

# GHG Reduction Options - Indian Iron & Steel Industry

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Options to Reduce GHG Emissions through National Appropriate Mitigation  
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# Background to Iron & Steel in India

- India is the 5<sup>th</sup> largest producer of steel
- Per-capita steel in India is 40 kg, rural India only 2 kg
  - Global average 150 kg, developing world 350 kg
  - Current plans - expand urban per-capita from 77 to 165 kg by 2019-2020
  - Current plans – expand rural per-capita from 2 kg to 4 kg by 2019-2020
- Expansion likely to come from green-field

# Projection of National Steel Policy - 2005

<b>Year</b>	<b>Production (MT)</b>	<b>Import (MT)</b>	<b>Export (MT)</b>	<b>Consumption (Mt)</b>
<b>2004-05</b>	<b>38</b>	<b>2</b>	<b>4</b>	<b>36</b>
<b>2019-20</b>	<b>110</b>	<b>6</b>	<b>26</b>	<b>90</b>
<b>CAGR (%)</b>	<b>7.3</b>	<b>7.1</b>	<b>13.3</b>	<b>6.9</b>

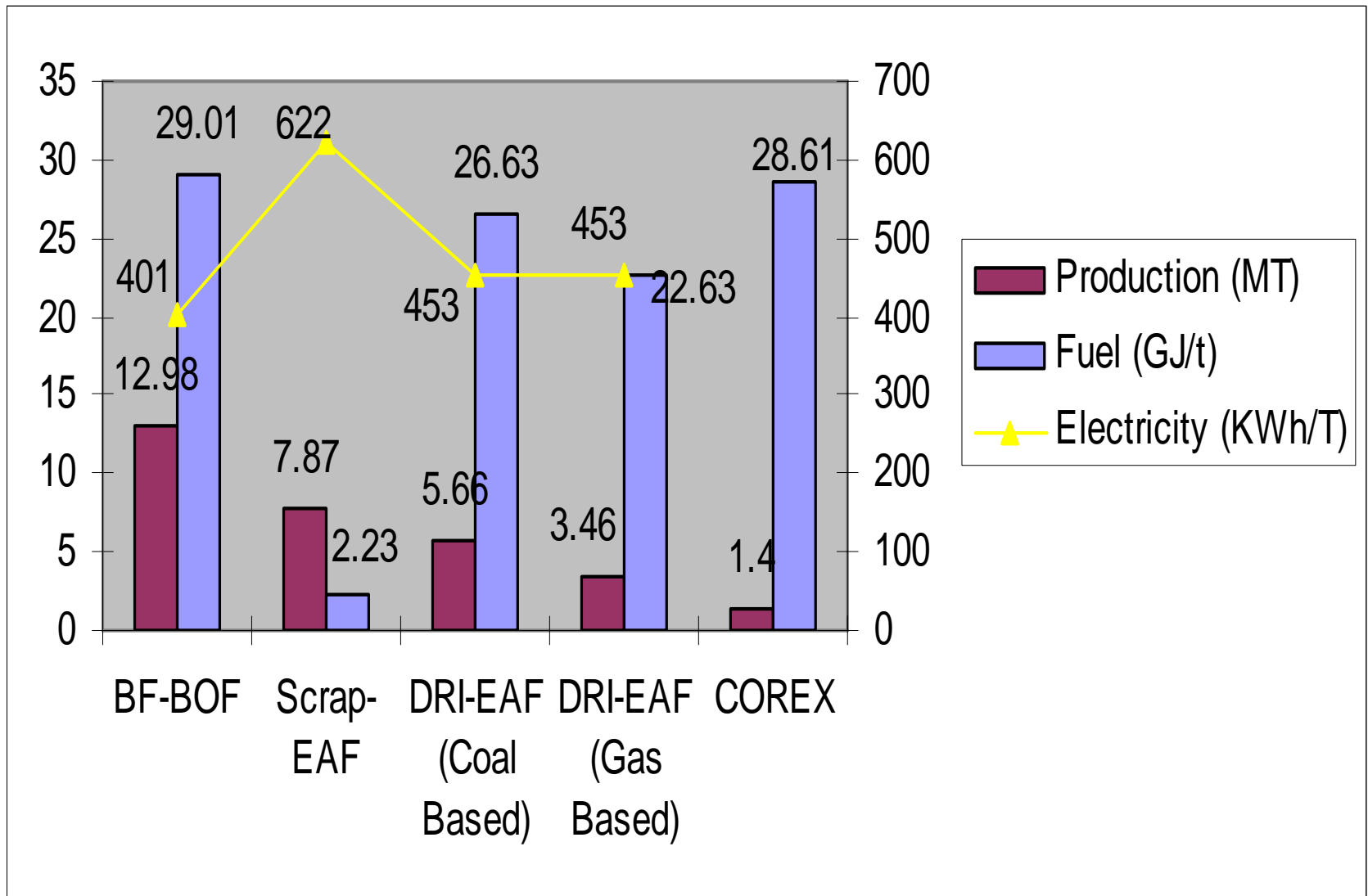
# Profile of Indian Iron & Steel Sector

- Main producers
  - Capacity  $> 0.5$  mtpa
  - Integrated steel making facility
  - Combined capacity of 19 mt, 104% utilization
- Major producers
  - Combined capacity of 6.5 mt, 97% utilization

# Profile of Indian Iron & Steel Sector

- Secondary producers
  - 120 sponge iron plants supply to steel plants
    - Combined capacity 13 mt, 75% utilization
  - 650 mini-furnaces that use iron ore, sponge iron and melt scrap iron to produce steel
    - Combined capacity 15 mt, 58% utilization
  - 1,200 re-rollers that produce finished steel from semis for consumer use
    - Combined capacity 15 mt, 55% utilization

# Energy Consumption in three Routes



# GHG Emission & Specific Energy Consumption

Steel Plants	CO2 Emissions		Sp. Energy Consumption	
	T/T of Steel	Ref. Year	Gcal/tcs	Ref. Year
SAIL - Bhilai Steel, India	2.9	1999-00	6.9	2004-05
SAIL			7.2	2006-07
RINL, India	3.0	1999-00		
Tata Steel, India	2.6	2002-03	7.0	2003-04
Tata Steel, India			6.7	2007-08
Raahe Steel, Finland	1.9	1998		
Kimitsu, Japan	1.8	1999-00	5.2	2001-02
Hoogovens, Holland	1.2	1998	4.7	2001-02
Corus Steel			4.4	2004

TERI report & Annual Report of Steel Plant

- India average 2.8 tCO<sub>2</sub>/ t steel
- Global average 1.7 tCO<sub>2</sub> / t steel

# Practices & Technologies Yielding Energy Saving and GHG Mitigation

Power & Energy Savings in GJ/T, Retrofit cost (Million Rs./ MT)					
Option	Fuel Savings (GJ/t)	Electricity (GJ/t)	Retrofit Cost	Cost / GJ (Rs./ GJ)	
Preventive Maintenance	0.43	0.02	0	0	Short
Energy monitoring & Management system	0.11	0.01	7	58	Short
Process control in hot strip mill	0.26	0	28.3	109	Short
Recuperative Burners	0.61	0	101	166	Short
Sinter plant heat recovery	0.12	0	30.6	255	Medium
Coke dry quenching	0.37	0	104	282	Medium
Improved Blast Furnace control system	0.36	0	275	764	Short
Pulverized Coal Injection to 130 kg/ thm	0.69	0	530	768	Short
Adopt Continuous Casting	0.24	0.08	554	1732	Short
Improved insulation of furnaces (refractory)	0.14	0	405	2892	S & M
<b>Total</b>	<b>6.07</b>	<b>0.72</b>	<b>5297</b>		
Thin strip casting (values are not available)					
Slag Granulation Plant (Input for cement plant)					
GJ - Giga joules; t = tonnes, MTPA= Million Tonnes per thm= tonne of hot metal, BOF= Basic Oxygen Furnace,					

# Barriers for Adopting Mitigation Measures

- Technical
  - Coal quality
  - Renovation, modernization difficult to implement
- Policy
  - Large number of secondary units
  - Unorganized market structure
- Commercial
  - High capital costs
  - Financing challenges

# Domestic Policy Options for Steel Industry

- Encourage investments in green-field plants
- Specific monitoring parameter of maintenance
- Adequate financing mechanisms
- Fiscal subsidies / support
- Using reduction monetizing schemes, like CDM

***THANK YOU***