

TEMPLATE ON INDC – MITIGATION

Name of the Ministry / Department: Ministry of Steel						
Information / Various programs	Existing Prog. 1 (BF-BOF based Integrated route)	Prog. 2 (Coal based DRI)	Prog. 3 (EAF based Mini steel plants)	Prog. 4 (IF based mini steel plants)	Prog. 5 (SRRM)	Total
Baseline Emission Scenario in 2005 in CO₂ eq.	73.20 million tonnes (@ CO ₂ emission intensity of 3.0 T/tcs)	70.62 million tonnes (@ CO ₂ emission intensity of 3.2 T/tcs)				143.82 million tonnes (approx. 144 MT)
Mitigation Scenario Projection in 2020 in CO₂ eq. in the existing programmes	216 – 234 million tonnes @ CO ₂ emission intensity of 2.4 – 2.6 T/tcs (Avg : 225 MT) (1)	168 – 174 million tonnes @ CO ₂ emission intensity of 2.8 – 2.9 T/tcs for coal DRI – EAF/IF based plants (Avg : 171 MT) (2)				384-408 million tonnes (Avg : 396 MT)
T/tcs : Tonnes of CO₂ equivalent per tonne of crude steel						

<p>Technology mapping:</p> <p>Existing Technology</p>	<p>(i) Coke Dry Quenching (CDQ) (ii) Sinter Cooler Waste Heat Recovery (iii) Top Recovery Turbine (TRT) (iv) LD Gas Recovery N.B : in limited plants.</p>	<p>Waste Heat Recovery Boilers. N.B : In limited plants.</p>	<p>(i) Oxygen injection (ii) Water cooled panel/ roofs/walls (iii) Ultra high power transformers (iv) Oxyfuel Burners N.B. In limited units.</p>	<p>Practically non-existent</p>	<p>1. Recuperator 2. Pulveriser 3. Direct rolling 4. Roller bearing 5. Capacitor Bank N.B : in limited plants.</p>	
<p>Required New Technology:</p>	<p>List of necessary technologies annexed at Annex : 1</p>	<p>Waste Heat Recovery Boilers in all viable plants.</p>	<p>1. Supersonic oxygen lance management system. 2. Efficient foamy slag practices. 3. Efficient eccentric bottom tapping 4. Static var compensatory 5. Scrap/DRI pre-heating. 6. Hot DRI Charging.</p>	<p>List of necessary technologies annexed at Annex : 2</p>	<p>List of necessary technologies annexed at Annex : 3</p>	

Capacity Building: Existing Measures	Manpower Training in India and abroad for Exposure to seminar at National/international level.	Manpower Training in India and abroad for Exposure to seminar at National/international level.	Manpower Training in India and abroad for Exposure to seminar at National/international level.	Manpower Training in India and abroad for Exposure to seminar at National/international level.	Manpower Training in India and abroad for Exposure to seminar at National/international level.	
Required Additional/ New Measures						
Financial Requirements: Total requirement of funds (taking into account technology and capacity building needs) to achieve the projection under the Mitigation Scenario in 2020 in the existing Programme in INR	Domestic Sources in INR Rs.6000 crores ⁽³⁾	Rs. 400 crores (Rs. 2400*1/3*1/3) ⁽⁴⁾	Rs. 150 crores ⁽⁵⁾	Rs. 3000 crores ⁽⁶⁾	Rs. 650 crores ⁽⁷⁾	Rs. 10,200 crores
	International Sources (Multi/Bilateral) Rs. 6000 crores. ⁽³⁾	Rs. 400 crores (Rs. 2400*1/3*1/3) ⁽⁴⁾	Rs. 150 crores ⁽⁵⁾	Rs. 500 crores ⁽⁶⁾	Rs. 100 crores ⁽⁷⁾	Rs. 7,150 crores
Current provision of funds under the	Domestic sources in INR Not Budgeted	Not Budgeted	Not Budgeted	Not Budgeted	Not Budgeted	

existing programme in INR in the year 2014-15	International Sources (Multi/Bilateral) Not firmed up	Not firmed up	Not firmed up	Not firmed up	Not firmed up	
Deficit / Additional funds needed to achieve the projection under the Mitigation Scenario in 2020 in the existing Programme in INR	Domestic Sources in INR Rs. 6000 crores	Rs. 400 crores	Rs. 150 crores	Rs. 3000 crores	Rs. 650 crores	Rs. 10200 crores
	International Sources (Multi/Bilateral) Rs. 6000 crores.	Rs. 400 crores	Rs. 150 crores	Rs. 500 crores	Rs. 100 crores	Rs. 7150 crores

Proposed Programs / Schemes between the year 2020-2030

Baseline Emission Scenario in 2005 in CO2 eq.	73.20 million tonnes (@ CO2 emission intensity of 3.0 T/tcs)	70.62 million tonnes (@ CO2 emission intensity of 3.2 T/tcs)			143.82 million tonnes (approx. 144 MT)
CO@ emission projection in 2020 in business as usual scenario	270 million tonnes (@ CO2 emission intensity of 3.0 T/tcs)	192 million tonnes (@ CO2 emission intensity of 3.2 T/tcs)			462 million tonnes

Mitigation Scenario Projection in 2020 in CO₂ eq. in the PROPOSED programmes (Absolute quantity)	216 – 234 million tonnes @ CO ₂ emission intensity of 2.4 – 2.6 tonnes/tcs ⁽¹⁾ <i>(avg : 225 MT)</i>	168 – 174 million tonnes @ CO ₂ emission intensity of 2.8 – 2.9 tonnes /tcs for coal DRI – EAF/IF based plants. ⁽²⁾ <i>(avg : 171 MT)</i>	384-408 million tonnes <i>(avg : 396 MT)</i>
Mitigation Scenario : Absolute reduction projection in 2020 in CO₂ eq. viz-a-viz BAU (2005)	45 MT	21 MT	66 MT
CO₂@ emission projection in 2030 in business as usual scenario	630 million tonnes (@ CO ₂ emission intensity of 3.0 T/tcs)	288 million tonnes (@ CO ₂ emission intensity of 3.2 T/tcs)	918 million tonnes
Mitigation Scenario Projection in 2020 - 2030 in CO₂ eq. in the PROPOSED programs	462- 504 million tonnes @ CO ₂ emission intensity of 2.2 – 2.4 tonnes/tcs ⁽¹⁾ <i>(avg : 483 MT)</i>	234 - 243 million tonnes @ CO ₂ emission intensity of 2.6 – 2.7 tonnes /tcs for coal DRI – EAF/IF based plants. ⁽²⁾ <i>(avg : 239 MT)</i>	696 – 747 million tonnes <i>(avg : 722 MT)</i>
Mitigation Scenario : Absolute reduction projection in 2030 in CO₂ eq. viz-a-viz BAU (2005)	147 MT	49 MT	196 MT

<p>Technology mapping</p> <p>Existing Technology:</p>	<p>(i) Coke Dry Quenching (CDQ) (ii) Sinter Cooler Waste Heat Recovery (iii) Top Recovery Turbine (TRT) (iv) LD Gas Recovery</p>	<p>Waste Heat Recovery Boilers.</p>	<p>(i) Oxygen injection (ii) Water cooled panel/ roofs/walls (iii) Ultra high power transformers (iv) Oxyfuel Burners</p>	<p>Practically non-existent</p>	<p>1. Recuperator 2. Pulveriser 3. Direct rolling 4. Roller bearing 5. Capacitor Bank</p>	
<p>Required New Technology;</p>	<p>List of necessary technologies annexed at Annex : 1</p>	<p>Waste Heat Recovery Boilers in all viable plants.</p>	<p>1. Supersonic oxygen lance management system. 2. Efficient foamy slag practices. 3. Efficient eccentric bottom tapping 4. Static var compensatory 5. Scrap/DRI pre-heating. 6. Hot DRI Charging.</p>	<p>List of necessary technologies annexed at Annex : 2</p>	<p>List of necessary technologies annexed at Annex : 3</p>	

Capacity Building: Existing Measures	Manpower Training in India and abroad for Exposure to seminar at National/ international level.	Manpower Training in India and abroad for Exposure to seminar at National/ international level.	Manpower Training in India and abroad for Exposure to seminar at National/ international level.	Manpower Training in India and abroad for Exposure to seminar at National/ international level.	Manpower Training in India and abroad for Exposure to seminar at National/ international level.	
Required Additional/ New Measures						
Financial Requirements:	Domestic Sources in INR Rs. 12000 crores ⁽³⁾	Rs. 800 crores (Rs. 2400*2/3*1/2) ⁽⁴⁾	Rs. 300 crores ⁽⁵⁾	Rs. 6000 crores ⁽⁶⁾	Rs. 1300 crores ⁽⁷⁾	Rs. 20400 crores
Total requirement of funds (taking into account technology and capacity building needs) to achieve the projection under the Mitigation Scenario between 2020 – 2030 in the proposed programmes (in INR)	International Sources in INR (Multi/ Bilateral) Rs. 12000 crores ⁽³⁾	Rs. 800 crores (Rs. 2400*2/3*1/2) ⁽⁴⁾	Rs. 300 crores ⁽⁵⁾	Rs. 1000 crores ⁽⁶⁾	Rs. 200 crores ⁽⁷⁾	Rs. 14300 crores
Current provision of funds under the	Domestic Sources in INR	Not Budgeted	Not Budgeted	Not Budgeted	Not Budgeted	

program (in INR)	International Sources (Multi Bilateral)	Not firmed up	Not firmed up	Not firmed up	Not firmed up	
Deficit / Additional funds needed) to achieve the projection under the Mitigation Scenario between 2020 – 2030 in the proposed program (in INR)	Domestic Sources in INR Rs. 12000 crores	Rs. 800 crores	Rs. 300 crores	Rs. 6000 crores	Rs. 1300 crores	Rs. 20400 crores
	International Sources (Multi Bilateral) Rs. 12000 crores	Rs. 800 crores	Rs. 300 crores	Rs. 1000 crores	Rs. 200 crores	Rs. 14300 crores

(1) Production of crude steel in India in 2005 was 46.46 million tonnes of which 52.5% i.e. 24.4 MT was produced from BF-BOF route and the balance 47.5% i.e. 22.07 MT was produced from DRI-EAF-IF route. Based on available/estimated data CO2 emission intensity has been taken as 3.0 T/tcs for BF-BOF route and 3.2 T/tcs for DRI-EAF-IF route as business as usual (BAU) data and accordingly, total emission has been worked out.

Present (2014-15) steel production in India is around 88 million tonnes with about 45% production through integrated route. The crude steel production is expected to increase to 150 million tonnes by 2020 with a proportion of ISP route @ 60% and to 300 MT by 2030 with a proportion of ISP route @ 70%. GHG emission in Indian integrated steel plants (ISP) is relatively high varying in the range of 2.4 – 3.0 Tonnes/per tonne of crude steel (T/tcs) as compared to the international benchmark of 1.8 – 1.9 T/tcs mainly because of technological obsolescence, limited adoption of waste heat/energy recovery system and constraints in Indian raw material quality i.e. high alumina content in iron ore and high ash content in coal. Accordingly, it is projected that with adoption of state-of-art technologies and practices specific GHG emission will reduce to 2.4-2.6 T/tcs by 2020 and 2.2 – 2.4 T/tcs by 2030. However, absolute GHG emission will increase in view of additional manufacturing capacity build up.

(2) Presently about 55% of total steel production is produced through EAF/IF route using coal/gas based DRI as well as scrap. DRI is also produced by some stand alone units which is sold to the EAF/IF units. It is projected that proportion of this route of steel production will reduce from present level of 55% to 40 % by 2020 and to 30% by 2030 though the absolute production will increase. GHG emission through gas based DRI-EAF route is almost at par with the international benchmark. However, natural gas is not available in sufficient quantity for gas based DRI units. GHG emission through coal DRI-EAF/IF route is much higher at the rate of 3.0 – 3.2 T/tcs because of technological characteristic of coal based DRI plants. It is projected that over the years, the industry adopts waste heat recovery system thereby reducing their GHG emission to 2.8 – 2.9 T/tcs by 2020 and 2.6 – 2.7 T/tcs by 2030.

(3) There are 15 energy efficient clean and green technologies identified for adoption in Indian steel plants with an overall estimated investment of Rs. 30000 – 36000 crores. It has been presumed that at least 5 of these technologies will be adopted by 2020 with total investment of Rs. 12000 crores and the balance 10 technologies by 2030 with a total investment of Rs. 24000 crores. It has further been assumed that fund requirement from international sources would be @ 50% of the total fund requirements i.e. @ 6000 crores and Rs. 12000 crores respectively for the two terminal years.

(4) The gas based DRI plants in India are world class. However, the production is reducing because of non-availability of natural gas. Accordingly, no investment has been projected for the sector. For the coal based DRI sector, there are more than 300 units of which 120 units would require investment for setting up of energy efficient facilities. Total investment in the sector works to Rs. 2400 crores out of which 1/3rd amount (Rs. 800 crores) has been projected for 2020 and 2/3rd amount (Rs. 1600 crores) for 2030. It has further been projected that the fund requirement from international sources would be @ 50% i.e. Rs 400 crores by 2020 and Rs. 800 crores for 2030.

(5) While the large electric arc furnaces are world class, there are around 35 mini steel plants adopting EAF technologies most of which require technological intervention. Total average investment per unit is estimated at around 30 crores and thus total investment for say 30 units would work out to 900 crores of which the fund requirement by 2020 and 2030 would be 300 crores and 600 crores respectively, 50% of which is proposed to be met from international sources.

(6) There are over 1300 Induction Furnace units in the country with a total production capacity of around 36 million tonnes. Of this, 15 units have been identified for technological intervention for adoption of energy efficient clean and green technologies under the UNDP-Ministry of Steel project. Taking clue from the investment figure @ Rs. 300 crore per million

tonne capacity, it is projected that an investment of Rs. 10800 crore would be required to upgrade all the induction furnace (IF) units in the country by 2030. Of these, 1/3rd capacities are expected to be covered by 2020 with an investment of Rs. 3600 crore and the remaining 2/3rd by 2030 with an investment of 7200 crores. Further based on the fund mix in the aforesaid 15 projects it is presumed that the fund from international source would be required @ 500 crores by 2020 and @ 1000 crores by 2030. The balance fund would be required from the domestic sources.

(7) There are over 1800 steel re-rolling mills with an average GHG emission @ 8000- 10000 T per unit per year. With the intervention of UNDP-GEF project, GHG emission has been reduced by 25-30% per unit per year in 34 units with an average investment of Rs. 1.5 crores per unit. 285 more units have been taken up for energy efficient technologies in second phase, and the remaining 1500 units need technological intervention by 2030 requiring fund @ 750 crores and Rs. 1500 crores by 2020 & 2030 respectively. Further, based on the experience in the ongoing projects it is presumed that fund from international sources would be in the proportion of 1:6 i.e. RS. 100 crores by 2020 and Rs. 200 crores by 2030.

Note: While calculation/projection of GHG emission the contribution from DRI, EAF & IF and rolling mills have been combined together and represented under DRI-EAF/IF route.