



KALYANI

Manufacturing

Green Steel

in India



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Why Green Steel?

Our Goal



Limit global average temperature increase to 2°C; preferably 1.5°C in this century

Our Commitment



To reduce GHG emissions by 45% below 2005 level by 2030 & to be Net Zero By 2070

Globally, Steel Industry is Fifth Largest CO₂ emitter

	<u>Global</u>	<u>India</u>
Steel Industry's Contribution to total CO ₂ emissions	7 % ^{\$}	12 % [^]
Average CO ₂ emissions per ton of Crude Steel	1.89 tons [#]	2.5 tons [*]

^{\$} - ourworldindata.org/emissions-by-sector

[^] - TERI, Towards A Low Carbon Steel Sector, ourworldindata.org

[#] - World Steel Association Data 2020

^{*} - TERI, Towards A Low Carbon Steel Sector

Stakes are Very High...

USD 20 billion

Automobile Component
Export industry

Industry will be at risk if global customers start charging Carbon Tax to Indian manufacturers for not using Green Steel in their products

295 Million tons

Steel Industry CO₂
emissions

CO₂ emissions will increase further as we are increasing our total steel production capacity with conventional methods

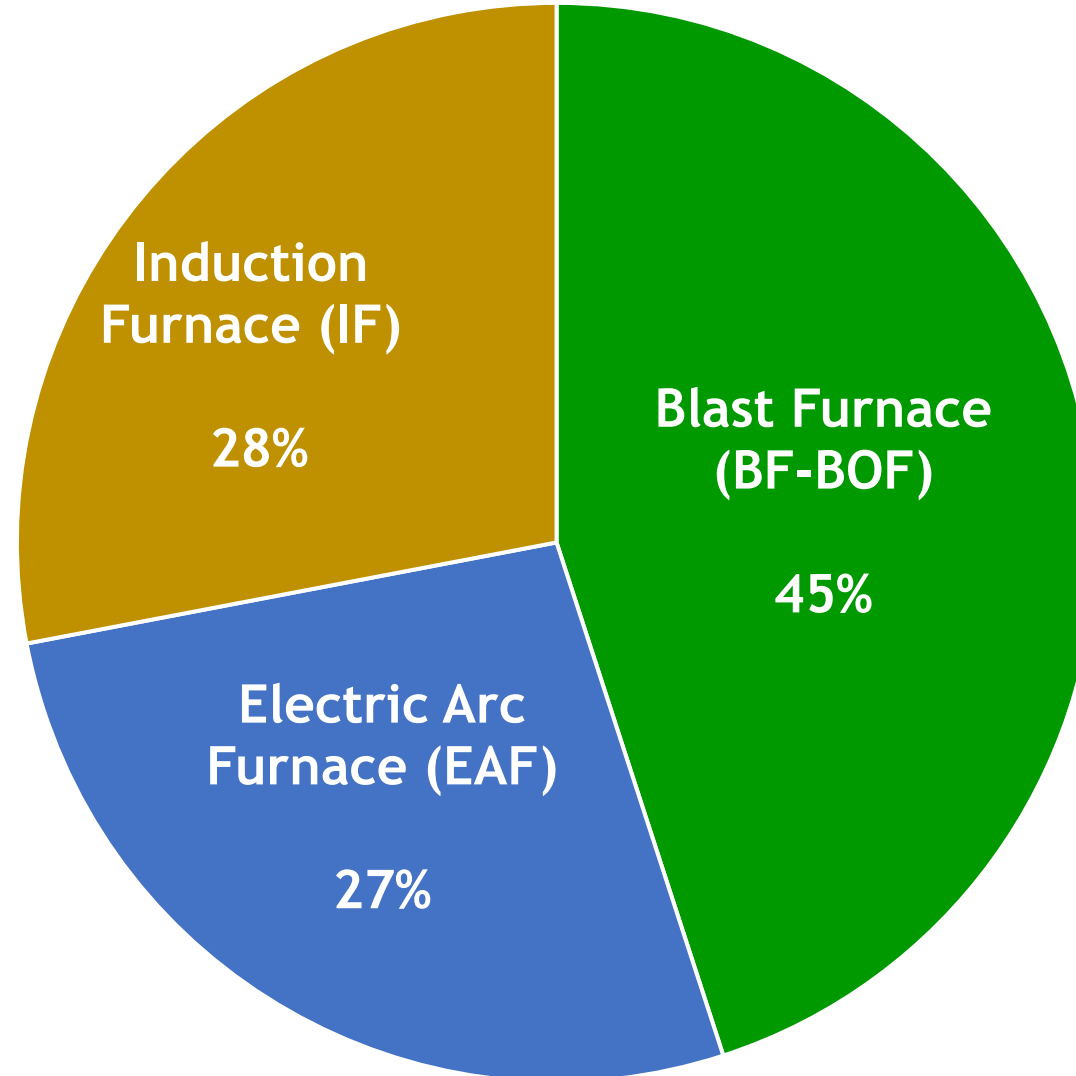
14 Million tons

Finished Steel Export

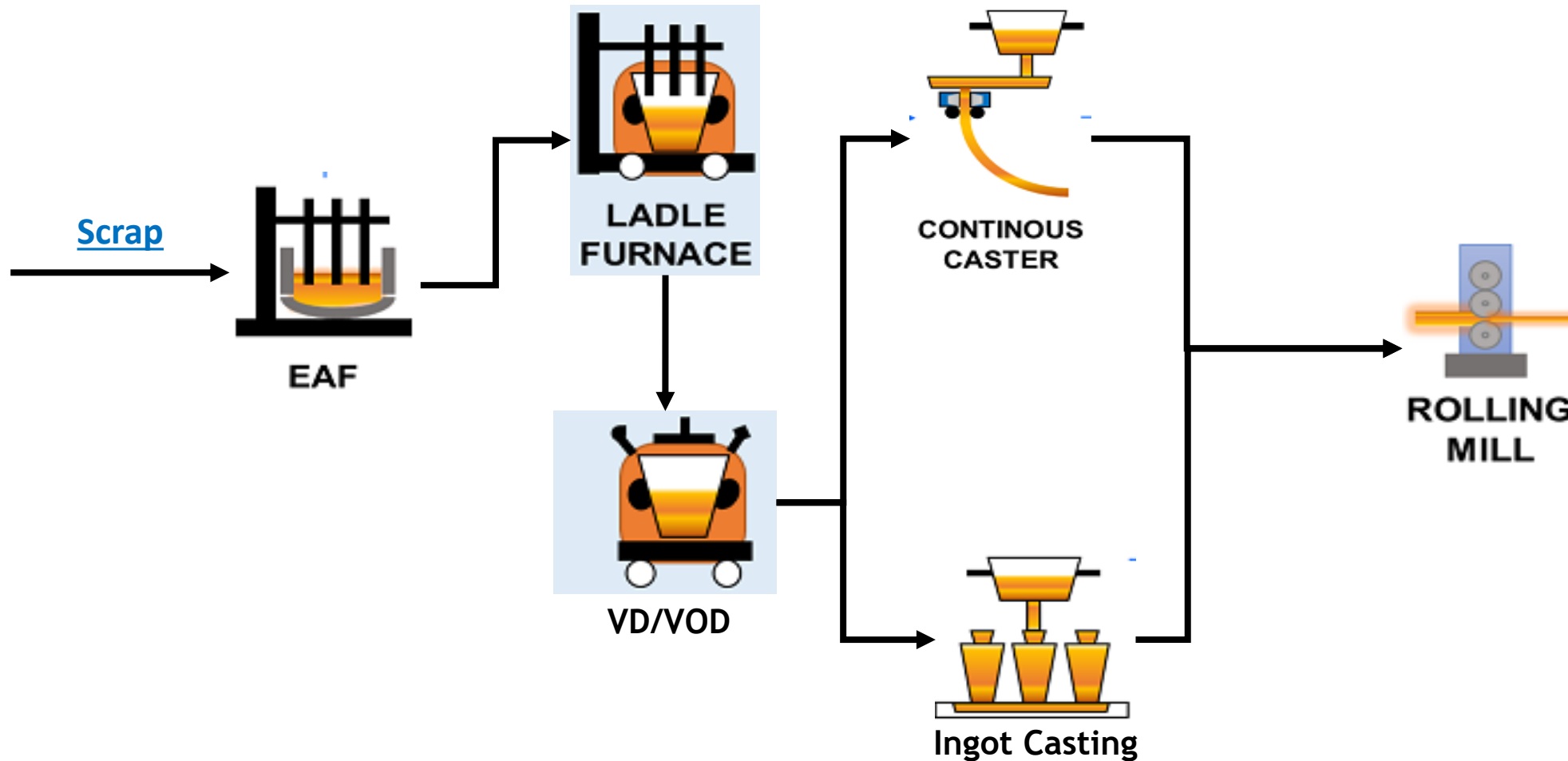
Export of finished steel is at risk if global customers stop using Indian steel because of high Carbon emissions

Indian Steel production - FY2021-22

Total Steel Production,
FY22
120 Million MT

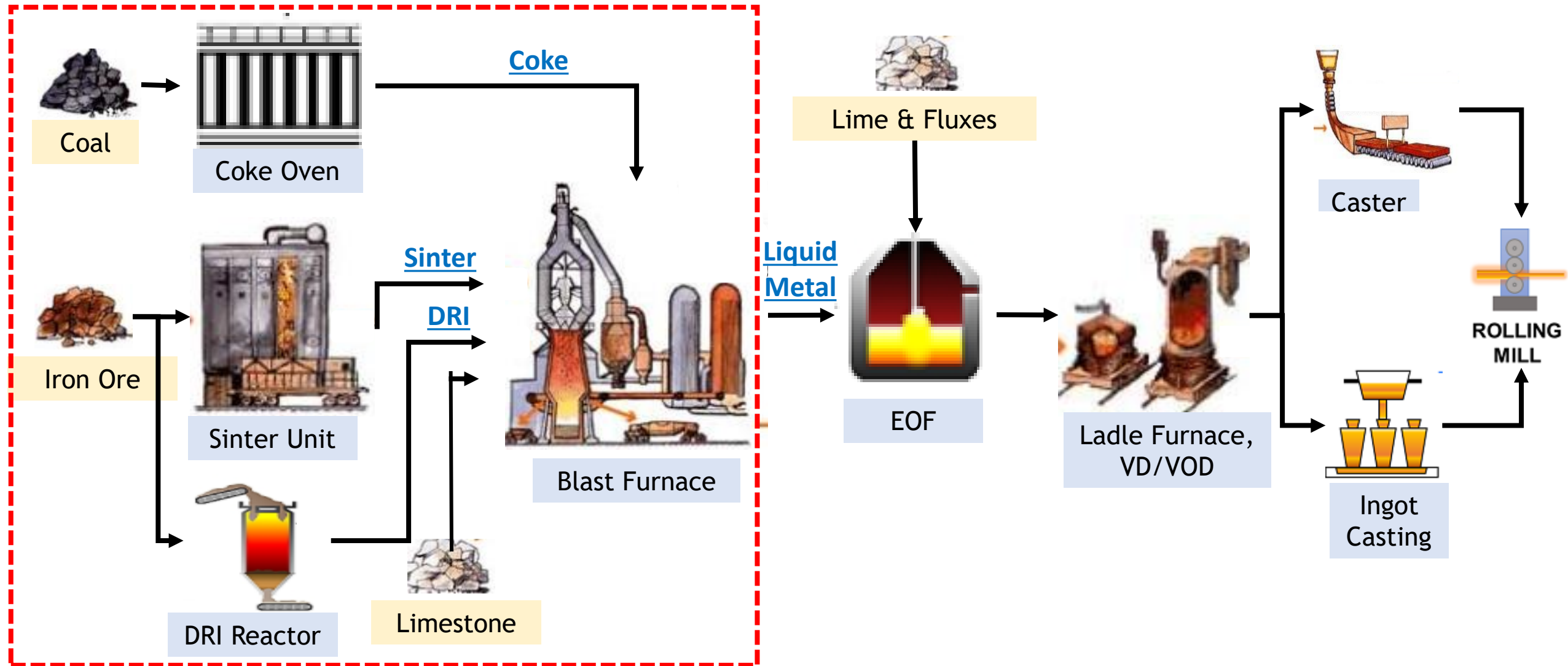


Scrap based EAF Route: ~1.1 -1.4 tons of CO₂ per ton of Steel



70% of the total CO₂ emissions is because of use of Fossil Fuel based Electricity

Blast Furnace route : ~2.5 -3 tons of CO₂ per ton of Steel



70% of the total CO₂ emissions is till Blast Furnace process



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Way Forward

1. Decarbonizing 'EAF/IF' route ... A Low Hanging Fruit

1

~~Fossil Fuel Power~~

EAF/IF
Steelmaking

2

Convert Fossil
Fuel based
furnaces to
Electric

All other
Equipment

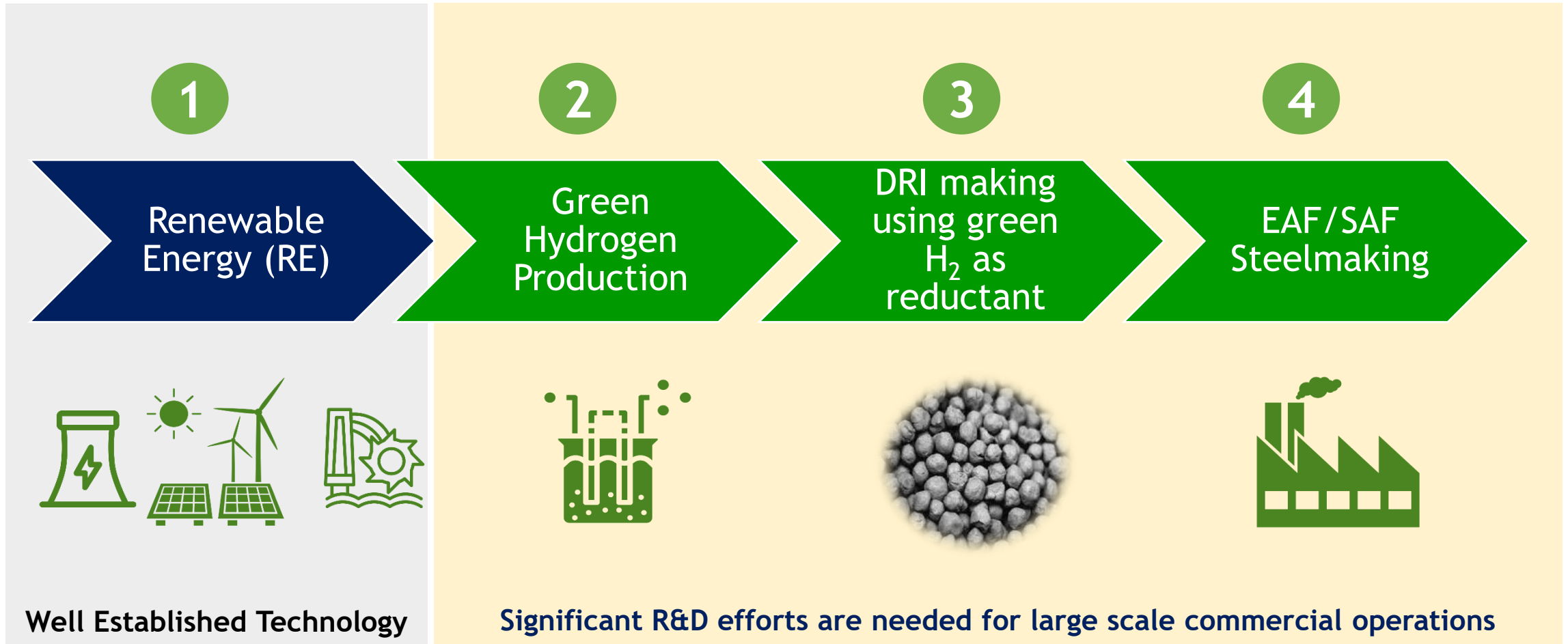
Renewable
Energy (RE)



- We can achieve up to 80-90% CO₂ emissions reduction -
 - If we could replace this power with Renewable Energy Power
AND
 - If we convert Fossil Fuel Based furnaces to Electric
- Potential of ~33 GW RE power plant set up in Country

Moving from 'BF - BOF' to Green H₂ - Green DRI - EAF/SAF

We can break the entire process into 4 parts



We can achieve ~85-90% reduction in CO₂ emissions from above process.

India is blessed with huge Solar power potential ...



Wasteland
558,000 Sq. Km



Reservoirs
31,500 Sq. Km



Backwaters
1,900 Sq. Km

If we convert just 3.5% of the total area, we can install ~1000 GW of Solar power

Benefits from ... Decarbonizing EAF/IF route

Incremental RE Power Plants	Investment & Employment generation	Thermal Coal	Decarbonization of steel Industry
<ul style="list-style-type: none"> • Attractive proposition for Steel producers to set up captive RE power plants • Potential ~33GW RE power plant set up representing ~7% of our 2030 target of reaching 500 GW 	<ul style="list-style-type: none"> • Potential investment of ~ Rs. 2 Lac Cr^{^^} if all EAF/IF based plants are converted to green steel plant by using RE Power • Huge Employment generation 	<ul style="list-style-type: none"> • Will save on valuable Forex of ~\$ 7-8[#] bn spent on import of Thermal Coal • Will become thermal Coal import independent 	<ul style="list-style-type: none"> • Replacing Thermal power with RE power can reduce ~59 million tons of CO₂ per year

^{^^} Estimated figure based on power consumption, capex per MW of RE power

* At landed power cost of Rs. 2.5/KWh

[#] Estimated figure based on coal consumption, requirement & price

Benefits from ... Moving to Green H₂-DRI-EAF/SAF route

Green H ₂ Hub	Coking Coal & Coke	Reduction in Cost of Green Hydrogen	Decarbonization of steel Industry
<ul style="list-style-type: none"> • India will become Green H₂ hub and allied supply chain • Huge Employment generation • Huge capex investment to set up Electrolysers and allied components manufacturing & Usage 	<ul style="list-style-type: none"> • Will save on valuable Forex of ~\$12 bn spent on import of Coking coal & Coke • Will become Coking coal and Coke independent 	<ul style="list-style-type: none"> • Reduction in cost of Green Hydrogen from current \$ 4.5 to target of \$ 1 * per Kg of H₂ 	<ul style="list-style-type: none"> • Adoption of Green H₂ based steelmaking route can reduce ~150 million tons of CO₂ per year

This would prove to be a significant step towards realizing the vision of ‘Aatmanirbhar Bharat’ !

^^ Estimated figure based on power consumption, capex per MW of RE power

* At landed power cost of Rs. 2.5/KWh

Estimated figure based on coal consumption, requirement & price

T H A N K Y O U