDGE (ASSAM)

INDIA'S FIRST AND ONLY FULLY WELDED DOUBLE DECKER BRIDGE THAT CAN WITHSTAND EARTHQUAKES OF MAGNITUDE MORE THAN 7 ON RICHTER SCALE.



### PRODUCT RANGE FROM JSP



PARALLEL FLANGE  
BEAMS & COLUMNS



CHANNELS AND ANGLES



PLATES AND COILS



TMT REBARS



RAILS

### SPECIALITY OF PRODUCTS FROM JSP



HIGHER  
STRENGTH



HIGH CORROSION  
RESISTANCE



CUSTOMIZED  
AND CONTROLLED  
CHEMISTRY



SUPERIOR  
WELDABILITY



WIDE  
PRODUCT RANGE

INNOVATIVE AND SUPERLATIVE PRODUCTS FROM JSP  
ARE REVOLUTIONIZING BRIDGE INFRASTRUCTURE.

**#SteelFact**

One electric heavy vehicle with zero tail-pipe emission, reduces Greenhouse Gas footprint by over

**125 tons CO<sub>2</sub>**  
equivalent every year.

Source: World Steel Association

# REDUCING GHG FOOTPRINT FOR A BETTER TOMORROW



Introducing Electric  
in Steel Transport  
Inaugural Run on July 29, 2021  
Pilkhuwa to Sahibabad

In keeping with its Responsible Supply Chain Policy, Tata Steel had the unique honour of the first ever deployment of Electric Heavy Vehicles to transport finished steel and became the first steel producer in the country to do so. Each such heavy vehicle uses sophisticated technologies with a minimum carrying capacity of 35 tonnes of steel.

Sure, we make steel.

**But #WeAlsoMakeTomorrow.**



Tata Steel is now a part of ResponsibleSteel™, the industry's first global multi-stakeholder standard and certification initiative.

# Blue-Green Infrastructure: Key to Sustainable Urbanisation

By SERC Bureau

When one thinks of an urban city, what is the first thing that comes to mind? Isn't it the well paved roads and the gleaming high towers - i.e. the very definition of grey infrastructure. As the threat from climate hazards rise, several global cities have altered their urban planning and design approaches to incorporate nature-driven solutions as a counter to conventional infrastructure practices by harnessing blue elements (for instance, seas, rivers, lakes, wetlands, and water utilities) alongside the green (such as trees, parks, gardens, playgrounds and forests). This paper explores the emerging concept of blue-green infrastructure, and analyses existing plans and projects in India and globally. It also identifies opportunities in the blue-green space to help India's cities respond to climate hazards, promote equity and resilience, and catalyse economic transitions for sustainable urban futures.

As countries around the world embark on economic recovery plans in the wake of the COVID-19 pandemic, there is widespread acknowledgement of the need for sustainable revival focussed on adapting to and mitigating climate change. For India, which aims to grow into a US\$5 trillion (INR 364 trillion) economy by 2024, climate-proofing the economy and building resilient development sectors is a priority. This necessitates a policy and investment response addressing the three linked aspects of sustainable development: economic, social and environmental.

Urban areas are facing increasing climate risks and threats to human comfort and environmental justice. Of the four major global risks projected to have a negative decadal consequence on countries through temperature increases, three are primarily environmental-natural disaster, extreme weather and biodiversity loss, with climate action failure as the fourth. In attempts to address these challenges, growing attention is being paid to the potential role of green (such as trees, parks, gardens, playgrounds and forests) and blue (seas, rivers, lakes, wetlands, and water utilities) spaces, often approached through the concept of green and blue infrastructure.

According to the Intergovernmental Panel on Climate Change, global CO<sub>2</sub> emissions will need to decline by about 45 % below 2010 levels by 2030 and reach net zero by 2050 to keep the overall temperature increase within the 1.5°C-limit by the end of the century. In India, average temperatures increased by 0.7°C between 1901 and 2018 due to excessive greenhouse gas emissions. Even at the most optimum rate of immediate emissions mitigation, India's temperature will still rise by 2.7°C by 2099; in the worst scenario, it will rise by 4.4°C by the end of the century.

Cities are a key contributor to climate change. Despite accounting for less than 2 % of the Earth's surface, cities consume 78 % of the world's energy and produce over 60 % of all greenhouse gas emissions. By 2050, about 68 % of the global population is expected to reside in urban agglomerations. One in every two Indians is expected to live in cities by that year.

The unprecedented surge of extreme weather events in India—such as drought, cyclones, forest fires, heatwaves and floods—have been directly linked to climate change, induced by greenhouse gas emissions through the use of fossil fuels and aerosols, and changes in land use and land cover. Existing urban infrastructure will need to be reinforced and made resilient to the anticipated population growth and withstand future shocks and calamities expected as outcomes of climate change. Sustainable water management through blue interventions and investment in green infrastructure can help build climate resilience.

Several Indian cities have seen a decline in green and blue features due to rapid urbanisation, with studies on land-use transitions indicating environmental losses (see Figure 1). Bengaluru, for instance, has seen a 925-% increase in built-up area between 1973 and 2013, with green features decreasing from 68 % to 14 %, and blue features from 3 % to less than 1 %. Similarly, from 1977 to 2017, Mumbai witnessed a 60-% loss in vegetation and 65-% decrease in waterbodies. A technical land-use land cover assessment for Greater Mumbai released in 2020 further indicates up to a 2.5 % loss in vegetation and a 1.4 % loss in waterbodies over the 1999-2019 period. And Ahmedabad is projected to see an approximate 50-% loss in vegetation between 2010 and 2030. An inability to effectively streamline, regulate and monitor urbanisation processes is inadvertently responsible for this vast environmental loss.

Although, cities and metropolitan areas are at the core of economic activities, contributing to around 60% of the world GDP, they are also the major contributors to climate change, accounting for 70% of the GHGs emissions and 60% of resource use. Given the growing consensus among experts about the complex relation between climate change and economic growth, there has been a growing realisation in international communities to actively work towards achieving sustainable development targets.

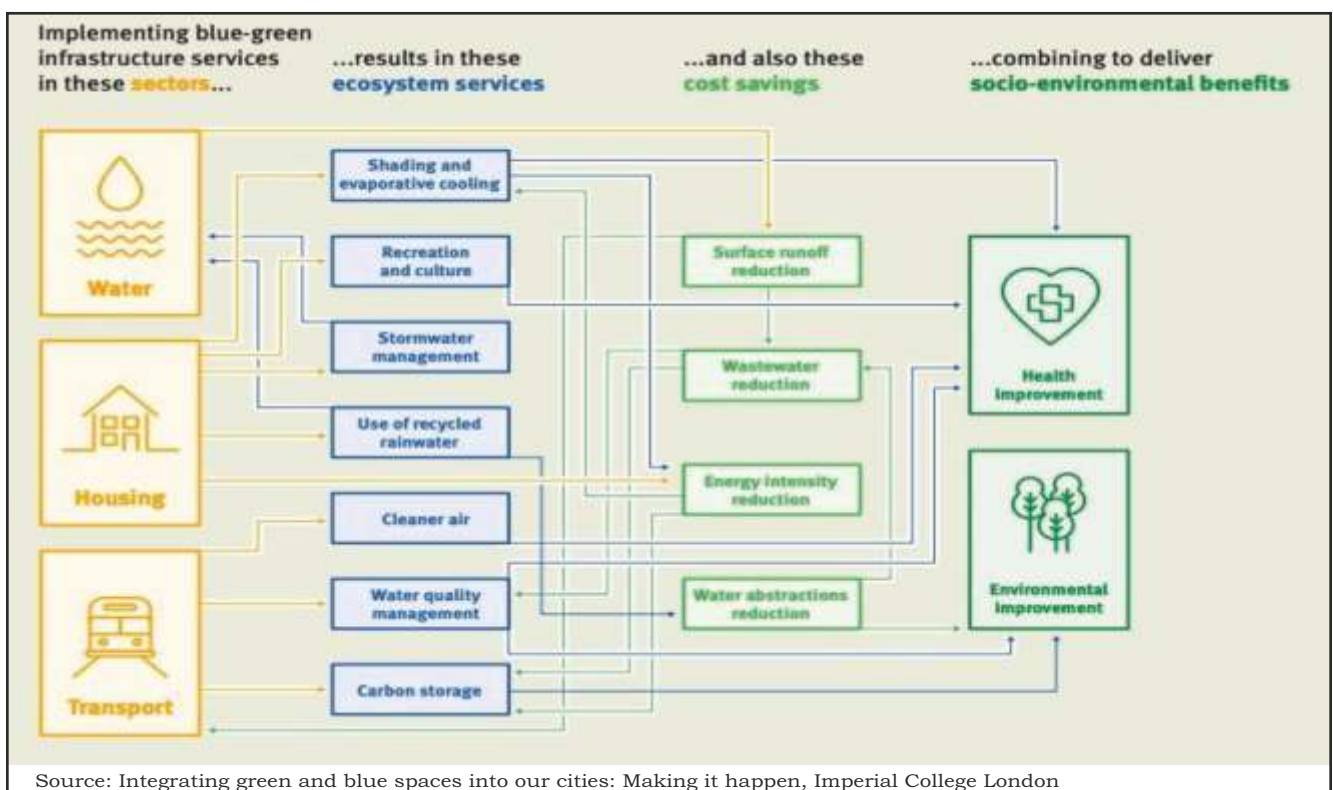
Listed 11th amongst the 17 Sustainable Development Goals established by the United Nations General Assembly in 2015 as Sustainable Cities and Communities, the main aim of this goal is "to make cities inclusive, safe, resilient and sustainable". Goal 11 promotes inclusive and sustainable urbanisation. It encompasses investments in public transports, improving urban planning and resource management as well as implementing policies for climate adaptation and improving resilience to disasters. Particularly, target 11.6 and 11.7 aims at reducing the adverse per capita environmental impact of the cities and providing universal access to safe, inclusive and accessible, green and public spaces respectively.

The growing pace of economic growth along with commercialisation and industrialisation in India have been the driving force behind rapid urbanisation, as individuals migrate from rural to urban areas in search of better employment opportunities and to attain improved standards of living. It is estimated that by 2050, about 68% of the world population is expected to reside in urban dwellings. This means that 2 in every 3 Indians are expected to live in cities by then. Currently, most Indian cities are plagued with problems of pollution, congestion and unequitable access to resources. Rapid urbanisation has exerted excessive pressure on fresh water supplies, sewage capacities, living environment as well as public health.

In light of these facts, there is a pressing need to change our stance around urban planning beyond the traditional grey infrastructure. Sustainable infrastructure has been identified as a crucial solution to tackle the aforementioned problems. A core component of it being

Blue-Green Infrastructure.

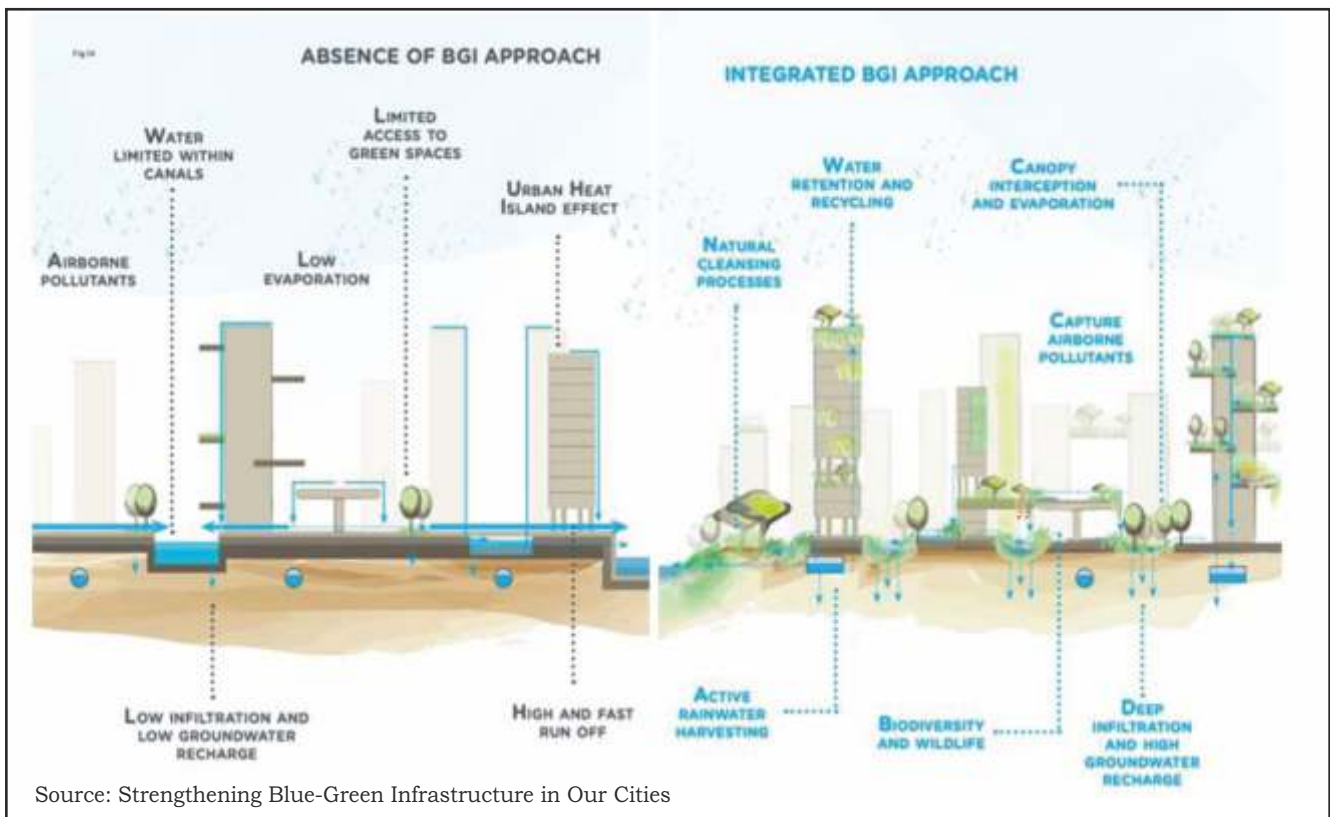
Although there is no universally accepted definition of Blue-Green Infrastructure there is a growing consensus among experts that it is an emerging solution for sustainable urban planning and efficient utilisation of urban space. While green infrastructure often refers to projects that include elements such as parks, green roofs, vertical and horizontal gardens, it is imperative to recognise its dependence on "blue" processes. Blue infrastructure on the other hand refers to features of urban planning which are designed to benefit both the quality and quantity of resilient provision of water supply. Therefore, the term blue-green infrastructure is an amalgamation of the above two types of infrastructure.



Blue-green infrastructure promotes sustainable as well as resource efficient living. Taking a simple example, effective and efficient water treatment plans allow for multipurpose use of wastewater in industries and agriculture, therefore reducing excessive water wastage and depletion. The benefits of blue-green infrastructure are immense and yield cross-sectorial results across the following 3 sectors: economic, social and environmental. This type of infrastructure plays a vital role in protecting the environment, it is specially considered as a potent source of climate mitigation actions. Initiatives in this segment help to reduce pollution, lower urban temperature, and regulate local ecosystems. These in turn have an important economic impact, for example, terrace gardens promote lower temperature of building surfaces which reduces the cooling demands, in turn decreasing the demand for energy and power. Other financial and economic benefits include reduced use of important raw material and resources, pollution prevention and reduced carbon emission.

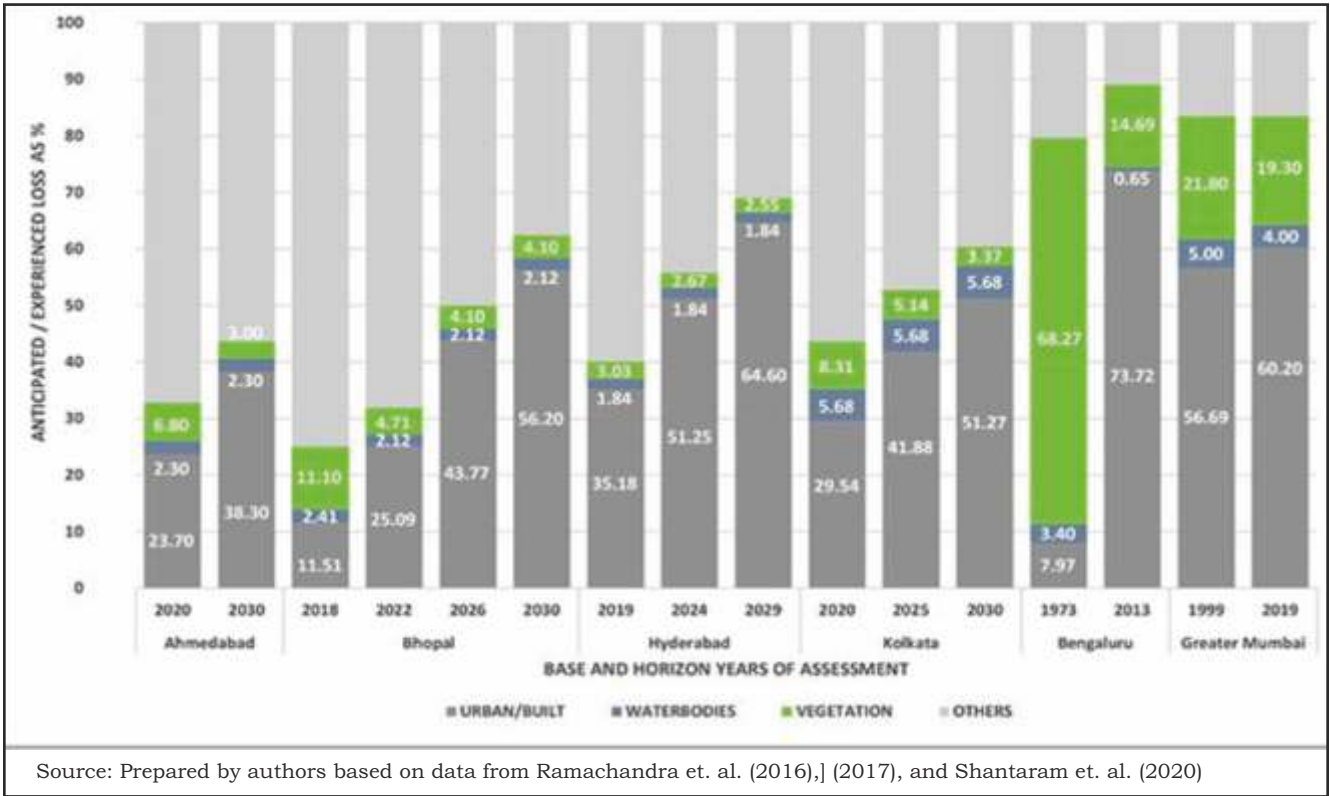
Therefore, urban planning that takes into account themes and designs from blue-green infrastructure planning provides for a feasible and effective solution for the various challenges faced by urban regions such as excessive contribution to climate change, extremely stressed water supply induced by rapid urbanisation and impervious land cover as well as the dwindling green cover in urban India.

Furthermore, SDG 11 is deeply interlinked with various other SDGs. A careful analysis of the targets of 11th SDGs highlights its role in improving not only the living conditions of urban dwellers but also its role in improving health and well being (SDG 3), provision of clean water and sanitation (SDG 6) as well as mitigation of climate change (SDG 13) making its adoption all the more vital. Perhaps one of the major advantages of Blue-Green infrastructure is its applicability in the smallest of infrastructure projects such as individual buildings to large cities. Example: As depicted below, one can introduce vertical and terrace gardens in apartment complexes which apart from playing a role in reducing cooling demands of the building, also increases the water retention and recycling capabilities. Similar initiatives enacted on a larger scale across cities can then majorly improve the water level in cities while capturing airborne pollutants.



Source: Strengthening Blue-Green Infrastructure in Our Cities

Although the concept of Blue-Green Infrastructure is relatively new, it is important that as India embarks on the journey of COVID-19 recovery with infrastructure development at its forefront, adequate policies and plans are put in place to reach the sustainable development goals by putting emphasis on Blue-Green Infrastructure. Especially with India expected to house 6 mega-cities with population above 10 million by 2030, it is important to recognise that economic and social stability of cities is hinged on the environment with efficient urban planning needed for a sustainable future.



Source: Prepared by authors based on data from Ramachandra et. al. (2016), (2017), and Shantaram et. al. (2020)

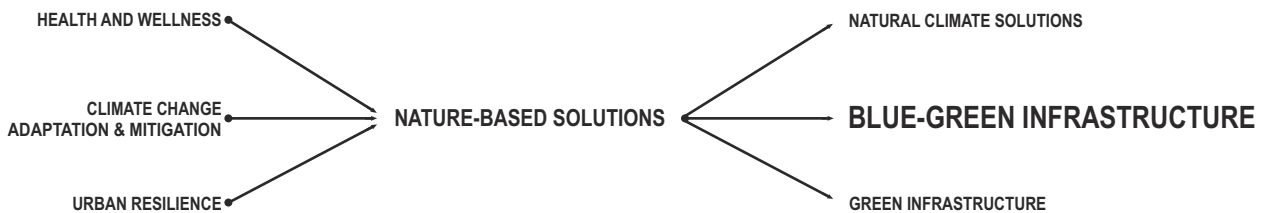
### Loss in Blue-Green Areas and Rise in Built-Up Areas in Major Indian Cities

Where the responsibility of compensating for natural losses lay with statutory development norms and the regulations of each Indian state and their cities, early approaches involved creating 'grey' infrastructure—artificially engineered solutions adapted to deal with climate emergencies related to water, such as wastewater treatment plants, water pumping stations in flood prone zones, pipelines, dams and reservoirs. Since these works involved the construction of hard surfaces and the usage of concrete, asphalt and steel, there are more capable solutions that could provide the climate resiliency required in the twenty-first century. Infrastructure planning must become more sensitive to ecological considerations by developing and adapting nature-based solutions to meet climate and sustainability goals, a purpose served by blue-green infrastructure.

### Blue-Green Infrastructure: Defining the Concept

While there is no established definition of the concept of blue-green infrastructure, a literature review of most terminologies and output can be categorically adjusted under the umbrella of nature-based solutions, with a focus on three pillars—climate change, health and urban resilience as figure below:

### The Umbrella of Nature-Based Solutions and Benefit Categories



Source: Interpreted by the authors from Seddon N. et. al. (2020) and Fargione et. al.

Western definitions of 'green infrastructure' and blue-green infrastructure tend to be synonymous for the most part. Blue features have been included in most definitions specifically pertaining to green infrastructure, and thus cannot simply be categorised as 'green' but must be called 'blue and green' definitions. The European Commission defines green infrastructure as "strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation and climate mitigation and adaptation. This network of green (land) and blue (water) spaces can improve environmental conditions and therefore citizens' health and quality of life. It also supports a green economy, creates job opportunities and enhances biodiversity".



The Australian public sector approach expanded the scope of dormant opportunities in blue-green infrastructure (in reference to integrating water management and planning with urban landscape and greening outcomes) by recognising the inherent multifunctionality of the individual blue and green components. Deploying blue-green infrastructure in sectors such as transportation, water and housing can result in various provisioning, regulating, supporting and cultural ecosystem services, which in turn lead to health and environmental improvements alongside financial savings.

The blue-green infrastructure concept is still new in India, and as such will be defined as per its inclusion in policies at the central, state and sub-regional levels. For instance, the Delhi Development Authority, which is creating a blue-green masterplan for the city, defines blue and green infrastructure separately, and restricts both to the field of urban planning: "'Blue 'infrastructure refers to water bodies like rivers, canals, ponds, wetlands, floodplains, and water treatment facilities; while 'Green 'stands for trees, lawns, hedgerows, parks, fields, and forests. The concept refers to urban planning where water bodies and land are inter-dependent and grow with the help of each other while offering environmental and social benefits".

#### Existing Global Blue-Green Practices

Global instances of blue-green interventions over the past two decades have been introduced to address various kinds of urban issues. For instance, the German city of Leipzig overcame population and economy declines in the post-reunification period through comprehensive green infrastructure planning at the city and regional levels. By making way for detached housing in previously developed green sites, proposing pocket parks, and chaining green spaces near high density housing, the liveability and valuation of Leipzig's urban areas improved substantially.

Although existing global blue-green interventions may differ in terms of density, size or the nature of the problem and the goal, learnings from these initiatives will be useful to Indian cities and others in creating blue-green infrastructure frameworks to address local problems and challenges.

#### India's Blue-Green Interventions

In India, the term infrastructure is primarily associated with the 'grey'—engineered, brick and mortar features. Nevertheless, blue-green infrastructure alongside grey is slowly becoming part of urban planning at the national, regional and municipal level.

#### Central Ministries and Missions

Green infrastructure was first mentioned in an early discussion on India's environmental policy in the Fourth Five Year Plan (1964-69), which merely called environmental protection an important ideology of a healthy life and mentioned how countries around the world were impacted by environmental issues. Yet, the environment ministry was formed only a decade later in 1980. Several issues have since come under its ambit, such as controlling air and water pollution, and preserving forests, mangroves and other natural resources. Rechristened as the Ministry of Environment, Forest, and Climate Change in 2014, it remains the central point for planning, monitoring and implementing policies pertaining to environment and climate, while the Ministry of Water Resources and Ganga Development oversees India's national water resources (the country's blue infrastructure).

In 2008, India formulated the National Action Plan on Climate Change (NAPCC) in response to the UN Framework Convention on Climate Change and the UN's 'Green Economy Initiative'. The initiative listed out the macroeconomic, sustainability and poverty reduction implications of green investment in sectors like renewable energy and sustainable agriculture, and also provided guidance on catalysing increased investment in these areas. The NAPCC includes 12 missions-National Mission for Green India; National Solar Mission; National Water Mission; National Mission for Sustainable Agriculture; National Mission on Sustainable Habitat; National Mission for Enhanced Energy Efficiency; National Mission for Himalayan Ecosystem; National Mission on Strategic Knowledge on Climate Change; National Wind Mission; Mission on Health (to deal with climate change impacts on human health); National Coastal Mission; and the Waste-to-Energy Mission. The missions dealing with sustainable habitat, water, and agriculture and forestry are multisectoral, overlapping and multi-departmental in nature.

Institutional, systemic and process barriers-including financial constraints, inter-ministerial coordination, lack of technical expertise and project clearance delays-are major challenges in the efficient implementation of the missions. Additionally, there is "little synergy among the missions, which are still being viewed in terms of portfolios of ministries operating in different domains, and this will impact the ability to implement the policies".

Crucially, the success of these missions is pegged to the achievements of the panchayats, councils and municipal corporations. Effective decentralisation and functional division are crucial to the success of these programmes.

The prevalent top-down approach does not create enough capacity nor provide guidelines (especially related to funds, training and technological knowhow) to be followed by state governments to help the local bodies implement the missions.

In addition to the NAPCC, India has two national flagship projects—the Smart Cities Mission and the Atal Mission for Rejuvenation and Urban Transformation (AMRUT)—focused on improving urban living and that include blue and green components as part of the mission intention. AMRUT works on issues of water supply, sanitation and green space upgradation, while the Smart Cities Mission works on solutions like sanitation, water supply, preserving open spaces and improving the quality of life of citizens.

For example, the rejuvenation of lakes is a major component of the Udaipur Smart City programme, which involves preventing sewage discharge, de-weeding lakes and stopping idol immersions. The city's economy is tourism-dependent, with lakes forming a big part of this sector, and thus cleaning up the water and creating more habitable waterfronts and spaces is the crux of the programme. Similarly, water cleaning and the desilting project of the Godavari river, and developing the parks, gardens and green spaces in the surrounding areas are major components of the Nashik Smart City mission. The interplay between and planning of the blue and green infrastructure will determine the success of both these and other smart cities.

### Blue-Green Cities

Although a relatively new concept, several Indian cities—such as Delhi, Bhopal, Madurai and Bengaluru—are including blue-green components in their master or action plans, with the aim of enhancing existing natural blue systems in the city and the surrounding public spaces through a planned strategy.

However, these cities—and indeed many of India's other cities—are already high-density built areas with existing challenges, including mix land use, overlapping jurisdiction among different agencies, skewed development patterns, technical difficulties and socio-political will. Land scarcity in such high-density areas means there is limited space for blue-green installations, which suggests that high efficiency and adaptability in urban blue-green infrastructure development is needed.

### Blue-Green Masterplan, Delhi

Delhi is one of the first cities in India to include a blue-green policy focus in its 2041 masterplan. While the details of the policy are still being determined through public consultations, the overarching idea is to ensure that water bodies and green spaces are synchronously planned in an interdependent fashion. The current masterplan ends this year, and the Delhi Development Authority (DDA) will need to notify the new plan as soon as it is ready.

According to the DDA's 2041 proposal, 'blue' infrastructure refers to water bodies like rivers, canals, ponds, wetlands and floodplains, and water treatment facilities, while 'green' refers to trees, lawns, hedgerows, parks, fields, and forests.

The DDA has taken a practical approach by creating a multi-pronged strategy to ensure the policy is integrated into the masterplan. It is currently preparing a 60-layer digital map of the city to include the different agencies under whose jurisdiction the specific water and land bodies fall. Subsequently, the 50 big drains (nullahs) that are currently governed by the different agencies will be cleaned up—pollutants will be treated, and untreated outfalls and waste dumping in water sources will be stopped. Delhi generates about 3,800 million litres of sewage per day, half of which goes directly into water bodies without being treated, so the cleaning up of drains will prove beneficial.

Next, the cleaned areas alongside the drains will be declared as buffer zones and green corridors that will be backed by creating walking and cycling paths through gardens. Low impact infrastructure like exercise areas, yoga gardens, open air theatres, museums, boating facilities, green houses, and community vegetable gardens will also be set up.

A multiplicity of governing agencies has resulted in the poor implementation of policies and decisions in the city. The DDA is consulting with these agencies on the blue-green policy to establish a common rulebook to ensure the integrated development of blue-green infrastructure in Delhi. Indeed, proper coordination and cooperation among the city's multiple municipal authorities, the DDA, the state government and development agencies will be crucial to the successful realisation of the blue-green policy and wider masterplan.

### Blue-Green Masterplan, Bhopal

Madhya Pradesh's Bhopal is a city of lakes and among the 100 cities selected under the Smart Cities Mission. The Bhopal Municipal Corporation is in the process of finalising the 2021 masterplan, while the Bhopal Smart City

Development Corporation Limited, a special purpose vehicle created under the Smart Cities Mission, will help create a separate 'green and blue masterplan' for the city, the main goals of which are to maintain and grow the green cover, to influence citizens' lifestyle indicators; and to promote an environmentally sustainable city. It also aims to "create conditions for local and international businesses to thrive" in Bhopal and make the city "the place for people centric development and a cultural hub for arts, architecture, crafts and natural heritage". The green and blue masterplan includes initiatives on sustainable water management, making all buildings green, waste management and recycling, and creating a network of parks, cycling paths and green walkways by linking land parcels.

Bhopal's previous masterplan expired in 2005; the city expanded without infrastructure services and urban planning guidelines, leading to a mushrooming of gated communities and townships and uncoordinated urban growth in the peri-urban areas. Although the new draft masterplan is ambitious in scope, it appears to have been conceptualised without community participation to address all concerns. The Bhopal Citizens' Forum has filed a public interest litigation against it over concerns related to a historic lake and surrounding tiger habitat, which could derail the plan or delay its implementation.

### Blue-Green Action Plan, Madurai

In December 2014, the Madurai Municipal Corporation partnered with an international academic institution, a local NGO and citizen groups to create a blue-green action plan, driven by the severe water stress conditions faced by the city and the wider Vaigai Basin. This plan was developed through bottom-up stakeholder engagement. For instance, 'water walks' were conducted near water sources, bringing together community members and representatives from government and local organisations to discuss the degraded river corridor and related issues. Managing the drainage and sewerage network, cleaning up the lakes, and green space development emerged as the top priorities for the blue-green plan through such discussions, and gave rise to the projects that became part of the blue-green plan.

The blue-green plan has been merged with ongoing work under the Smart Cities Mission to "accelerate economic growth via climate compatible development projects" funded by the larger mission.[74] This plan will also need to be linked with the Madurai masterplan to institutionalise all decisions and processes.

### Bangalore Masterplan 2050 for Water Supply and Sewerage Management

The Bangalore Water Supply and Sewerage Board (BWSSB) oversees water supply and water and sanitation quality and has been working to reduce the leakages of water, increase water revenue, and improve sanitation standards and disposal processes.

In 2014, the BWSSB, the Indian Institute of Human Settlements and local stakeholders conceptualised a blue-green action plan to future-proof the city through resource security, climate resilience, a move to a low carbon economy, and ecosystem protection. Consequently, the Masterplan 2050 for Water Supply and Sewerage Management was announced, which had three key drivers—population growth, water demand and climate change. The masterplan, being implemented through foreign loans, has been divided into a mix of short-term and long-term targets, including the implementation and continuous evaluation of technical aspects of the project, climate adaptation by setting up new approaches and network models, and creating warning systems through academic support and strategic stakeholder engagement.

### Blue-Green Foundation for Urban Planning

Many of India's urban planning statutes are outdated and follow regimental approaches through rigid land use plans and development control regulations. To adapt to an ever-evolving component like blue-green infrastructure, Indian cities must move towards dynamic urban planning that considers changes taking place around them. More intensive and transparent digital interfaces, like GIS mapping and live tracking, must be developed by the public sector to ensure real-time monitoring and evaluation of blue-green benefits. This is also necessary to keep up with innovations in urban planning ranging, such as environmental real-time GIS mapping or using artificial intelligence for sustainable urbanisation.

### Conclusion

The concept of blue-green infrastructure is relatively new, but many global cities have already begun the transition, driven by exacerbating climate impacts and events. While the green infrastructure concept has found some acceptance in India,[91] the country must also consider including blue infrastructure in its sustainability transition. It is important to combine and protect hydrological elements of the urban landscape alongside the

ecological while planning for adaptation and resilience.

Several scattered attempts are being made in cities across the country and at the central level to introduce blue-green infrastructure aspects for climate adaptation and mitigation. India needs an all-encompassing plan that acknowledges that its cities' economic and social stability is dependent on the environment, and that the existing blue-green resources will need to be planned mindfully for a sustainable future.

Table: Summary of Key Indian Blue-Green Infrastructure Initiatives

City	Area (sq. km.)	Initiative	Responsible Agency	Intent
Delhi	1483	Blue-Green Masterplan	Delhi Development Authority	To ensure that blue and green features are synchronously planned, mitigating pollution, and adapting to climate challenges.
Bhopal	1017	Blue-Green Masterplan	Bhopal Municipal Corporation and Bhopal Smart City Ltd	To maintain and grow the green cover, create an environmentally sustainable city, and improve health.
Madurai	148	Blue-Green Action Plan	Madurai Municipal Corporation	To mitigate and adapt to flooding and accelerate economic growth via climate compatible development projects.
Bengaluru	1307	Blue-Green Action Plan that culminated in the Water and Sewerage Masterplan 2050	Bangalore Water Board and Bangalore Municipal Corporation	To achieve resource security, climate resilience, a move to a low carbon economy, and ecosystem protection.

Source: Compiled by authors using data from Bengaluru Blue Green Action Plan; India's National Action Plan on Climate Change; Madurai plan; Bhopal Blue Green Masterplan; and Delhi Master plan.



Let Devi Shakti transforms in Women Power

With Pure Power Prayers

**RASHMI**  
**GROUP**

# Financing Green Urban Infrastructure

By SERC Bureau

Cities play a critical role in planning and investing in urban infrastructure. In many cases, local governments have authority over the selection of infrastructure projects made at the municipal level. Therefore, they exercise influence over the nature of infrastructure renewal and expansion, and have the ability to promote greener and more sustainable urban centres. Their leadership role extends to the kinds of investment mechanism selected to finance, for example, improvements in the transportation, building, waste and water and, to a lesser extent, energy sector. Because cities have revenue sources that are tied to many aspects of these sectors, their design can stimulate or dissuade the development of greener and more sustainable cities.

The greening of municipal financial instruments, such as congestion charges, variable parking fees, toll lanes and split-rate property taxes, is an important first step toward achieving greener urban infrastructure. Public sector financing, however, may not be sufficient to stimulate a paradigm shift. Therefore, the second critical step is to mobilise private sector investments to fill funding gaps for many urban green infrastructure projects. There are certain conditions that need to be put in place in order to attract and capture private sector investments. The three main conditions are (1) markets for green urban investment projects, (2) good return on investment and (3) limited risk. Cities and countries differ with respect to these conditions; as such, some of these instruments could be more appropriate for cities in industrialised and medium income countries than lower income developing countries, for which grants, loans and other development finance instruments could be more relevant.

There are several existing financial instruments that cities have applied in order to attract private finance for urban green infrastructure:

- Private sector involvement in urban green infrastructure can take the form of **public-private partnerships** (PPPs), in which the long-term risk is transferred to the private sector.
- Through an alternative instrument, **tax increment financing**, future tax revenues are used to attract private finance.
- Real estate developers may also pay for the infrastructure that is needed to connect their new development to existing infrastructure in the form of **development charges** (impact fees) and **value capture** (taxes that capture the value increases of real estate due to new infrastructure development nearby).
- Finally, loans, bonds and carbon finance are instruments used to attract private finance in well-functioning capital markets.

## Policy alignment across levels of government

1. *National policies are key.* The greener the national framework, the easier it will be to address city-specific challenges and to ensure coherence and consistency between national and local policies. The national framework is particularly important with respect to pricing signals for non-localised environmental externalities, such as GHG emissions. Moreover, in many countries, reform of urban revenue sources requires central government action.

2. *Remove barriers to local government action.* While national governments may face challenges to immediately implementing holistic reforms, they can start by eliminating current regulations that impair the potential for local governments to act.

3. *A holistic approach is necessary.* Efforts to green urban revenue sources may have undesirable distributional consequences. These concerns should be addressed in the context of the entire tax and benefit system, rather than trying to ensure that each individual policy measure serves both environmental and equity objectives.

4. *Keep the policy package simple.* While the design of specific instruments will in many cases need to be quite sophisticated, it is important to keep the overall policy package as simple as possible. An overly complex system of environmental taxes, charges and fees makes impact assessment harder and raises the risk of unintended interaction effects or perverse incentives.

## Making existing revenue sources greener

5. *The overriding aim is to internalise externalities.* To the extent possible, taxes, charges and fees should be designed to confront agents with the full marginal social cost of actions affecting the environment. At a minimum,

this means eliminating the anti-green bias of some existing local tax provisions and the perverse incentives created by many environmentally harmful subsidies.

6. *Road-pricing policies can help reduce traffic and pollution.* Road-pricing policies like congestion charges are likely to be most effective at reducing traffic and emissions when differentiated according to the level of congestion, peak hours or both. Linking pricing structures to vehicle type as well may strengthen incentives to switch to greener forms of transport.

7. *Transport-related revenue sources require coherent planning.* The use of congestion charges to achieve green objectives will be more effective and less costly to users when alternative mobility solutions are available; governments might consider earmarking such revenues to finance public transportation.

8. *Fees for water and waste services should be more responsive to actual resource use.* Fees and prices should be used to signal the scarcity of the resources being consumed, as well as covering the costs of infrastructure investment and service provision.

9. *Where appropriate, intergovernmental grants should take into account environmental objectives.* This will help compensate cities for the opportunity costs of green behaviour (e.g., the loss of development charges if an area is designated as a public park). Specific or matching grants can compensate local governments for the spillovers generated by green policies that incur localised costs but generate broad benefits.

**Tapping new sources of finance**

10. *Carbon finance should be more accessible to cities.* Cities and central governments can work together to make better use of carbon-offsetting programmes (e.g., the Clean Development Mechanism and Joint Implementation) and to ensure that these (and other) resources may come directly to cities. One of the conditions of carbon finance should be use of a harmonised emission inventory for cities.

11. *Infrastructure needs related to new development should be internalised in the financing of development projects.* The costs of sprawl, for example, may be recovered from developers through development charges or other financial contributions. In a similar fashion, new developments should also, where appropriate, incorporate the cost of investment in alternative water sources.

12. *National-local co-operation is essential to developing access to new forms of green finance.* There are a number of potential instruments for tapping private finance in support of urban greening and aligning private investment with policy priorities. These include private-public partnerships, green bonds and green infrastructure banks. However, they each raise potential problems of insufficient size, moral hazard and opportunism. Cities thus need to co-operate with one another and with central governments to build capacity and ensure that they possess the requisite financial, technical and legal expertise, as well as sufficient bargaining power when negotiating private-sector financing.

Status as on 30.09.2022																
Sl. No.	Mode	NHDP Phase/ Scheme	Name of Project	NH No. (Old/ New)	Length (Km)	Sanctions of Cost/TPC Rs. in crore	Awarded Cost Rs. in crore	Date of Award	Date of Start/Appointed Date	Right of way (ROW) Available %	Cumulative Physical progress %	Cumulative Financial progress %	Target date of completion as per contract	Likely date of completion	Name of the Contractor	Remarks/ Issues (Land Acquisition Issues/ Forest Issues/ Utility Shifting/ Contractor Issues)
<b>West Bengal</b>																
1	EPC	EPC (NCE)	Construction of Machi bridge (of 475m) and Approaches of 2x4-Lane with paved shoulder across Indo-Nepal border on Asian Highway (NH-50)	079	1.00	18.86	10.78	3/2017	2/2018	100.0%	100.0%	100.0%	13/0/2021	Completed	Orish Chandis R Agrawal Infracon Pvt Ltd.(ORACI)	
2	EPC	SARDP	Construction/Upgradation of existing highway to 2 lane with paved shoulder from Km 0.06 to Km 13.69 NH-717A Bagrakat-Kater IV A	717A	13.00	42.94	261	2/2019	18/2019	100.0%	41.69%	36.98%	4/3/2022	7/10/2023	M/s HSRP - I (P) (JV)	
3	EPC	SARDP	Construction/Upgradation of existing highway to 2 lane with paved shoulder from Km 13.80 to Km 25.80 NH-717A Bagrakat-Kater IV B	717A	12.00	268.87	184.48	3/2020	18/5/2020	100.0%	46.86%	37.22%	4/6/2023	8/23/2023	Rail Contractors Pvt. Ltd. - Sri Saje Sai Infrastructure Pvt. Ltd. (JV)	
4	EPC	SARDP	Construction of alternative highway to Gangtok in Sikkim via Bagrakat-Chukhim-Nambong-Kater-Bukhim-Agarah-Rwanek in W.B. and from Rhenock-Rumtong-Piyong along with spur from Arjan-Ratap-Menda in Sikkim from Km 25.88 to Km 26.10 of Bagrakat-Kater IV C	717A	0.20	77.44	-	-	-	-	0.00%	0.00%	-	-	-	-
5	EPC	SARDP	Construction/Upgradation of existing highway to 2 lane with paved shoulder from Km 26.10 to Km 43.80 NH-717A Bagrakat-Kater IV D	717A	17.00	342.97	177.88	3/2020	6/11/2020	100.0%	41.13%	39.19%	8/10/2022	1/16/2023	Rail Contractors Pvt. Ltd. (RCL) - Shivan Builders Pvt. Ltd.(SBPL) (JV)	
6	EPC	NHCE	Construction & upgradation of existing road to 2-lane with paved shoulder including geometric improvement of Kater-Lava Lane section from km 40.06 to km 61.100 of NH717-A on EPC under SARDP-NE A (Pkg-VI)	717 A	21.10	311.82	186.28	8/2/2020	18/3/2020	100.0%	26.42%	31.86%	4/3/2023	7/30/2023	Rail Contractors Pvt. Ltd. - Sri Saje Sai Infrastructure Pvt. Ltd. (JV)	
7	EPC	NHCE	Construction & upgradation of existing road to 2-lane with paved shoulder including geometric improvement of sect. from Pedong bypass to Rechi Border km 78.700 to km96.234 of NH-717A under SARDP-NE-A on EPC (Lava-More-Rishi Border) (Pkg-VI) as part of Alternate connectivity to Gangtok	717 A	17.50	345.38	340.3	7/24/2020	18/20/2020	100.0%	34.91%	28.82%	4/11/2022	12/28/2022	M/s TTC Infra India - IIRB Sanyal&S Infra Projects (S) Pvt. Ltd. (JV)	
<b>Total</b>					<b>78.15</b>	<b>1834.37</b>	<b>1158.78</b>									

# HEDGE

**YOUR PRICE RISK ON BSE USING**

**BSE SUFI STEEL BILLET FUTURES CONTRACT**



## BENEFITS OF BSE SUFI STEEL BILLET FUTURES CONTRACT

- 1 **Hedging and Price Risk Management tool**
- 2 **Latest technological framework**
- 3 **Structured and healthier price discovery platform**
- 4 **National level benchmark prices**
- 5 **Robust delivery mechanism**
- 6 **Most cost-efficient platform for hedging**

THE WORLD'S FASTEST EXCHANGE WITH A SPEED OF 6 MICROSECONDS

[www.bseindia.com](http://www.bseindia.com) | [/BSEIndia](https://www.facebook.com/BSEIndia) | [@BSEIndia](https://www.instagram.com/BSEIndia) | [/BSEIndia](https://www.youtube.com/BSEIndia) | [/BSEIndia](https://www.linkedin.com/BSEIndia)





# BSE Sufi Steel Billets Futures – The perfect hedge for all Steel Variants

**Shri Sameer Patil, Chief Business Officer, BSE**

With the U.S. Dollar strengthening globally, concern remains for India and Indian companies with their financial woes affecting sentiment. India has lost about USD 80/LDT on steel prices over the last several weeks and despite gaining a marginal USD 5/Ton, remains under pressure as the lowest placed of all sub-continent markets once again. The Indian Rupee has also crossed the psychologically worrying Rs.80/- mark, leaving Indian commodity players worriedly cautious.

Adding to the woes, the world's biggest economy, the US, is technically in recession (negative growth for two continuous quarters) with factories dialling back production and job cuts increasing. In a desperate bid to prevent a 'long recession' expected by the end of this year, the UK a month ago went in for the sharpest interest rate hike in a quarter of a century, while Germany is seeing the biggest drop in consumer spending since 1980. The UN, in a report on October 3rd '2022 warned that “monetary and fiscal policy moves in advanced economies risk pushing the world towards global recession and prolonged stagnation” and that it could inflict “worse damage than the financial crisis in 2008 and the Covid-19 shock in 2020”. Any event that results in volatility of the import items of India (oil, raw material for factories) or the export markets of India (iron, steel, jewellery), then we will be affected.

Fitch Ratings have cut the 2022 iron ore and coking coal price assumptions reflecting “ytd” (year till date) pricing on lower steel demand, particularly in China, which leads to steel production curtailments and lower demand for steelmaking inputs, falling steel producers' margins and build-up of iron ore inventories. In India, steel prices dropped 30% in the last three to four months since imposition of export duty on steel. The Micro Small Medium Enterprises (MSMEs) are now able to get steel at prices that was available two years ago. However, slowdown in demand is affecting the MSMEs. Production is down nearly 30% in most of the sectors as per the steel federation.

### Hedging price risks

In India, risk management tools, such as BSE SUFI Steel Billets Futures enable the steel ecosystem and its stakeholders along the entire supply chain to protect profit margins and minimize risk, using futures contracts. These contracts bring a national level benchmark price for the market participants which are transparent, structured, and healthier, reducing price risks.

Hedging is the process of offsetting the risk of price movements in the physical market by locking in a price for the same commodity in the futures market. It is similar as protecting your home, car or health, hedging guards against

having to incur unforeseen, extra costs. If properly hedged, changes in the underlying prices will be mostly offset by the hedge, thus protecting profit margin and asset value.

Refer below table for Hedging example:

A manufacturer has bought 1200 MT of Sponge iron in order to produce MS Billets. Monthly production of MS Billets is 1200 MT thereby consuming the stock of sponge iron. In the process to safeguard his business against the market volatility he takes opposite position in the BSE futures trading platform. Hence, mitigating the risk through hedging.

Date	Spot Market	BSE Futures Trading platform (BSE Sufi Steel Billets Futures Contract)
1 <sup>st</sup> September 2022	Buy 1200 MT Sponge Iron from trader @ Rs.37,000/MT	Sell 1200 MT BSE Sep 2022 contract @ Rs.49,500/MT traded price
15 <sup>th</sup> September 2022	Spot price goes down to Rs. 36500/- (Loss of Rs.500/MT)	BSE Futures rates also goes down to Rs 49000/- (Profit of Rs.500/MT)
30 <sup>th</sup> September 2022	Spot price goes up to Rs.36700/- (Profit of Rs.200/MT)	BSE Futures rates also goes up to Rs.49200/- (Loss of 200 Rs/MT)

### Hedge for other variants of Steel

BSE SUFI Steel Billets Futures contract is specifically created to help steel industry executives improve their understanding of the futures concept and update with the latest developments in launching price risk management tool. The various stakeholders will be able to deploy diverse risk management techniques and strategies to mitigate adverse price fluctuations.

The price of BSE Sufi Steel Billets Futures is in absolute correlation with the other variants of steel as can be depicted from the table below:

Correlation	
BSE Sufi Steel Billets vs Rebar	0.9620
BSE Sufi Steel Billets vs HRC	0.9050
BSE Sufi Steel Billets vs Angle (IF Route)	0.9931

So, despite the multiple steel types and alloys that each have unique properties — the BSE Sufi Steel Billets Futures contract is suited for price risk management for all specific grades. Some grades are sturdy and heavy, while other steels are ductile and versatile - the bottom-line remains that the hedging mechanism offered by BSE SUFI Steel Billets Futures contract can help navigate the price volatility of steel.

### In Conclusion

For BSE Sufi Steel Billets Futures, the underlying prices are as of Raipur, where the delivery centre is based. The trading and delivery unit are 10 MT. Stakeholders in the physical steel market will be able to benchmark different steel products they deal with against the BSE SUFI Steel Billets Futures price. BSE's open interest continues to grow.

October 2022

## STEEL MARKET PRICE (thousand tonnes)

CITY	INGOT	BILLETS	TMT 12MM	WIRE( 5.5MM/12G HB )	SCRAP	COIL/CR/HR	SPONGE IRON	PIG IRON	
								Foundry Grade	steel Grade
ALANG					40800				
AHMEDABAD	48300	49500			39200	66300/57800			
BHIWARI	48200								
BHAVNAGAR	49200	49300	54300		40000				
DELHI			53500		41000	65500/56800			
DURGAPUR	45900	46300	48700	49600/51600	42000		33100	47400	43500
GOA	48700	49000	54000						
GHAZIABAD	47800	48200	52000			64000/57000			
INDORE	48200	48600	54200		40200				
JALNA SUPER		48700	54500		39200				
JAIPUR	47800	48100	52500			64500/56500	36900		
JAMMU	49300								
KANPUR	48500		55000						
KOLKATA	46600	47000	48700		42500	64000/55000		46400	44600
LUDHIANA	48900	48800				66000/57000			
MANDI GOBINDGARH	48300	48500	53400		36600		37900	46600	44700
MUMBAI	48200	48700	55600			65300			
MUZAFRAGAR	47600	48100	51000		44400				
RAIGARH	45100	45700	49800				33600		42500
RAIPUR	45800	46300	51500	52000/54500	41700		33600		
ROURKELA	45200	45800	50800				33500		41500

Source: Metal Market

# TURNING EVERY ARCHITECTS DREAM TO REALITY



Toll Free No.: 1800 108 8282

www.tatastructura.com |

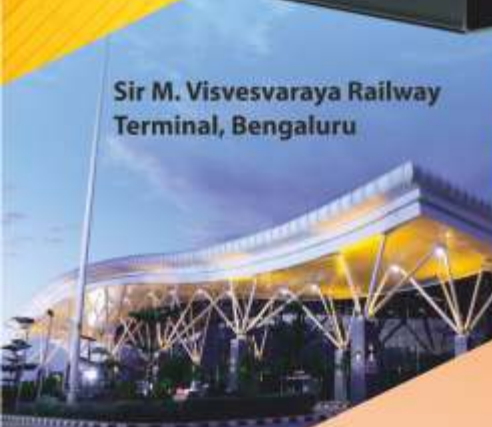
AIIMS, New Delhi



Kempegowda International Airport, Bengaluru



Sir M. Visvesvaraya Railway Terminal, Bengaluru



## *Innovative Tubes* for Door & Window Frames

**Sustainable**  
(GreenPro certified product)

**Aesthetic**  
(Premium look & finish)

**Perfect Fitment**  
(Sufficient space for perfect hinge placement)

**Surface Finish**  
(Black surface finish without any treatment for good painting)

**Superior Strength**  
(Made with YSt 210)



**TATA**  
**EZY FIT**  
Future Ready, Fits Easy

Toll Free No.: 1800 108 8282 |



**ELECTROTHERM®**



**ergolines**  
INNOVATION PARTNER

**Electrotherm, the most preferred steel plant maker up to 1 MTPA globally, is now the business partner of Ergolines (Italy), who is manufacturer and market leader of Electromagnetic Stirrers (EMS) for Caster and EAF, non-radioactive automatic mould level controller and powder thickness measurement and control system.**



**Caster Electromagnetic Stirrer**



**MFM - Gaussmeter**



**EAF-EMS Stirrer**



**Powder Thickness Control**



**Mould Level Control**

## **PRODUCT RANGE**

- **Mould Electromagnetic Stirrer (M-EMS)**
- **Strand & Final Electromagnetic Stirrer (S-EMS & F-EMS)**
- **Tundish Stirrer**
- **LF & EAF Stirrer**
- **Inductive Mould Level Detector (ILD)**
- **Ultrasonic Mould Level Detector (ULD)**
- **Optical Powder Profile Detector (OPD)**
- **Powder Thickness Measurement and Control System (PTC)**
- **Automatic Mould Powder Feeder (MPF) and Instrumented Powder Diffuser (IPD)**
- **Vibrational & Optical Slag Detectors (VSD & OSD)**
- **Mould Oscillation Checker (OPI)**



**Engineering & Technologies**

**ELECTROTHERM® (INDIA) LIMITED**

72, PALODIA, (VIA THALTEJ) AHMEDABAD, GUJARAT- 382 115, INDIA

Phone: + 91 2717- 660 550, Email: [mkt@electrotherm.com](mailto:mkt@electrotherm.com)

Website: [www.electrotherment.com](http://www.electrotherment.com)