



इस्पात मंत्रालय
MINISTRY OF
STEEL

Circular Economy Mission of India Conference New Delhi



PRESENTATION

ON

Resource Efficiency in Steel Sector

Dr Mukesh Kumar

Director-Steel Research & Technology Mission of India

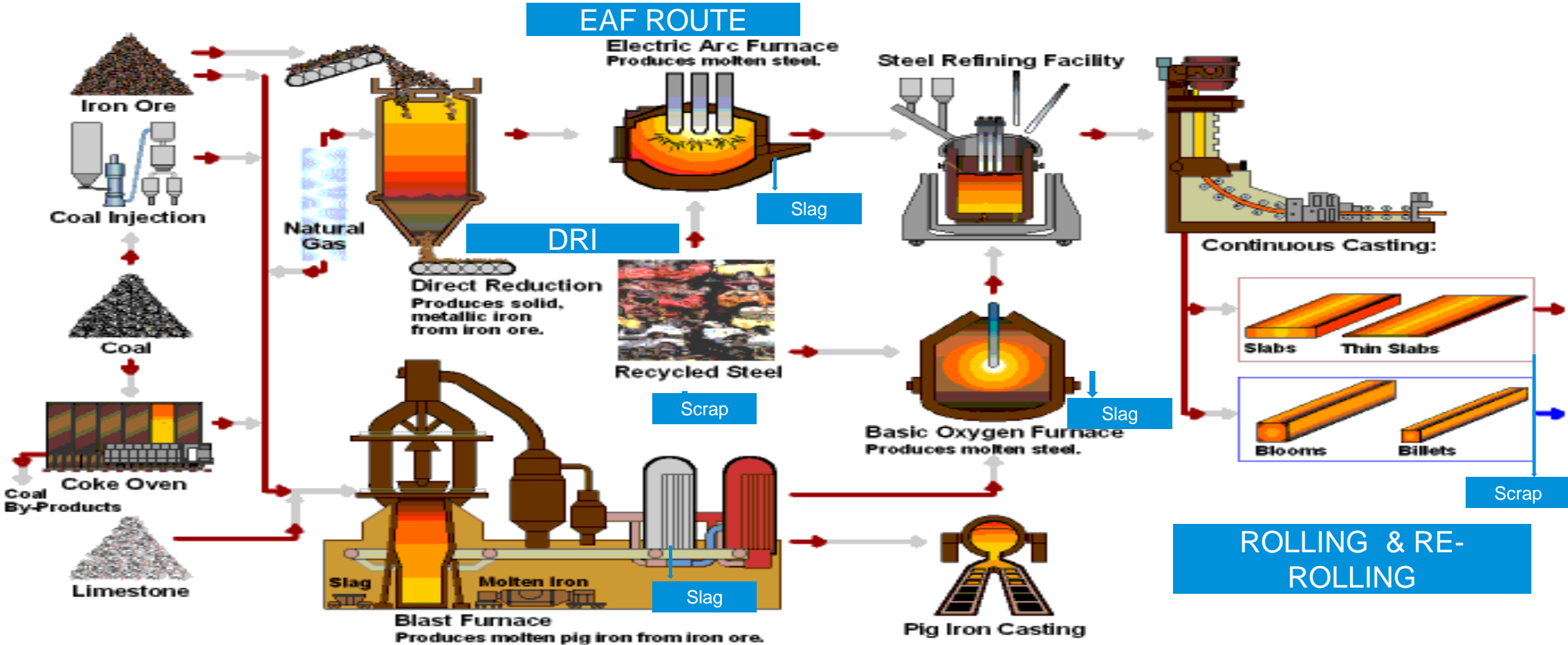
5th September 2018

Resource Efficiency- Steel Industry

Steel is a material most conducive for circular economy as it can be **used, reused and recycled** infinitely. While iron ore remains the primary source of steel making, used or re-used steel in the form of “**Scrap**” is the secondary raw material for the steel industry

Resource Efficiency means reducing the burden on nature through material & energy efficiency and by ensuring resources remain in use for as long as possible. On reaching end of life, the resources need to be recovered and reused, remanufactured, or recycled to create new products

Steel Making- Overview



RAW MATERIAL

BOF ROUTE

Indian Steel Industry

India is the 3rd largest steel producer in the world and had produced 100 MT in 2017 . Likely to become the 2nd largest producer in the world in 2018, just after China. However India's per capita steel consumption at 65 kg is much below the world average of 206 Kg. Thus having large opportunities to grow.

Indian steel industry contributes approximately 2% to the country's GDP and employs about 5 lakh people directly and about 20 lakh people indirectly.

National Steel Policy -2017

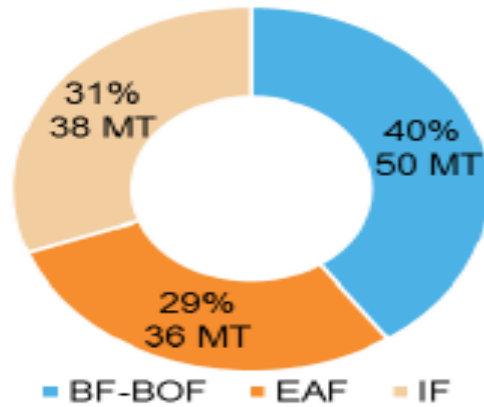
National Steel Policy 2017 (NSP-2017) is an effort to steer the industry to achieve its full potential by enhancing steel production capacity from 100 Million TPY to 300 Million TPY by 2030 with focus on :

- ❖ Global Competitiveness and Import Substitution
- ❖ Resource Efficiency,
- ❖ High end value added steel,
- ❖ Sustainable development with respect to environmental performance, mineral conservation & quality of steel products,
- ❖ Indigenous R&D efforts to reach global efficiency benchmarks and technology development
- ❖ Adherence to the principle of 6R's i.e Reduce, Reuse, Recycle, Recover, Redesign and Remanufacture

Steel Capacity & National Steel Policy 2017

INDIA

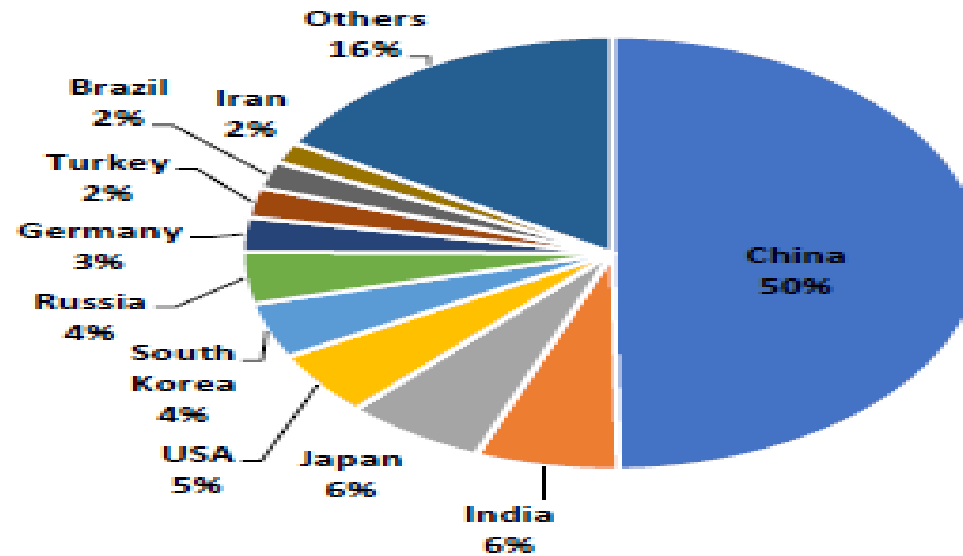
Capacity as on 1st January 2017



Total Capacity – 125 MT

GLOBAL

World Crude Steel Production, Top 10: January-March 2018 (p)



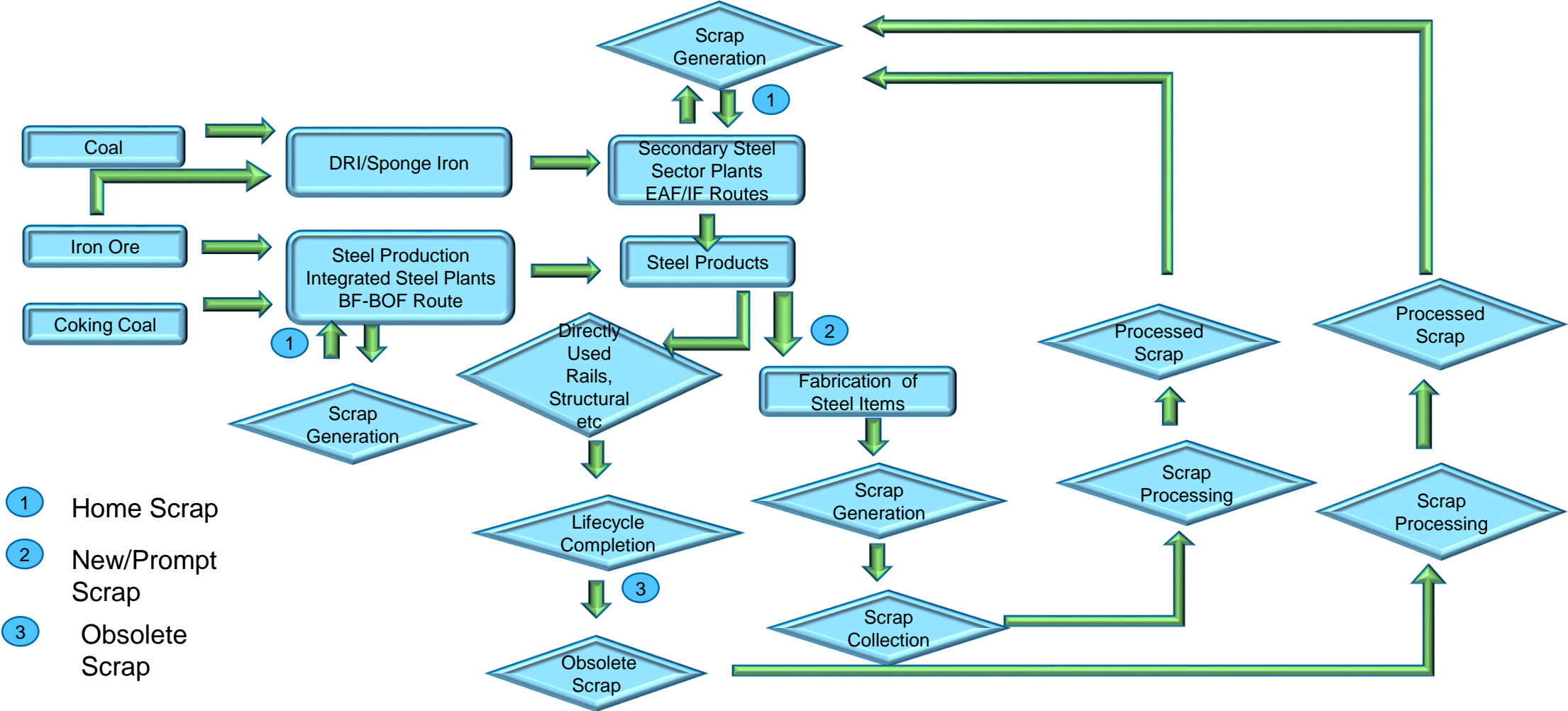
NSP-2017 envisages an increase in steel production capacity from existing 125 Million TPY to 300 Million TPY by 2030. This will require nearly USD 25 Billion of investment and shall generate more than 2 million direct/ indirect employment.

Why Steel Scrap Recycling ?

Recycling of one ton of scrap saves 1.1-1.4 ton of iron ore, 0.6-0.75 T of coking coal and 0.2-0.3 T of Fluxes. Specific energy consumption for production of steel through primary and secondary routes is 14 MJ/Kg and 11.7 MJ/ Kg respectively. Thus, it leads to savings in energy by 16-17%, water consumption by 40% and GHG emission by 58% respectively.

Depending upon percentage of Scrap, CO₂ emission can vary from low of around 500 Kg/T to as high as 1200 Kg/T against around 2000Kg /T from Primary sector

Steel Scrap Recycling-Methodology



Steel Industry Slag- Vital Resource

Slag is the material left out after recovery of valuable material i.e Iron from Iron Ore & Steel Scrap and considered as Waste . There are three types of Slags generated in the Steel making:

1. Blast Furnace Slag
2. LD Slag or known as Steel Slag
3. Electric Arc Furnace (EAF) Slag
4. Induction Furnace (IF) Slag

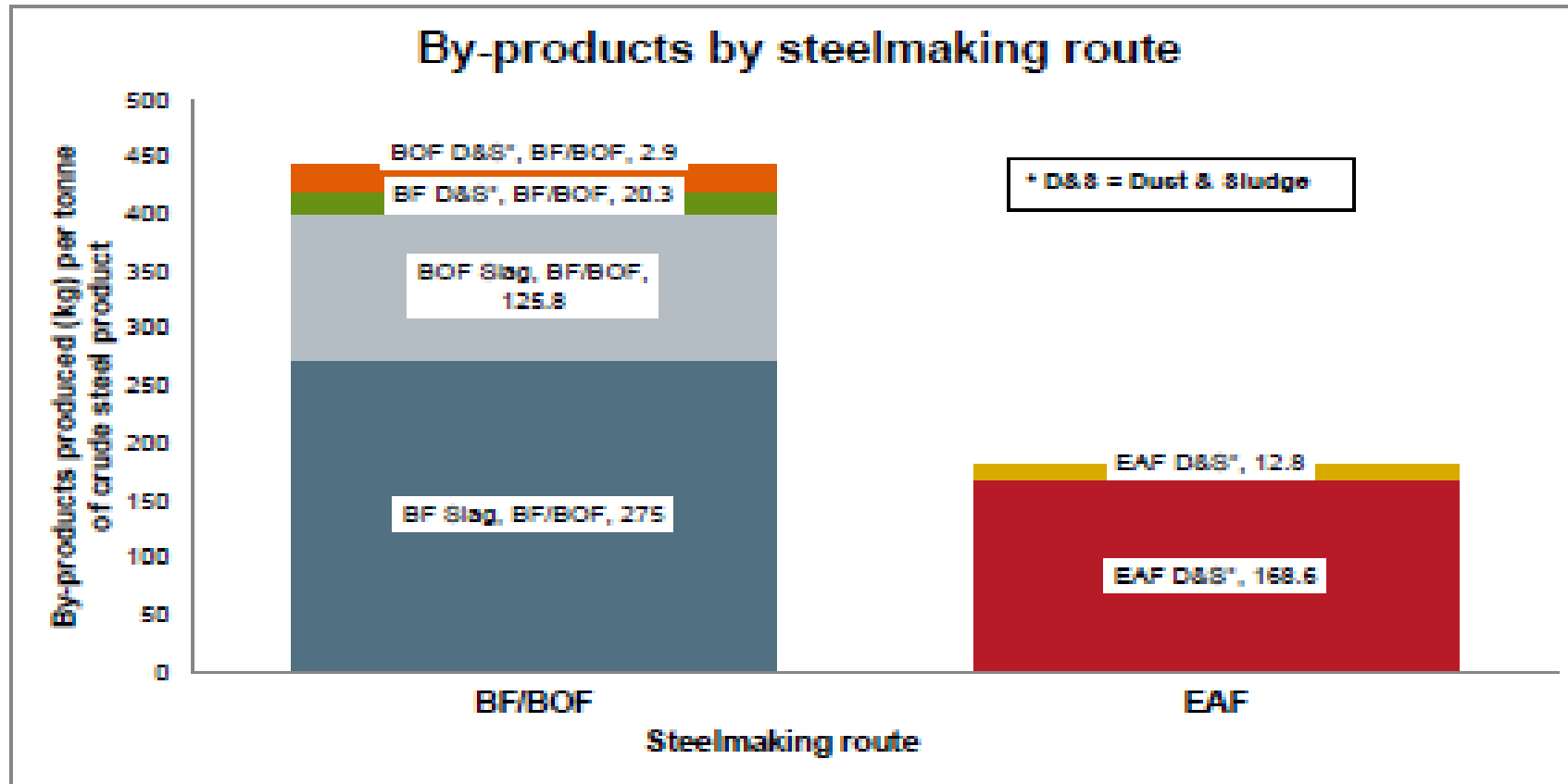
Slag Vs Natural Resources

Blast Furnace & Steel Slag are valuable by-products and thus must be used as a substitute of natural resources within the same legal framework as both can serve the same purpose. Substituting natural resources with by-products avoids duplication of energy use in the production phase and contribute in developing green economy

Humans are using technology in ways that are affecting nature adversely. The cost of doing so is heavy. For the future of mankind, we do not have to struggle against nature but find a symbiotic path with it.

Hon'ble Prime Minister Sh. [Narendra Modi](#)
[World Government Summit](#) in Dubai, 11th Feb 2018

Slag Generation- Global Scenario



Source : World Steel Association

Blast Furnace (BF) Slag as well as Basic Oxygen Furnace (BOF) Slag are considered as Non-Hazardous globally

Steel Slag in Agriculture

- ❖ Typical Steel slag contains Ca, Si, Mg, P, Mn , Fe besides plant available Si .
- ❖ . Steel Slag can be used as (1) Formation of silica body cells by application of silicate fertilizer. (2) Registration as phosphate fertilizer. (3) Restoration of paddy fields damaged by heavy rain fall and (4) Composting of cow manure in less time (Gobar Dhan yojna)
- ❖ Out of 142 million ha of arable land in India, 49 million ha covered by acid soils and spreading over 24 states of the country. Soil acidity negatively impacts the productivity of the staple food crops.
- ❖ Adding LD slag, having 40-45% CaO between 1.5 and 5.0t/ha instead of agriculture lime, quality and productivity of soil is improved by improving pH of the soil .

Initiatives by Ministry of Steel

- ❖ OM issued in 2016 to treat primary and secondary sector steel at par , subject to BIS quality requirement
- ❖ Use of Steel Slag (LD) & EAF in rural roads , Highways
- ❖ Use of BF slags in Cement , Road construction and Geo-Polymers.
- ❖ Initiation of projects with Ministry of Agriculture to promote use of Steel Slag for Soil remediation as well as fertilizer
- ❖ Draft policy on Steel Scrap Recycling issued promoting shredding of old vehicles and increasing domestic availability of Scrap
- ❖ Research and Collaboration with National and International agencies for Energy efficiency and Slag utilization

Sustainable Green Steel Industry.



इस्पात मंत्रालय
MINISTRY OF
STEEL



Thank you