


TATA STEEL

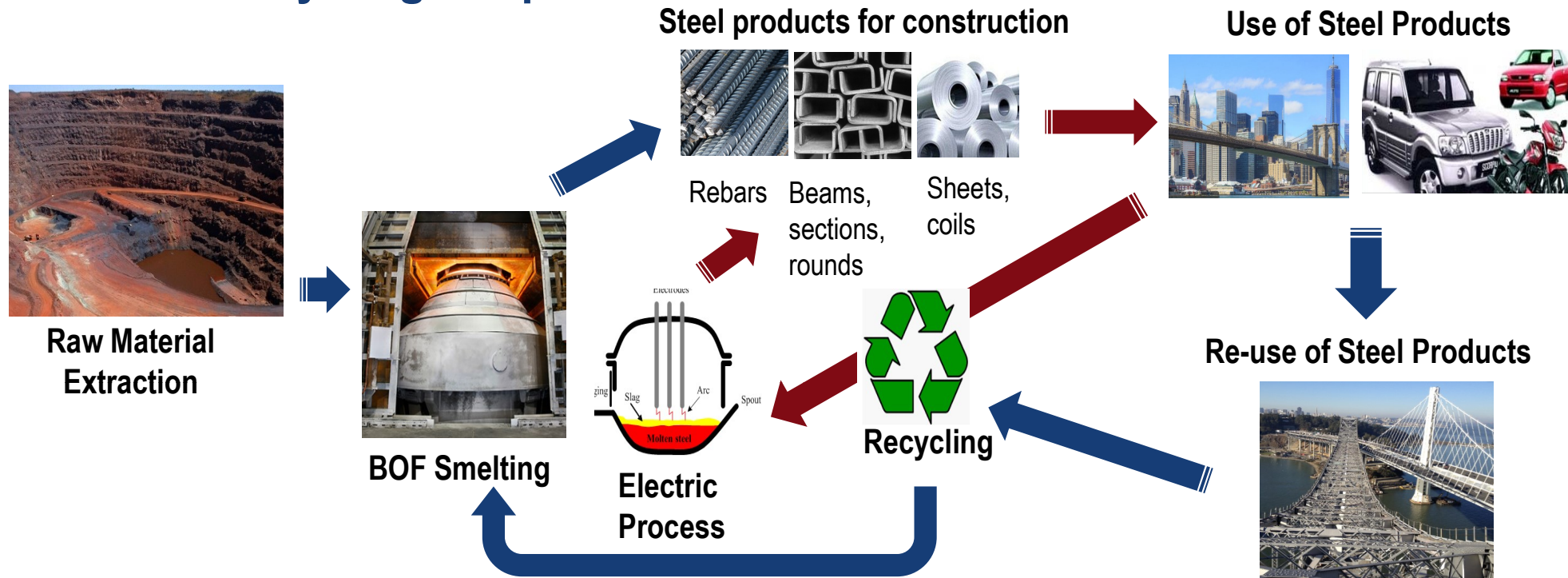
Green Products Leading to Resource Efficiency for a 'Better Tomorrow'

-  ➤ **Steel: The Most Recycled Material** [2 Slides]
- **Resource Efficiency in Manufacturing** [3 Slides]
- **Resource Efficiency in Use** [6 Slides]
- **Way Forward** [1 Slide]

Biswajit Ghosh
27th September '19

GREEN BUILDING CONGRESS 2019

The Steel Recycling Loop



- ❖ BF → BOF Route: ~ 45% of Indian Steel Output and 75% globally [Recycled scrap ~ 20% max, balance from virgin ores]
- ❖ Scrap → Electric Route: Recycled scrap input can be 100%. Alternate metallic inputs from virgin ores [e.g. Direct Reduced Iron, Hot Briquetted Iron etc.]

Steel: The Most Recycled Material

- ❖ Steel is 100% and indefinitely recyclable
- ❖ No quality loss in recycling
- ❖ Recycling rate varies from product to product
- ❖ Recycled steel is ~ 40% of steel industry ferrous input in world

Key Steel Uses	Recycling Rates [%]	Lifespan [Years]
Vehicles	95	20
Industrial Equipment	97	50
Structurals	95	50
Reinforced Steel	50	50

1 T Scrap Recycled

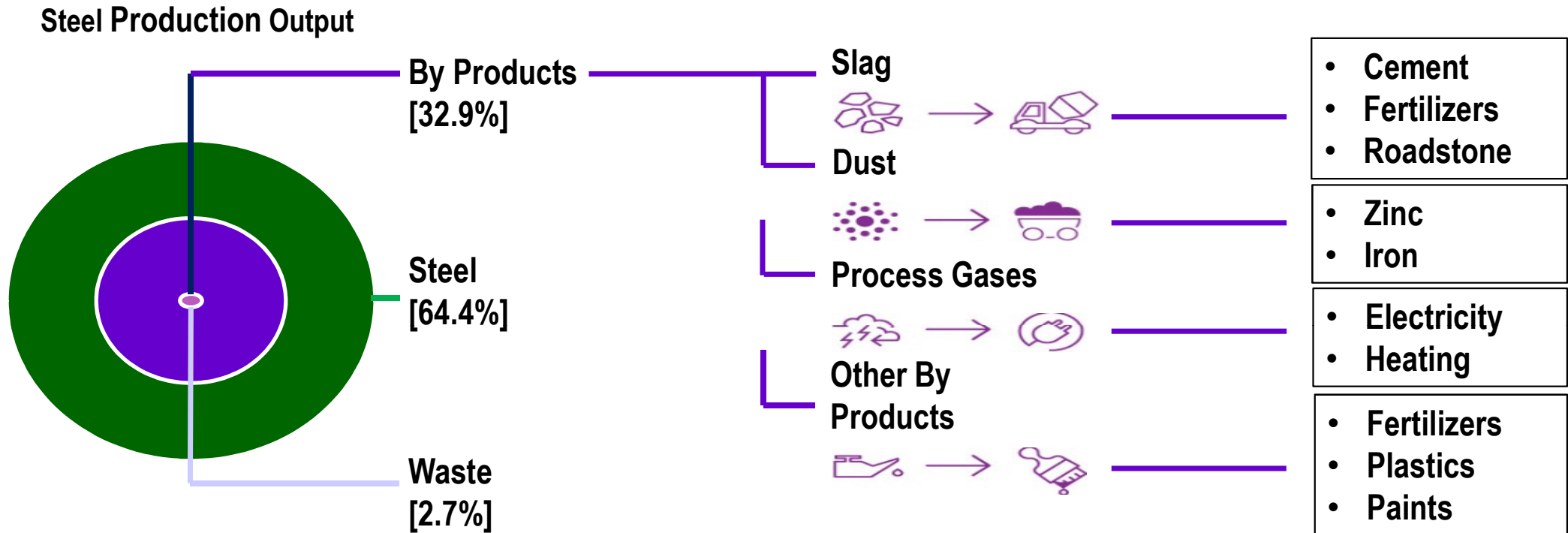
= 1.37 T Iron Ore + 0.6 T coking coal + 0.3 T fluxes + 16-17% less energy + 40% less water + ~ 58% less GHG

- ❖ Tata Steel recycles 100% of internally generated scrap
- ❖ ... and plans to start using external scrap as well

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Resource Efficiency: Utilization of By-Products



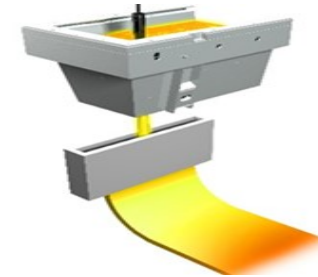
❖ Slag: Main By-product → Use in Cement Production → ~50% CO₂

❖ Gases → Can be Fully Reused to Provide 50-60 % Power. Can be Sold for Power Generation

Resource Efficiency: Reducing Material Consumption

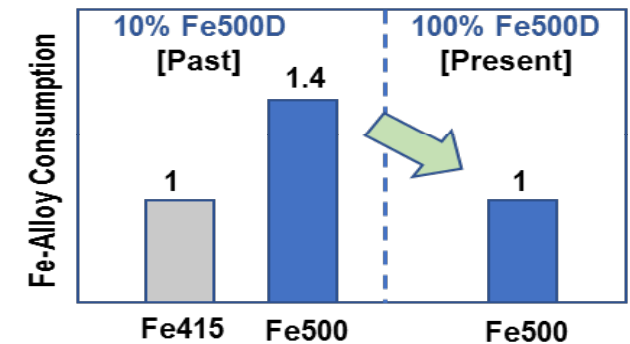
❖ Equipment Technology

- Eliminate Process Steps [e.g. Thin Slab Casting –vs- Conventional Slab Casting]



❖ Models and Process Optimization Tools

[e.g. Higher Strength Steels with Lower Ferro Alloy Consumption]



❖ Materials Selection:

- Optimize Composition, Size [e.g. Alloys]
- Longevity [e.g. Rolls]



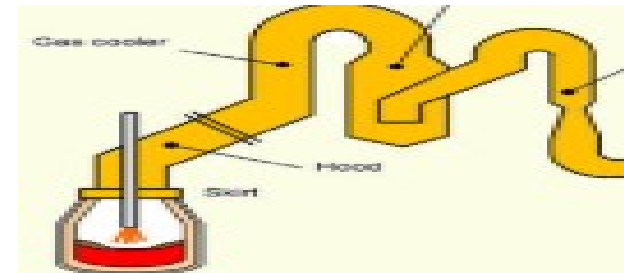
Resource Efficiency: Reducing Energy Wastage

❖ Reduce Energy Loss

- Integrate Processes [e.g. Caster with Mill → Hot Charging]
- Reduce Leakage [e.g. Ladle Management]

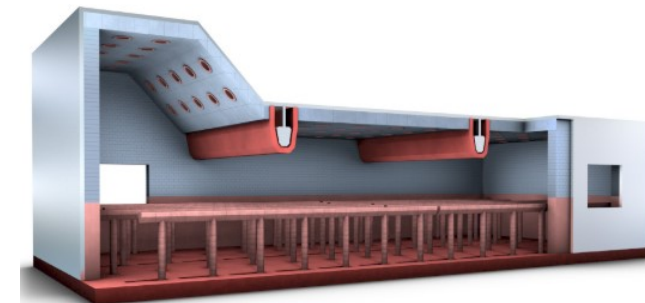


❖ Recover Chemical Energy for Use [e.g. BOF Gas Recovery → Use as Fuel]



❖ Energy Efficient Equipment

[e.g. Walking Beam – vs – ‘Pusher’ Furnace can lower overall fuel by > 30%]



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Saving Potential: Use High Strength Steels

- ❖ Steel: High Strength:: Weight Ratio
- ❖ Steel structures → much lighter than concrete equivalents
- ❖ → 30 – 70% conservation of natural resources
- ❖ Further savings by using high strength steels

72% saving in total materials by using steel frame
compared to concrete frame in One Kingdom Street,
London

- ❖ In UK, 96% of steel construction components are recovered

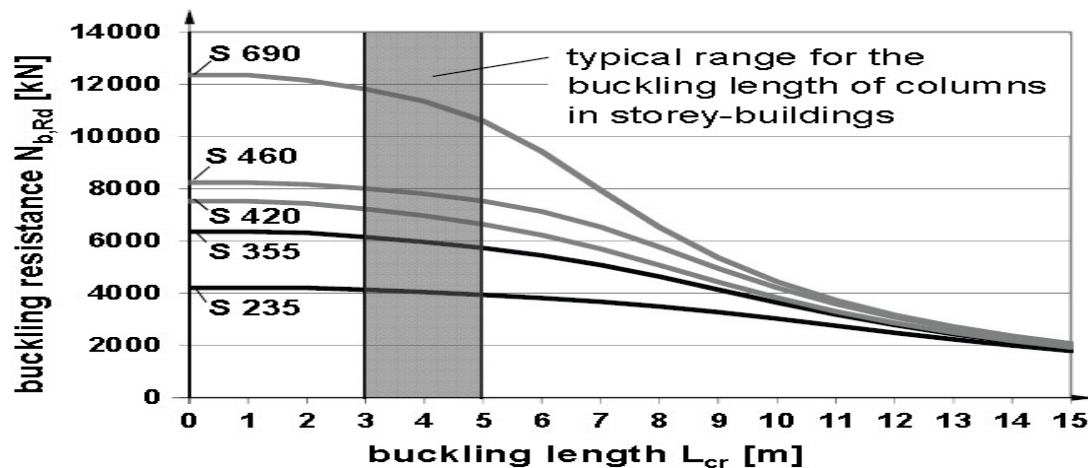
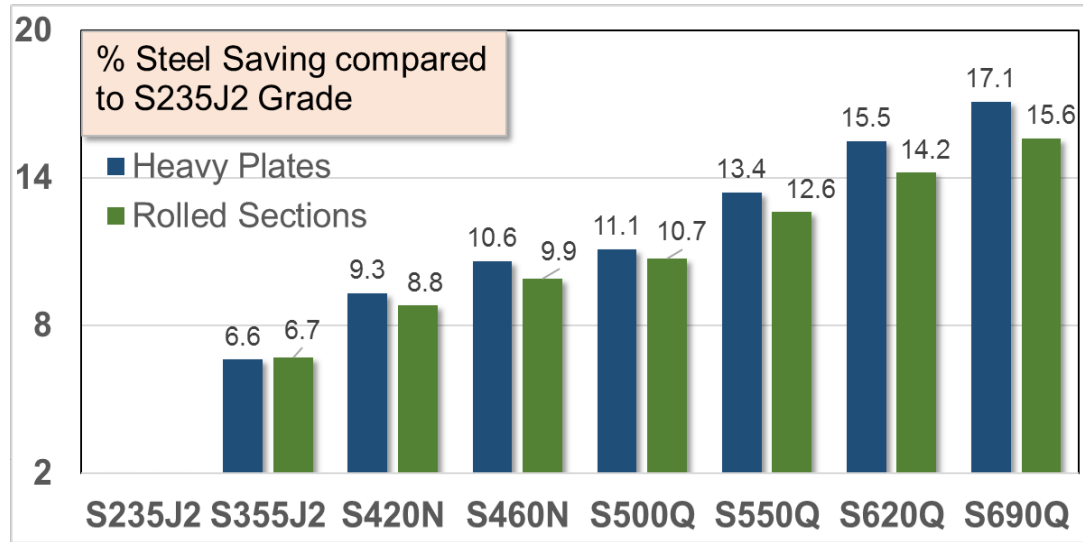


Bishop's Place, London: Office building with steel frame



One Kingdom Street, London

Savings by using High Strength Steel: Flat Structurals



❖ 6 – 10% savings by using upto S460 Grade

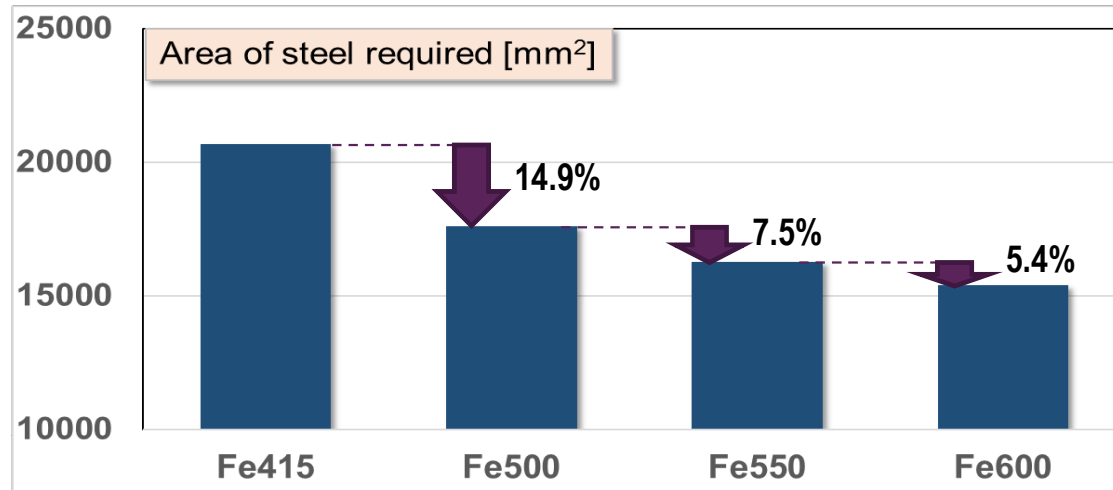
❖ Indian market not using > 460 Mpa steel at

present

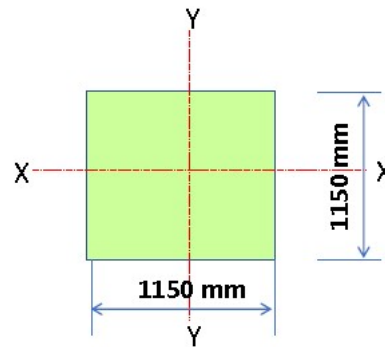
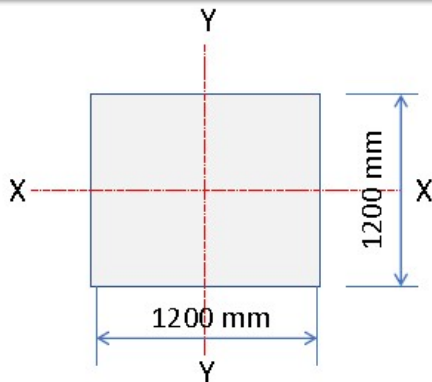
High strength steel has higher buckling resistance

[3-5 m length]

Savings by using High Strength Steel: Longs



- ❖ 12.5% ↓ in structural reinforcement by using Fe600 instead of Fe500
- ❖ 16 – 22% ↓ in case of nominal and deep beams



Fe500

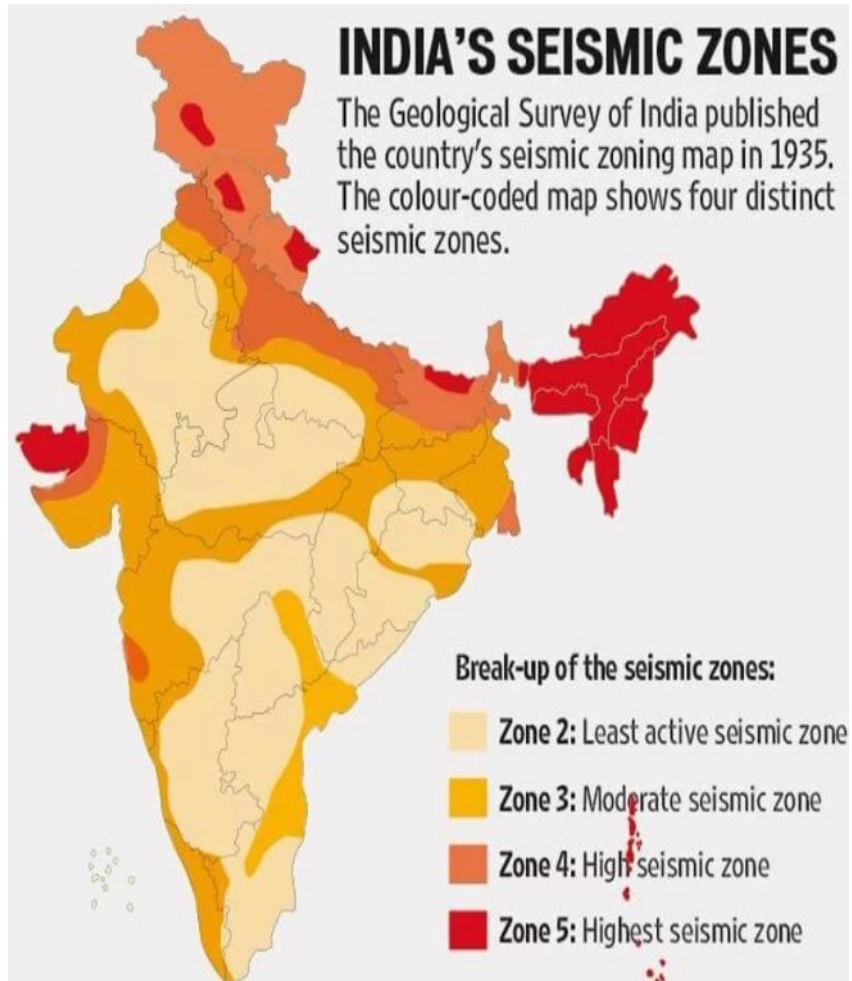
Steel Area: 17590 mm²
Concrete Area: 1440000 mm²

Fe600

Steel Area: 17590 mm²
Concrete Area: 1322500 mm²

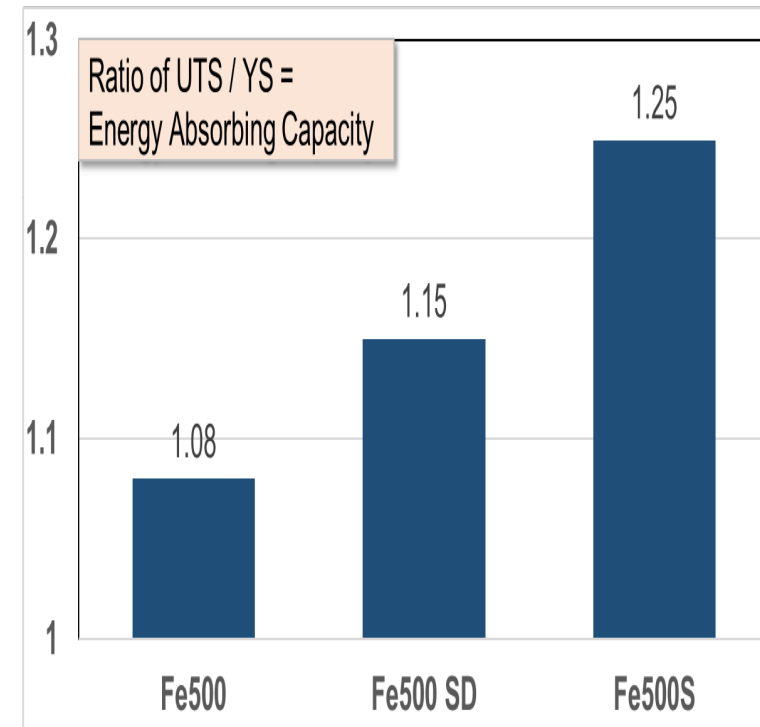
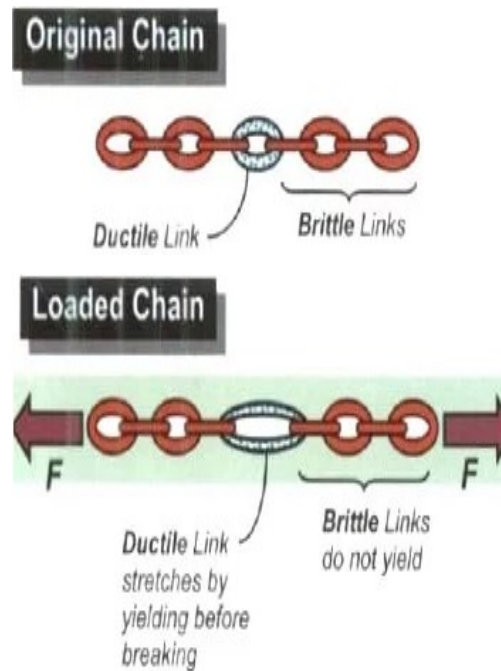
8.15% ↓ in concrete area keeping same steel consumption by using Fe600 instead of Fe500

Resource Efficiency by Increasing Longevity: **Seismic Resistance**

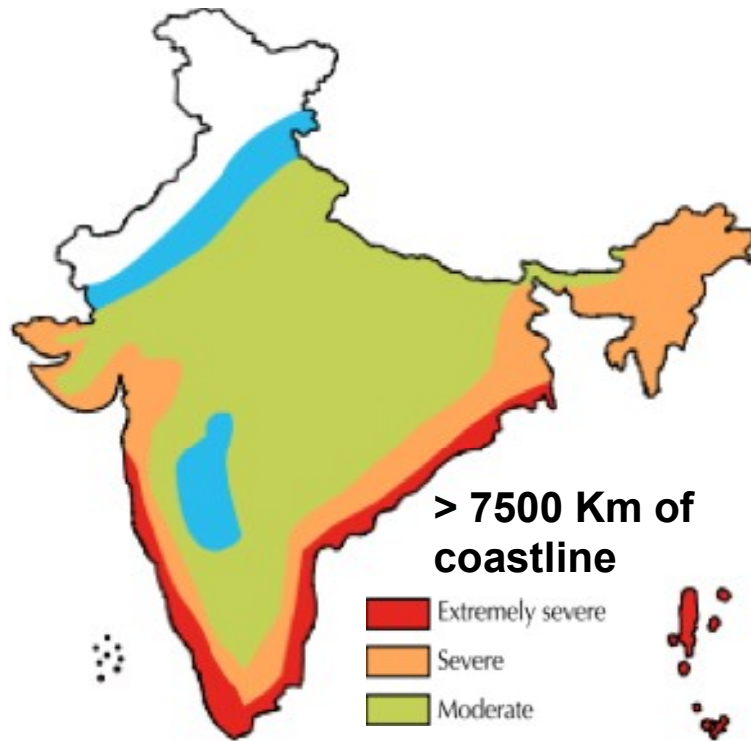


Steels to have higher ductility without sacrificing strength

= high energy absorption capability [= high UTS/YS]

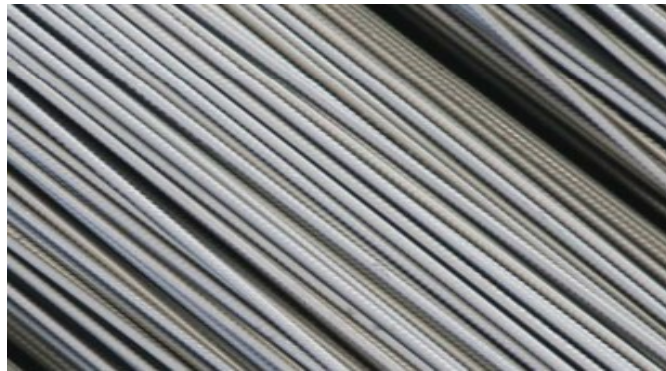


Resource Efficiency by Increasing Longevity: Corrosion Resistance



Galvanised steel rebars:

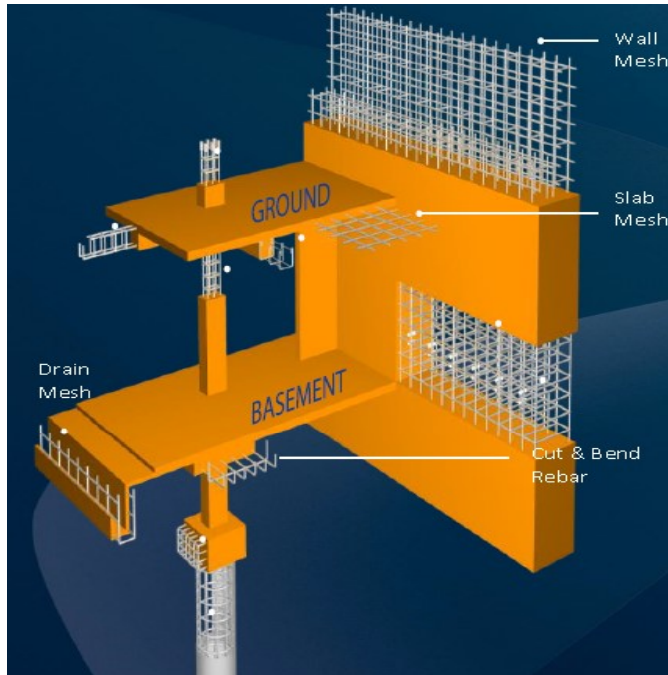
- ❖ Corrode @ 1/30th compared to bare steel in same environment.
- ❖ Can withstand 4-5 times higher Cl⁻ concentration



Corrosion resistant rebars:

- ❖ ~ 25%↓ rate of corrosion –vs- ordinary rebar
- ❖ Stainless steel rebars have service life of 75-100 years

Resource Efficiency: Reducing Wastage at Construction Site




Pre-fabricated welded wire mesh in customized configurations:

- ❖ Zero wastage: No scrap generation at site as cutting of bars at site is eliminated
- ❖ Less lapping: Savings due to lower lap length
- ❖ Minimal binding: Reduction of joints → less binding wire consumption



'Cut and bent' rebars are major enabler to reduce wastage at site

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Going Forward.....

- ❖ **Technology and Innovation: Resource efficient practices in manufacturing**
- ❖ **Work with Regulatory Bodies [e.g. BIS] → keep standards updated to current developments**
 - ❑ **New Technologies → New Standards**
 - ❑ **Streamline Existing Standards and Ensure Alignment**
 - ❑ **Promote 'Green Products'**
- ❖ **Product Stewardship → Important to educate customers on correct usage to get full potential**



Tata Steel: Key Recognitions

- **2014:** CII ITC Sustainability Awards for “Business of the Year”
- **2017:** GreenCo Platinum rating (*1st Integrated Steel Plant to receive*)
- **2017 & 2018:** Steel Sustainability Champions recognized by **WorldSteel**
- **2018:** GreenPro certification for the brands *Pravesh, Pipes & Structura* (*1st to receive in the segment*)
- **2018:** CII-ITC Biodiversity Excellence award



Steel Sustainability Champions 2018
recognition by World Steel Association



TATA
PRAVESH
DOORS OF INDIA

TATA
PIPES
FLOW OF LIFE

TATA
STRUCTURA
STEEL HOLLOW SECTIONS
THE SHAPE OF THINGS TO COME

Thank You