PRESENTATION
For
CII GBC NATIONAL ENERGY AWARD
FOR
EXCELLENCE IN ENERGY MANAGEMENT

Rashtriya Ispat Nigam Limited
VISAKHAPATNAM STEEL PLANT

TEAM MEMBERS

Sudhanshu Kumar, Sr. Mgr.(EMD)

Rishi Agarwal, Sr. Mgr.(O)-Utilities

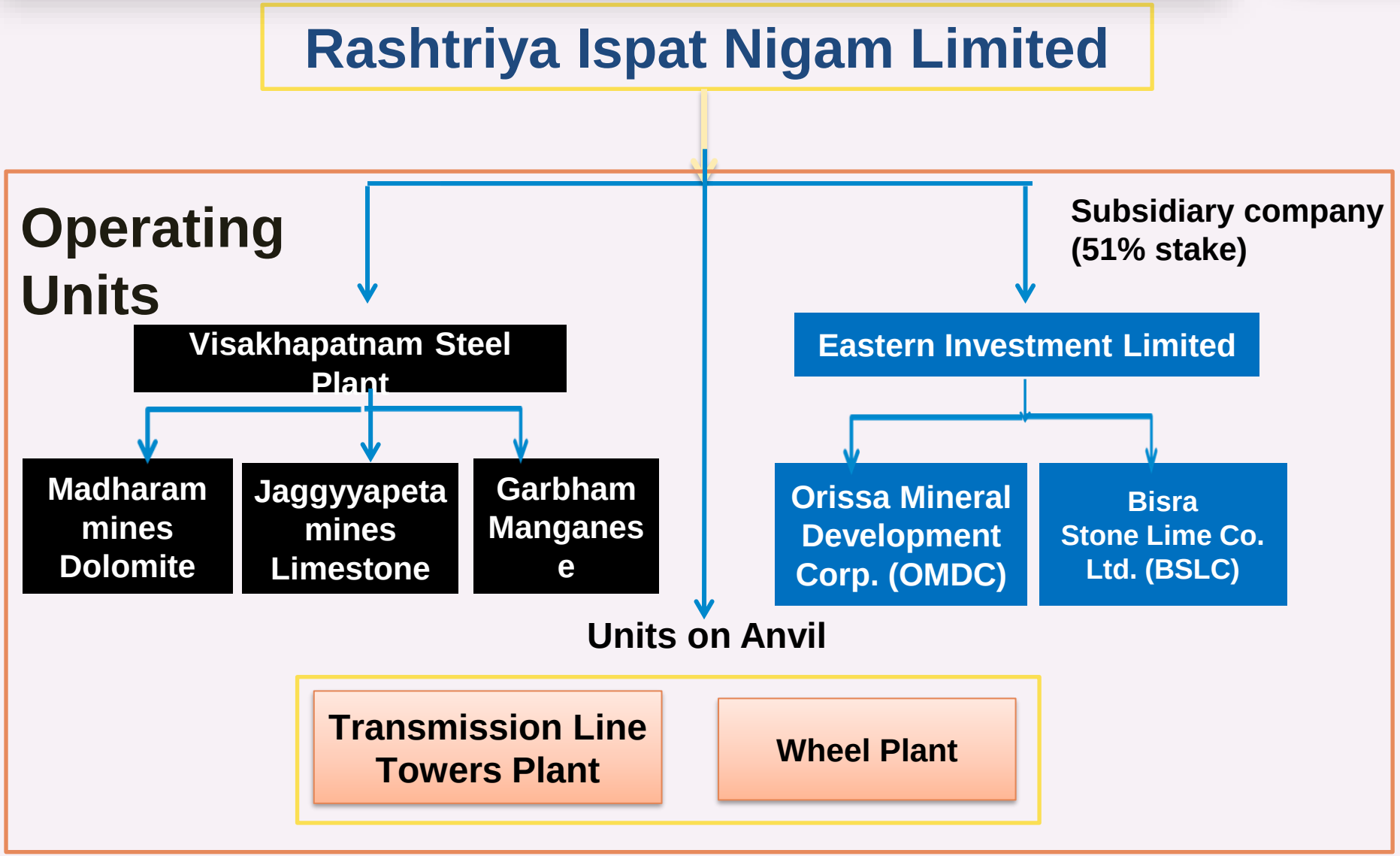
Shubham Singh, Dy. Mgr(O)-MMSM

K SUDHAKAR, GM(O)-EMD

(Designated Energy Manager)

CONTENTS

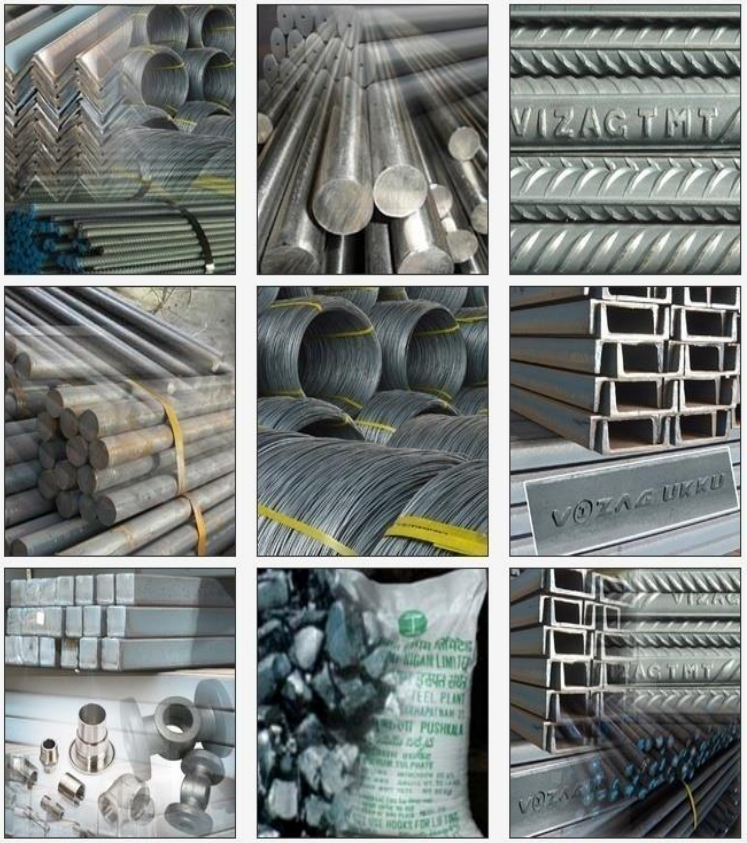
RINL Corporate Structure



RINL – Growth Plan

- **RINL's completed Upgradation & Modernization for 7.3 MTPA of Crude Steel.**
- **Products includes bars,rods, wire rod and structural's and Value Added Products**
- **Vision envisages growth to 20 Mtpa by 2032-33 in phases**

Turnover (2021-22)- 28082 INR Cr



Major Accreditations

- The 1st ISP to be certified for Quality, Health & Safety and Environment
- 1st Steel Plant to get ISO 50001 certification for Energy Management
- 1st Steel PSE to sign Integrity Pact of Transparency International
- CMMI Level 3 certification for IT Systems and ISO 27001 for ISMS
- 1st ISP to be 5S Certified for the whole plant

ISO 9001:2008 CERTIFIED

OCCUPATIONAL HEALTH & SAFETY OHSAS 18001

ENVIRONMENTAL MANAGEMENT SYSTEM ISO 14001

ISO ISO 50001 ENERGY MANAGEMENT

TRANSPARENCY INTERNATIONAL

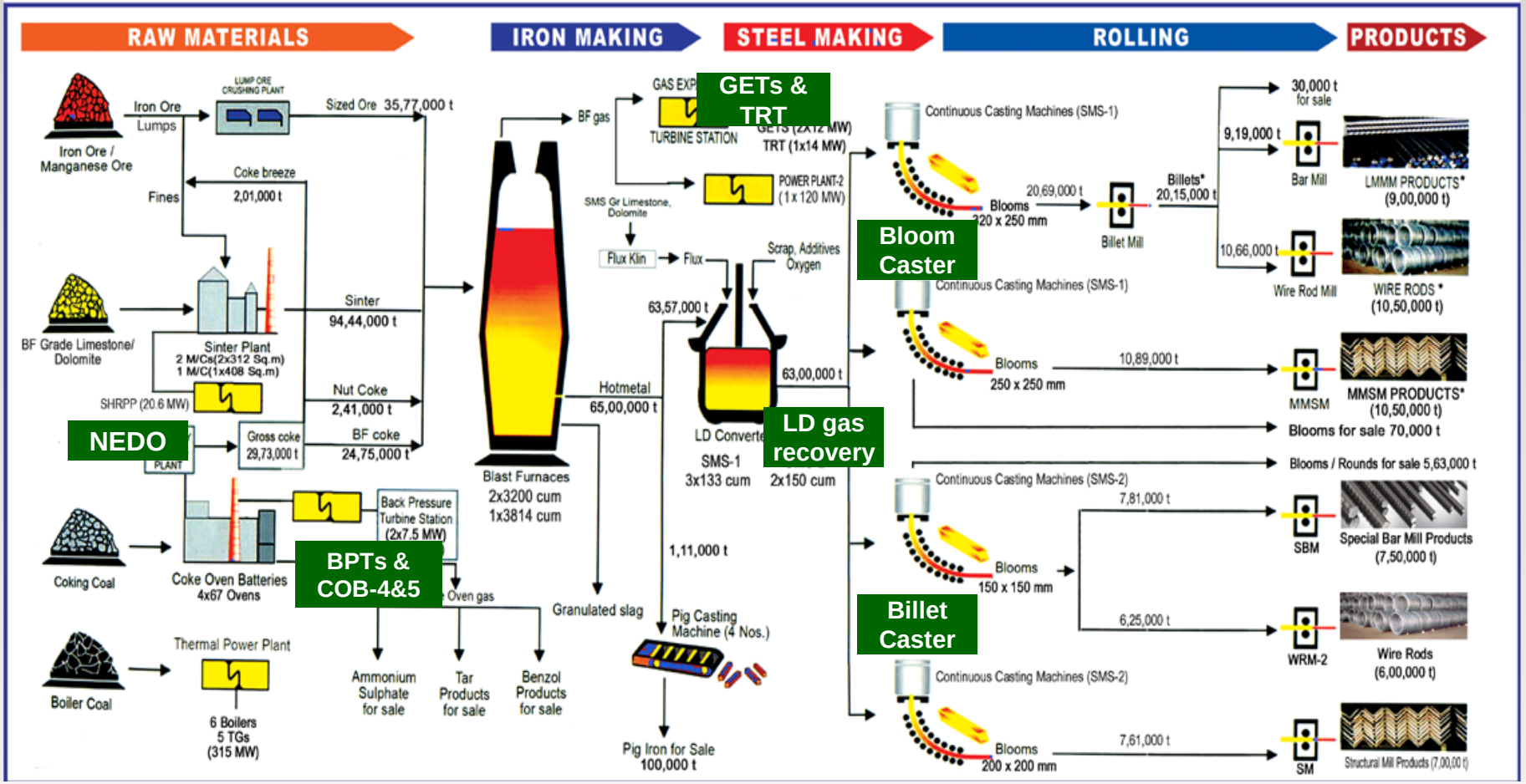
CMMI LEVEL 3

Information Security Management System ISO 27001 Certified

5S

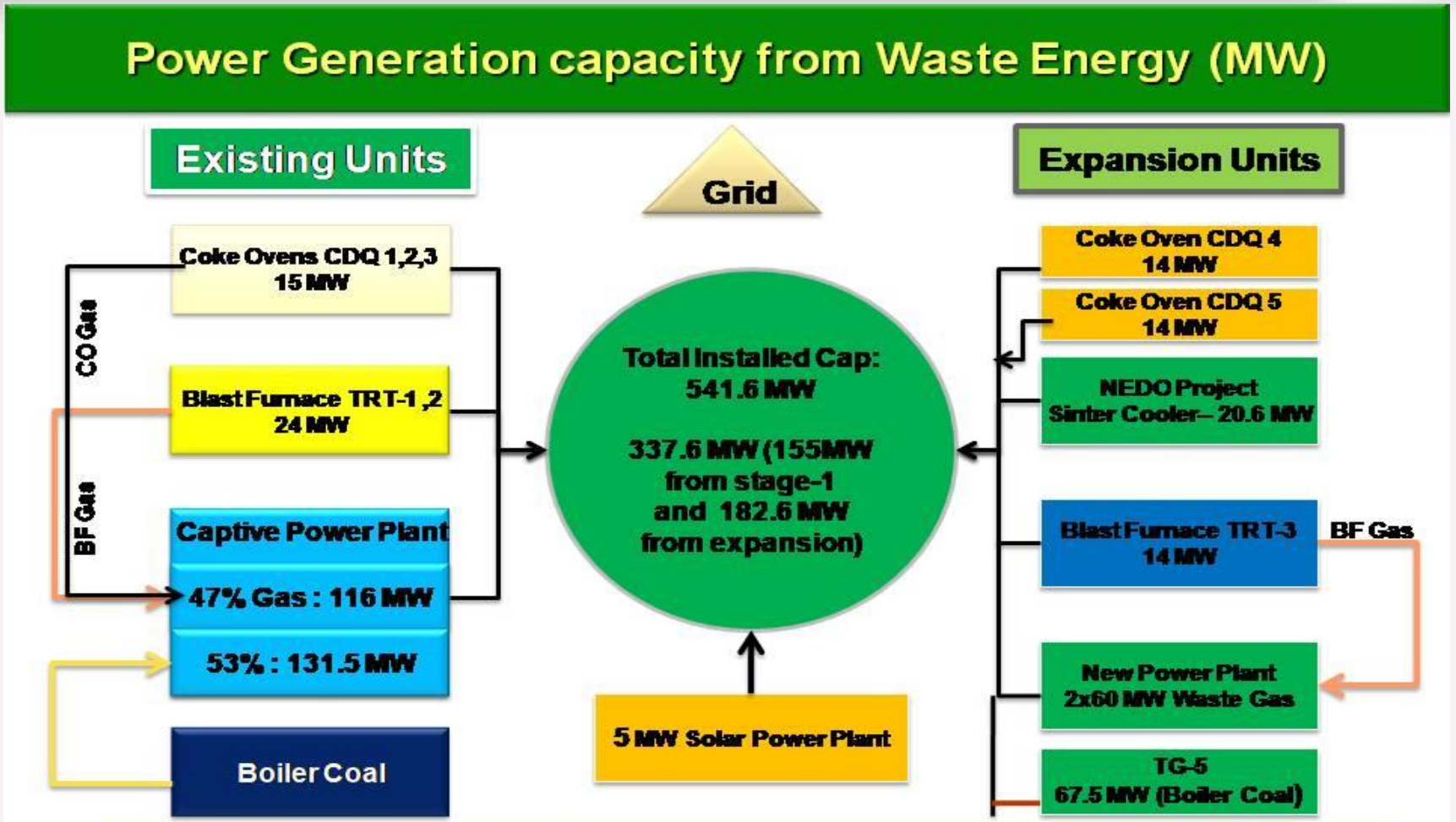
VISAKHAPATNAM STEEL PLANT

FLOW CHART (6.3 MT STAGE)
(Under Commissioning / Stablization)



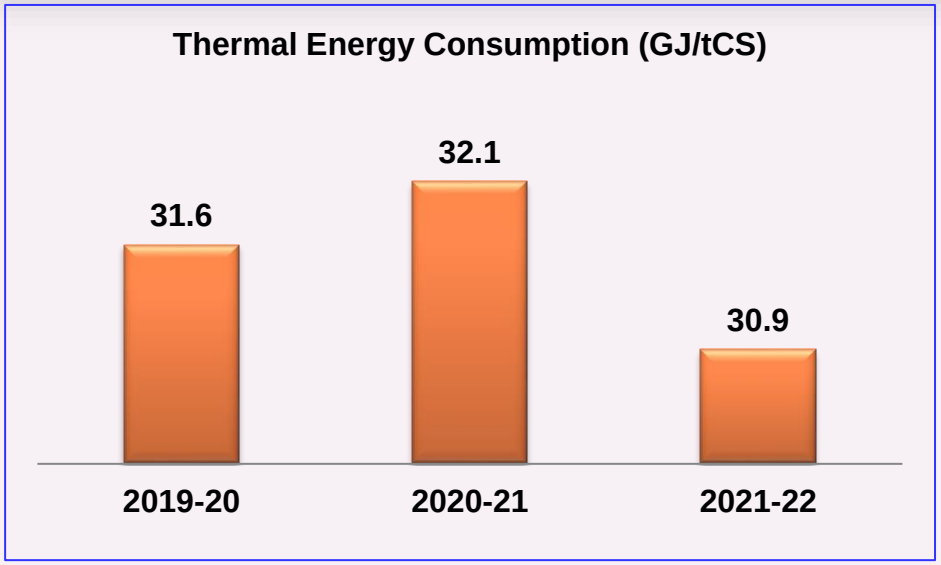
- Sinter Plant with NEDO
- CO Battery with Coke Dry Quenching and Back Pressure Turbine Station.
- BFs with Gas Expansion Turbine &Top Recovery Turbine station.
- SMS-1 & 2 with LD gas recovery plant.
- Continuous Bloom & Billet caster.

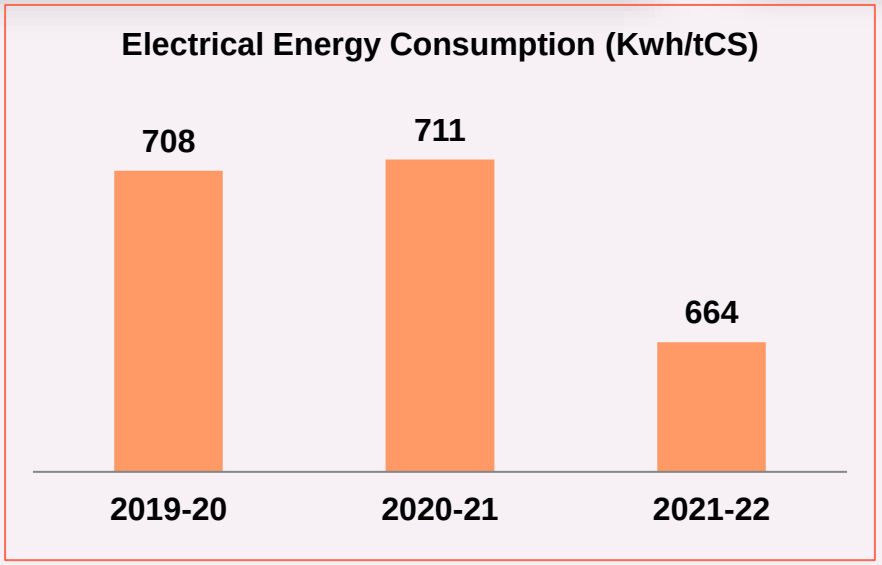
Power Generation capacity from Waste Energy (MW)

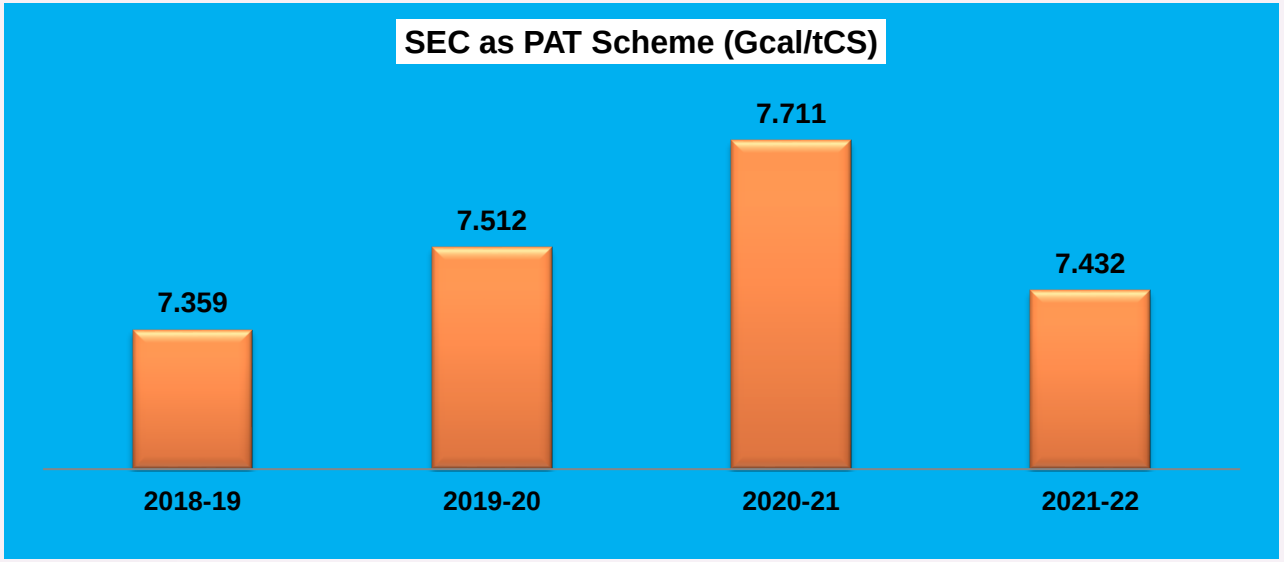


Total Installed capacity:	541.6 MW
Total Power Gen from Waste Energy incl Solar	337.6 MW
% of Power Generation through Waste Energy:	63.3%

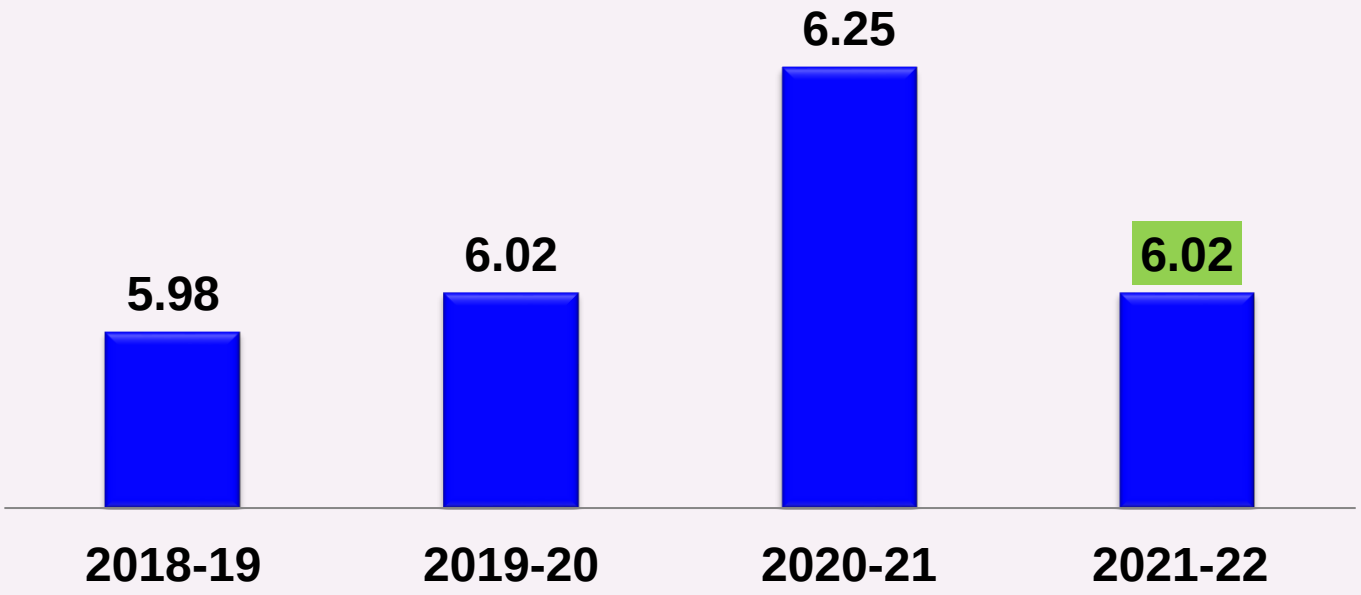
Energy Consumption Overview





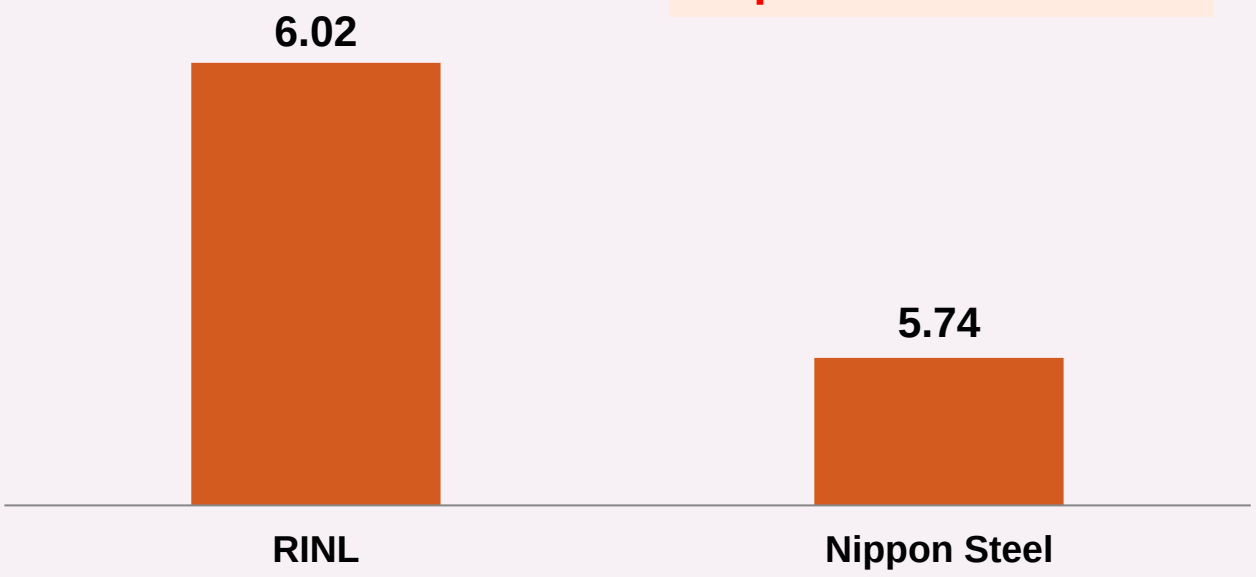


Sp. Energy Consumption-Gcal/tCS



International Bench Marking of SEC(Gcal/tCS)

Gap: 0.28 Gcal/tCS



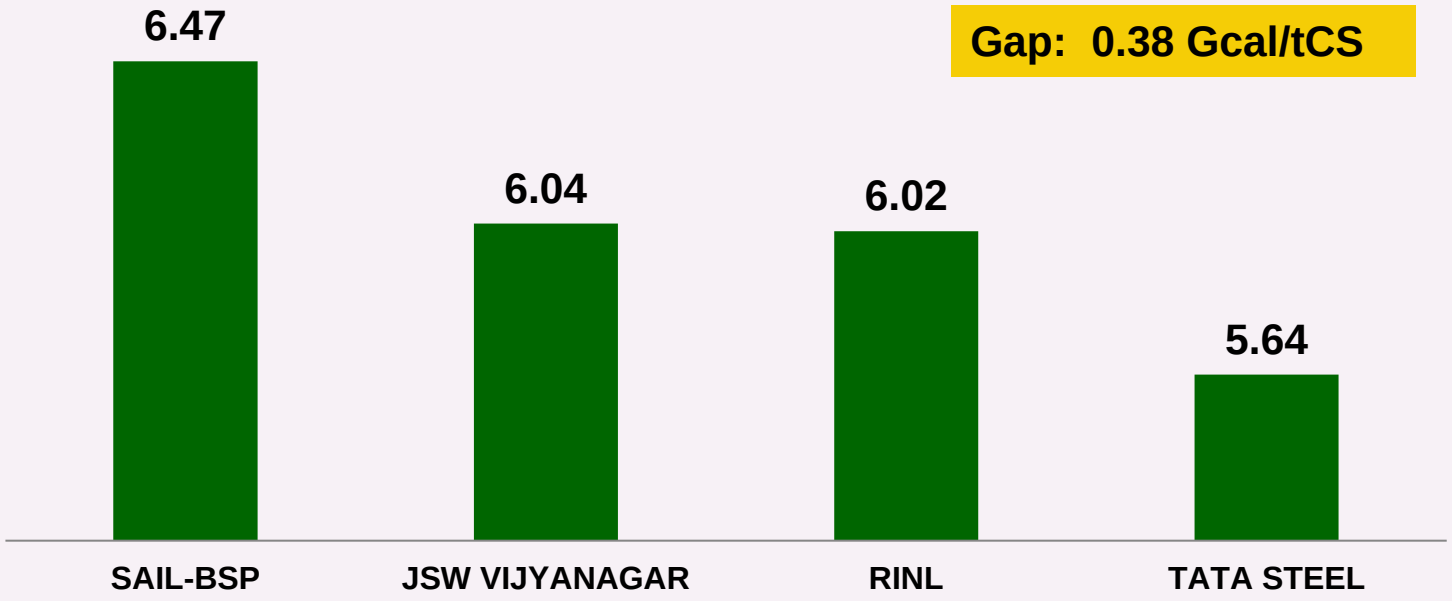
Bench Marking with Nippon Steel(2020-21)

Energy(2020-21)		GHG Emission	
RINL	NSC	RINL	NSC
6.02	5.74	2.60	2.09

Gap :0.28 Gcal/tCS

1) Scrap usage : 200 kg/thm(As per Japanese Industry)-RINL: 80 kg/tCS
2) All Energy Conservation technologies
Coke Dry Quenching,
Top Pressure Recovery Turbine,
BOF Gas Recovery,
Sinter Cooler waste heat recovery
Pulverized Coal Injection,
BF stoves Heat Recovery,
Billet Caster,
Hot Charging,
Regenerative Burners,
Coal Moisture Control
Sensible Heat recovery from BOF gas
3) Waste Plastics Injection and tires(0.2 million tons-6 kg/tCS)
4) Petro fuel 16 lts/Tcs

Benchmarking of Energy Consumption-Gcal/tCS



Energy(2020-21)		GHG Emission		Gap :0.38Gcal/tCS
RINL	Tata Steel	RINL	Tata Steel	1)Coal Injection of >180 kg/tHM (0.250Gcal/tCS) Vs 100 kg/tCS 2) Plant Production: 10 Mt Crude Steel.
6.02	5.64	2.60	2.43	

Energy Saving projects implemented in last three years with investment (2019-20)

S.No.	Title of Project	Energy Savings in		Investment (Rs Million)
		Gcal/MKwh	Rs Millions	
1	Improvement in Power Generation at GETS from 1.07 MW to 3.37 MW	20	142	5
2	Improvement in Power Generation at TRT from 5.39 MW to 6.80 MW	12	87	10
3	Increasing Hot Blast Temperature of BF 1 &2 by Inter Connection of Turbo Blowers-4 to BF-1&2 cold blast line at Captive Power Plant-1	67752	188	147
4	Modified Pass Design for Round 75 Rolling at MMSM	0.10	0.71	0.02

Energy Saving projects implemented (2019-20)

S.No.	Title of Project	Energy Savings in	
		Gcal/MKwh	Rs Millions
1	Improvement in Pulverized coal injection at BF-2 from 27.8 to 107.2 Kg/tHM at Blast Furnace	223830	308
2	Improvement in LD gas yield at SMS-1 from 104 to 109 Ncum/tCS	22457	31
3	Reduction in Coke Breeze consumption at SP-1 from 54.8 kg/tGS to 53.5 Kg/tGS	38888	54
4	Reduction in BF Fuel rate from 541.6 kg/tHM to 538.9 kg/tHM	95237	131
5	Enhanced argon production by increasing argon recovery from Air Seperation Unit-5	0.16	70

ENCON Projects with Investment (2020-21)

S.No.	Title of Project	Energy Savings in			Investment (Rs Million)
			Unit	Rs Millions	
1	Interconnection of LD Gas holder -1&2	99150	Gcal	128	8
2	Improvement in Power Generation at GETS from 3.37 MW to 6.16 MW	24.4	Mkwh	174	5
3	Improvement in Power Generation at SHRPP from 0.15 MW to 2.49 MW	20.5	Mkwh	146	10
4	Installation of 0.5MW roof top solar power plant	0.14	Mkwh	1.01	RESCO model

ENCON Projects with no Investment (2020-21)

S.No.	Title of Project	Energy Savings in	
		Gcal/MKwh	Rs Millions
1	Reduction in Sp. Power Consumption at SP-2 from 64.07 to 62.85 Kwh/tGS	2.8	20
2	Reduction in Sp. Heat Consumption at SP-1 from 27 to 26 Mcal/tGS	4080	5
3	Reduction in Sp. Power Consumption at SP-1 from 64.95 to 63.03 Kwh/tGS	7.8	56
4	Improvement in Pulverized coal injection at Blast Furnace-1 from 33.36 to 104 Kg/tHM	256953	331
5	Reduction in fuel rate at Blast Furnace-3 from 530.6 to 526.5 Kg/tHM	29537	38

ENCON Projects with no Investment (2020-21)

S.No.	Title of Project	Energy Savings in	
		Gcal/MKwh	Rs Millions
6	Reduction in Sp. Heat Consumption at SMS-2 from 45 to 35 Mcal/tCS	23544	30
7	Reduction in Sp. Power Consumption at SMS-2 from 119.26 to 113.06 Kwh/tCS	14.6	104
8	Reduction in Sp. Heat Consumption at CRMP-1 from 1380 to 1329 Mcal/tGL	13668	18
9	Reduction in Sp. Power Consumption at CRMP from 55.17 to 41.82 Kwh/tGL	7.27	52
10	Reduction in Sp.Power Consumption at WRM from 120.07 to 118.59 Kwh/tBl	1.12	8

ENCON Projects with no Investment (2020-21)

S.No.	Title of Project	Energy Savings in	
		Gcal/MKwh	Rs Millions
11	Reduction in Sp. Heat Consumption at WRM-2 from 260 to 247 Mcal/tBl	5756	7
12	Reduction in Sp.Power Consumption at WRM-2 from 211.30 to 200.46 Kwh/tBl	4.8	34
13	Reduction in Sp. Heat consumption at BF from 494 Mcal/tHM to 491 Mcal/tHM	14045	18

ENCON Projects with Investment (2021-22)

S.No.	Title of Project	Energy Savings in	
		Gcal/MKwh	Rs Millions
1	Reduction in Power Consumption during Deriming at Air Seperation Unit-5	0.78	0.13
2	Hydraulic Modfication in MMSM reheating furnace	15785	1.0
3	Reduction in power Consumption by reducing idle running of Stelmor Blowers at Wire Rod Mill	1.06	0.10

ENCON Projects with no Investment (2021-22)

S.No.	Title of Project	Energy Savings in	
		Gcal/MKwh	Rs Millions
1	Improvement in tar yield at coke oven from 3.07% to 3.09%	3884	5
2	Reduction in coke breeze consumption at Sinter Plant from 71.6 Kg/t charged sinter to 64.2 Kg/t charged Sinter.	403953	541
3	Reduction in Sp. Heat Consumption of Sinter Plant-2 from 12 Mcal/tGS to 11 Mcal/tGS.	3285	4
4	Reduction in Sp. Power Consumption of Sinter Plant-1 from 63.03 Kwh/tGS to 62.13 Kwh/tGS.	4.25	32
5	Increasing in Pulverized Coal Injection (PCI) in Blast Furnace-2 from 82.9 Kg/tHM to 100.3 Kg/tHM.	150692	202
6	Reduction in Sp. Power Consumption of Blast Furnace-3 from 50.41 Kwh/tHM to 42.27 Kwh/tHM.	10.5	80
7	Improvement in LD gas yield at SMS from 81 Ncum/tCS to 92 Ncum/tCS.	106526	143
8	Reduction in Sp. Heat Consumption of SMS-1 from 38 Mcal/tCS to 31 Mcal/tCS.	18760	25
9	Reduction in Sp. Heat Consumption of SMS-2 from 35 Mcal/tCS to 33 Mcal/tCS.	5184	7

ENCON Projects with no Investment (2021-22)

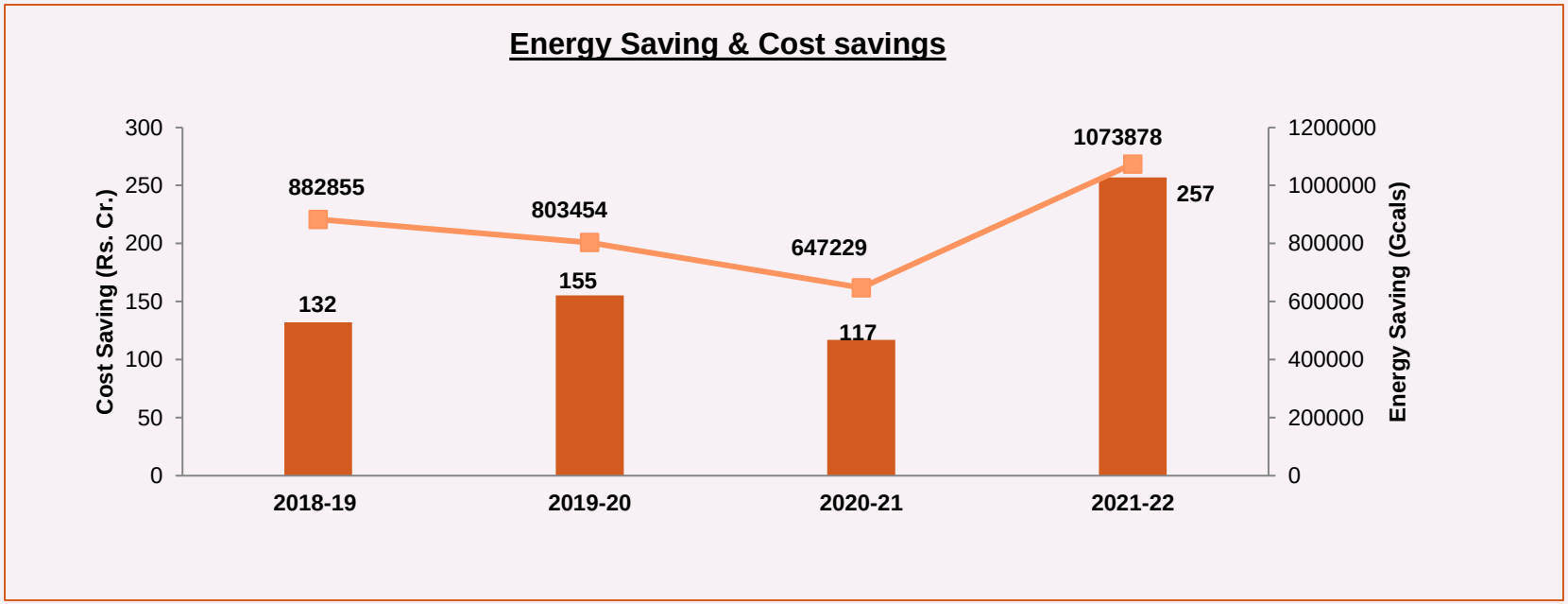
S.No.	Title of Project	Energy Savings in	
		Gcal/MKwh	Rs Millions
10	Reduction in Sp. Power Consumption of SMS-2 from 113.06 Kwh /tCS to 109.70 Kwh /tCS.	8.71	66
11	Reduction in Sp. Power Consumption of Bar Mill from 72.91 Kwh /tIP to 67.81 Kwh /tIP.	4.33	33
12	Reduction in Sp. Heat Consumption of Special Bar Mill from 323 Mcal /tIP to 306 Mcal/tIP	7260	10
13	Reduction in Sp. Power Consumption of Special Bar Mill from 115.35 Kwh /tIP to 109.02 Kwh /tIP.	2.70	21
14	Reduction in Sp. Power Consumption of WRM-2 from 200.46 Kwh /tIP to 193.31 Kwh /tIP	3.62	28
15	Reduction in Sp. Power Consumption of MMSM from 91.67 Kwh /tIP to 76.08 Kwh /tIP.	11.19	85
16	Reduction in Sp. Heat Consumption of STM from 335 Mcal /tIP to 309 Mcal /tIP.	10730	14
17	Reduction in Sp. Power Consumption of STM from 106.79 Kwh /tIP to 96.38 Kwh /tIP.	0.01	0.08
18	Reduction in Sp. Power Consumption of CRMP from 41.82 Kwh /tGL to 35.28 Kwh /tGL.	4	32

ENCON Projects with no Investment (2021-22)

S.No.	Title of Project	Energy Savings in	
		Gcal/MKwh	Rs Millions
19	Reduction in Sp. Heat Consumption of CRMP-1 from 1329 Mcal /tGL to 1220 Mcal /tGL.	23418	31
20	Reduction in Sp. Heat Consumption of CRMP-2 from 951 Mcal /tGL to 909 Mcal /tGL.	18020	24
21	Improvement in power generation in BPTS from 7.54 MW to 10.91 MW	29.52	224
22	Improvement in power generation in COB-4&5 from 7.95 MW to 15.79 MW.	68.68	521
23	Reduction in BF Gas bleeding from 10.28 % to 6.64 %.	306383	410

Summary of the Projects identified & Implemented

YEAR	No of Projects	Thermal Savings (Gcals)	Electrical Savings (Million KWH)	Savings in Rs.Cr	Investment In Rs Cr	Savings (GcaltCS)
2019-20	25	621918	75.64	155.3	16.2	0.17
2020-21	17	446733	83.54	117	2.3	0.104
2021-22	26	1073878	149.64	257.3	0.123	0.272



INNOVATIVE PROJECTS IMPLEMENTED

Name of the Project	Replicability	Impact on SEC (Gcal/tCS)	Annual Savings (Rs. In lakhs)	Investment (Rs. In lakhs)
Reduction in Power Consumption during Deriming at Air Separation Unit-5	Yes	0.0004	219	1.3
Hydraulic Modification in MMSM reheating furnace	Yes	0.003	211	10
Reduction in power Consumption by reducing idle running of Stelmor Blowers at Wire Rod Mill	Yes	0.001	162	1.0

INNOVATIVE PROJECT-1

Reduction in Power Consumption during Deriming at Air Separation Unit-5

Air Separation Plant produces Oxygen, Nitrogen and Argon in gas and liquid form by cryogenic-distillation process.

ASU-5 consists of Feed air Compressors (1 No.s), Nitrogen compressors (2 No.s), Expansion Turbines (2 No.s), Cryogenic pumps etc.

Main consumers of ASU-5 are Blast furnace, Steel melt shop, Coke Oven, Mills etc.

INNOVATIVE PROJECT-1

Reduction in Power Consumption during Deriming at Air Separation Unit-5

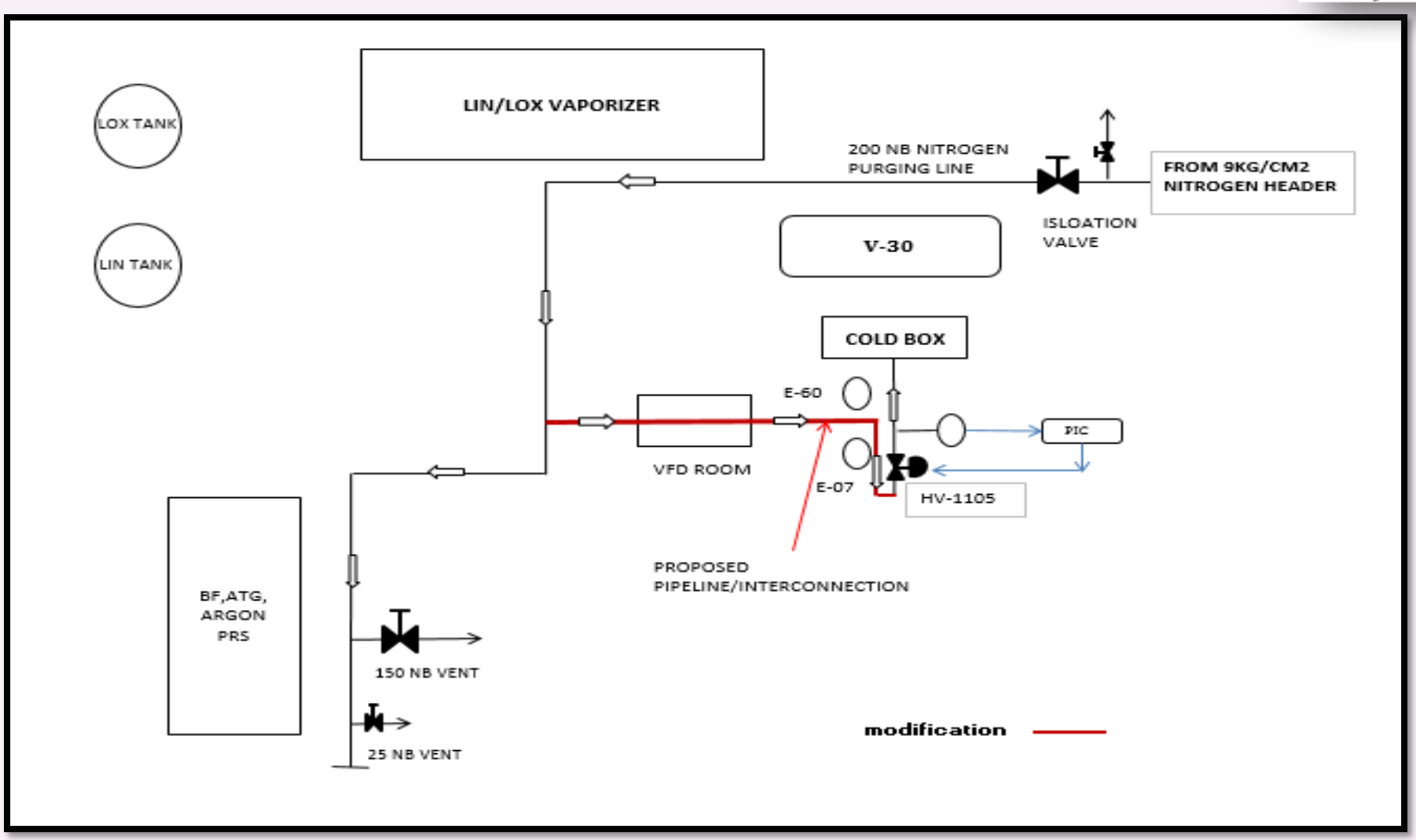
- Cryogenic systems are warmed with hot, dry and purified air to remove moisture and hydrocarbons.
- Prior to the the warm (more than 48 hours old) start up of ASU-5, deriming has to be done to ensure the unit is free of moisture and hydrcoarbons.
- Demand of deriming air is very low (5000 Nm3/hr to 8000 Nm3/hr) for which Air compressor is running at low load.
- Air compressor along with auxiliaries consumes 8.7 MWH of energy to provide deriming air.

INNOVATIVE PROJECT-1

MODIFICATION:

1. After a lot of brainstorming and discussions, It is planned to use nitrogen in place of air for deriming process as surplus nitrogenis available in network. .
2. A tapping from existing 9 KScg Nitrogen purge header is taken and connected to the upstream of deriming inlet valve.
3. Now whenever deriming is required to be done, Nitrogen isolation valve is opened and nitrogen is used for deriming.

Schematic layout of modification



BENIFITS

S.No.	Parameters	Unit	Before innovation	After innovation
1	Energy Consumption for deriming annually (MWH)	MWH	783	180
3	Cost of deriming annually in lakhs	Lakhs	216.85	14.04
4	Unit downtime annually in hours	Hours	168	132

Savings: 2.03 Crores per year

INNOVATIVE PROJECT-2

Hydraulic Modification in MMSM reheating furnace

FURNACE DETAILS

• NUMBER OF FURNACES	2
• CAPACITY EACH FURNACE	130 TONS/HR
• NUMBER OF ZONES	5
• HEATING ZONES	1,2,3
• SOAKING ZONES	4,5
• DIMENSIONS	21.7X14.51Mtrs
• EFFECTIVE DIMENSIONS	20X12 Mtrs
• EFFECTIVE AREA	240 M2

INNOVATIVE PROJECT-2

Need of Modification

- Furnace heating capacity is 130t/hr (46 blooms/hr)
- During the single furnace operation not able to roll more than 130 Tons/hr even mills rolling capacity is 260 Tons/hr.
- If discharging rate is more than 130 Tons/hr (46 blooms/hr), blooms are not getting fully soaked.
- Improper soaking results in high power consumption, cobbles and fast wear out of rolls.

INNOVATIVE PROJECT-2

Modification

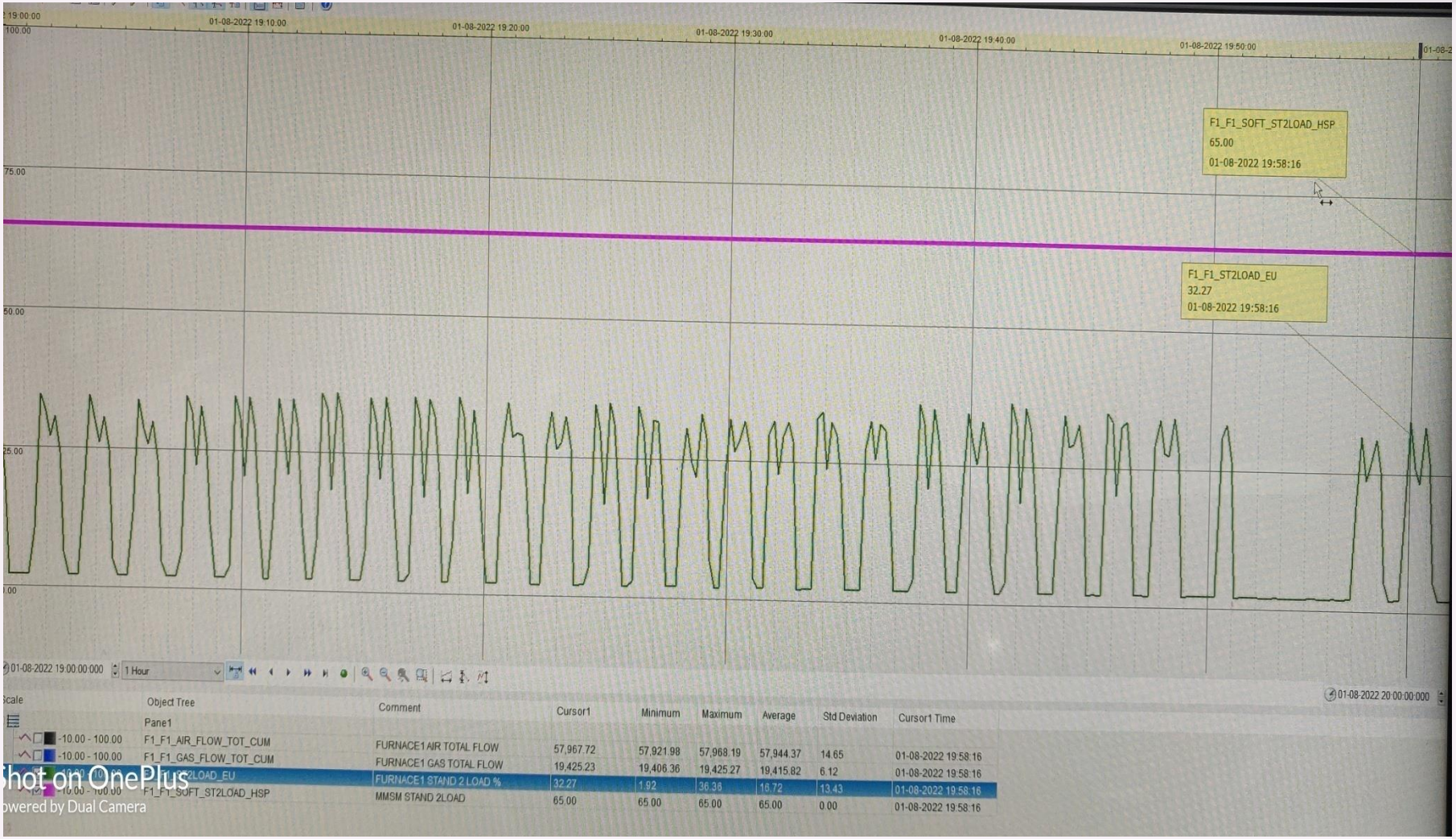
After discussion, the following options emerged,

Option	Feasible/not feasible
Increase the calorific value of mixed gas	not feasible (require more coke oven gas)
Oxygen enrichment	not feasible
Decreasing space between blooms	**Feasible by decreasing the hydraulic stroke from 400mm to 380 mm**

INNOVATIVE PROJECT-2

BENEFITS

- Increased flue gas resistance due to higher retention time.
- Increase in cycles from 50 to 53 resulted in blooms retention time by 10 minutes.
- Furnace holding capacity increased by 10 blooms.
- 56 blooms discharged in one hour with proper soaking in structural rolling
- Decrease in load in stand -2
- All problems associated with improper soaking in mill eliminated.



Scale	Object Tree	Comment	Cursor1	Minimum	Maximum	Average	Std Deviation	Cursor1 Time
	Pane1							
-10.00 - 100.00	F1_F1_AIR_FLOW_TOT_CUM	FURNACE1 AIR TOTAL FLOW	57,967.72	57,921.98	57,968.19	57,944.37	14.65	01-08-2022 19:58:16
-10.00 - 100.00	F1_F1_GAS_FLOW_TOT_CUM	FURNACE1 GAS TOTAL FLOW	19,425.23	19,406.36	19,425.27	19,415.82	6.12	01-08-2022 19:58:16
-10.00 - 100.00	F1_F1_ST2LOAD_EU	FURNACE1 STAND 2 LOAD %	32.27	1.92	36.36	16.72	13.43	01-08-2022 19:58:16
-10.00 - 100.00	F1_F1_SOFT_ST2LOAD_HSP	MMSM STAND 2LOAD	65.00	65.00	65.00	65.00	0.00	01-08-2022 19:58:16

INNOVATIVE PROJECT-2

Benefits

Parameters	Unit	Before Modification	After Modification
Blooms discharged	Nos.	46	56
Sp. Heat	Mcal/ton	248	226

Savings: 2.11 Crores per year

Reducing idle running of Stelmor Blowers at Wire Rod Mill-2

Brief of Activity:

- In WRM-2 stelmor area 10 Blowers are present in each line to cool down the coil and achieve desired metallurgical properties.
- These blowers are controlled by a variable frequency drive
- The blowers motor data per strand is as follows:

  200 KW -2 no's

  315kW -8 No's
- **During the mill down time in case of breakdown or cobble ,it is observed that operator were not switching off the drives for a long time. this idle running is causing huge wastage of power**

INNOVATIVE PROJECT-3

INNOVATION

- The drives Start/Stop control is provided with PLC system
- A logic with interlocks is incorporated in the PLC such that when the upstream equipment (rolling Stands) is off for more than 10 min , the stelmor drives were commanded switched off .

INNOVATIVE PROJECT-3

BENEFITS

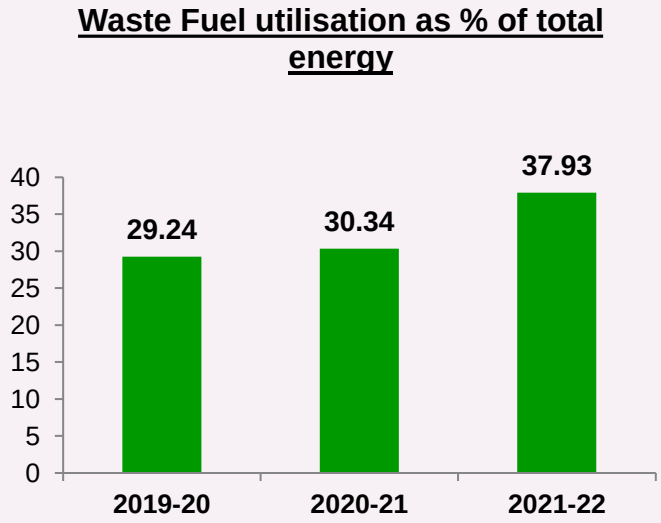
Parameters	Unit	Before Modification	After Modification
Power Consumption (Running all blowers and considering 5min idle running per hour)	KW	2920	2676
Power Savings	KW	244	
Power Saving	**MWH**	**2137**	
Savings per year	**Crores**	**1.6**	

Utilisation of renewable energy sources-Solar Energy Utilization

- RINL has been exempted from complying RPPO.
- RINL commissioned 5 MW Solar Power Plant
  Investment: Rs 36 cr
- RINL commissioned 0.5 MW Roof Top Solar Power Plant at three Building
  Investment: RESCO Model

Utilization of Waste Material as fuel

Name of the Fuel	Quantity of waste Fuel used (MT/ year)	GCV of fuel (kcal/kg)	Heat Value (million kcal/year)	Waste Fuel as % of total energy used
Coke Dust	32863	6860	225440	0.58
LD Slag	151734	1000	151734	0.46
Met Waste	414004	500	207002	0.63
Tar sludge	4205	7100	29856	0.09
Benzol muck	405	7100	2876	0.01
ASP sludge	224	7100	1590	0.00
BF gas	9868000	853	8417404	25.50
LD gas	487100	1837	894803	2.71
Coke dust(sold)	38044	775	29484	0.09
Granulated Slag	2426228	1070	2596064	7.86



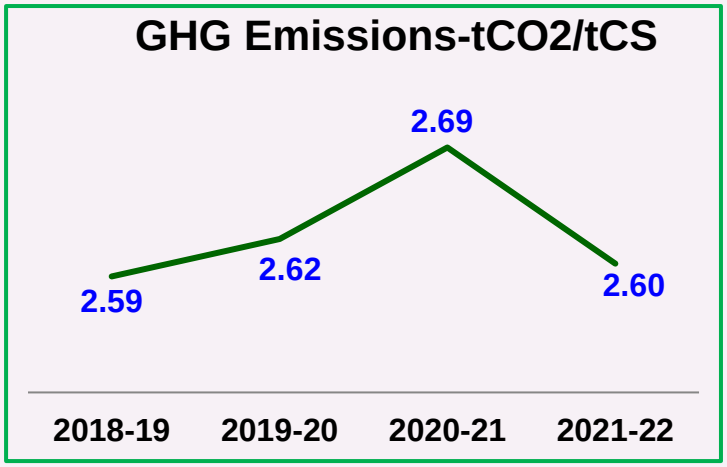
GHG Inventorisation

As per ISO:14064:-

Emission	Details
Scope 1&1.1	Direct emissions from site chimneys determined from straight carbon balance
Scope 2	Upstream emissions of electricity and steam from site.
Scope 3	Other upstream emissions by-products from site

Scope 1	Scope 1.1	Scope2	Scope 3	Total CO2(t CO2/TCS)
1,01,76,522	41,43,192	5,85,361	-43772	2.60

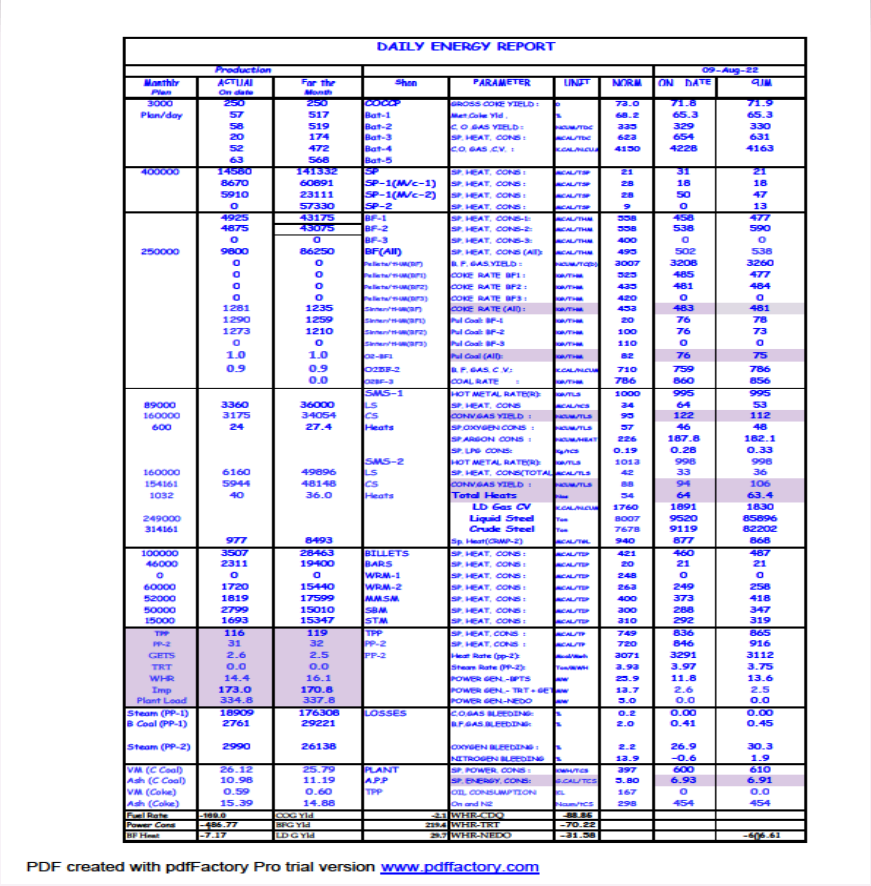
CLIMATE ACTION Member
worldsteel ASSOCIATION



Involvement of employees, Team Work and Monitoring

- **Employee Involvement Through**
  - Quality Circles, Suggestion Schemes, Department Energy Teams, Participation in Energy Conservation Campaigns, Cost Control Campaigns, Water Saving Campaigns
- **Implementation Methods**
  - Low Cost/No Cost Ideas (Process Improvements, House Keeping Measures, etc) will be Implemented by Frontline officers
  - Medium Investment Projects through AMR Schemes
  - High Investment Schemes through Board Approval/COM
  - Special Task Forces for Implementing Important Energy Conservation Projects for Sinter Cooler, Steam Utilization and By product gases usage.

Monitoring Format



DAILY ENERGY REPORT

Production									
								09-Aug-22	
Monthly Plan	ACTUAL On date	For the Month	Plan	PARAMETER	UNIT	NORM	ON DATE	CUM
3000	250	250	COCP	GROSS COKE YIELD :	%	73.0	71.8	71.9
Plan/day	57	517	Bat-1	Met.Coke Yld :	%	68.2	65.3	65.3
	58	519	Bat-2	C.O.GAS YIELD :	NCUM/TDC	335	329	330
	20	174	Bat-3	SP. HEAT. CONS :	KCAL/TDC	623	654	631
	52	472	Bat-4	C.O. GAS .C.V. :	K.CAL/NCUM	4150	4228	4163
	63	568	Bat-5					
400000	14580	141332	SP	SP. HEAT. CONS :	KCAL/TSP	21	31	21
	8670	60891	SP-1(M/c-1)	SP. HEAT. CONS :	KCAL/TSP	28	18	18
	5910	23111	SP-1(M/c-2)	SP. HEAT. CONS :	KCAL/TSP	28	50	47
	0	57330	SP-2	SP. HEAT. CONS :	KCAL/TSP	9	0	13
	4925	43175	BF-1	SP. HEAT. CONS-1:	KCAL/THM	538	458	477
	4875	43075	BF-2	SP. HEAT. CONS-2:	KCAL/THM	538	538	590
	0	0	BF-3	SP. HEAT. CONS-3:	KCAL/THM	400	0	0
250000	9800	86250	BF(All)	SP. HEAT. CONS (All)	KCAL/THM	495	502	538
	0	0	Pellets/THM(BF)	B. F. GAS YIELD :	NCUM/TDRM	3007	3208	3260
	0	0	Pellets/THM(BF1)	COKE RATE BF1 :	KG/THM	325	485	477
	0	0	Pellets/THM(BF2)	COKE RATE BF2 :	KG/THM	435	481	484
	0	0	Pellets/THM(BF3)	COKE RATE BF3 :	KG/THM	420	0	0
	1281	1235	Sinter/THM(BF)	COKE RATE (All) :	KG/THM	453	483	481
	1290	1259	Sinter/THM(BF1)	Pul Coal: BF-1	KG/THM	20	76	78
	1273	1210	Sinter/THM(BF2)	Pul Coal: BF-2	KG/THM	100	76	73
	0	0	Sinter/THM(BF3)	Pul Coal: BF-3	KG/THM	110	0	0
	1.0	1.0	O2-BF1	Pul Coal (All):	KG/THM	82	76	75
	0.9	0.9	O2SP-2	B. F. GAS .C .V.:	K.CAL/NCUM	710	759	786
		0.0	O2SP-3	COAL RATE	KG/THM	786	860	856
			SMS-1	HOT METAL RATE(R):	KG/TLS	1000	995	995
89000	3360	36000	LS	SP. HEAT. CONS	KCAL/NCS	24	64	53
160000	3175	34054	CS	CONV.GAS YIELD :	NCUM/TLS	93	122	112
600	24	27.4	Heats	SP.OXYGEN CONS :	NCUM/TLS	57	46	48
				SP.ARGON CONS :	NCUM/HEAT	226	187.8	182.1
				SP. LPG CONS:	Kg/NCS	0.19	0.28	0.33
			SMS-2	HOT METAL RATE(R):	KG/TLS	1013	998	998
160000	6160	49896	LS	SP. HEAT. CONS(TOTAL	KCAL/TLS	42	33	36
154161	5944	48148	CS	CONV.GAS YIELD :	NCUM/TLS	88	94	106
1032	40	36.0	Heats	Total Heats	Nos	54	64	63.4
				LD Gas CV	K.CAL/NCUM	1760	1891	1830
249000				Liquid Steel	Tns	8007	9520	85896
314161				Crude Steel	Tns	7678	9119	82202
	977	8493		Sp. Heat(CRMP-2)	KCAL/TML	940	877	868
100000	3507	28463	BILLETS	SP. HEAT. CONS :	KCAL/TSP	421	460	487
46000	2311	19400	BARS	SP. HEAT. CONS :	KCAL/TSP	20	21	21
0	0	0	WRM-1	SP. HEAT. CONS :	KCAL/TSP	248	0	0
60000	1720	15440	WRM-2	SP. HEAT. CONS :	KCAL/TSP	263	249	258
52000	1819	17599	MMSM	SP. HEAT. CONS :	KCAL/TSP	400	373	418
50000	2799	15010	SBM	SP. HEAT. CONS :	KCAL/TSP	300	288	347
15000	1693	15347	STM	SP. HEAT. CONS :	KCAL/TSP	310	292	319
TPP	116	119	TPP	SP. HEAT. CONS :	KCAL/TP	749	836	865
PP-2	31	32	PP-2	SP. HEAT. CONS :	KCAL/TP	720	846	916
GETS	2.6	2.5	PP-2	Heat Rate (pp-2):	Kcal/Kwh	3071	3291	3112
TRT	0.0	0.0		Steam Rate (PP-2):	Tns/MWH	3.93	3.97	3.75
WHR	14.4	16.1		POWER GEN.-BPTS	MW	23.9	11.8	13.6
Imp	173.0	170.8		POWER GEN.- TRT + GET	MW	13.7	2.6	2.5
Plant Load	334.8	337.8		POWER GEN.-NEDO	MW	3.0	0.0	0.0
Steam (PP-1)	18909	176308	LOSSES	C.O.GAS BLEEDING:	%	0.2	0.00	0.00
B Coal (PP-1)	2761	29221		B.F.GAS BLEEDING:	%	2.0	0.41	0.45
Steam (PP-2)	2990	26138		OXYGEN BLEEDING :	%	2.2	26.9	30.3
				NITROGEN BLEEDING	%	13.9	-0.6	1.9
VM (C Coal)	26.12	25.79	PLANT	SP. POWER CONS :	Kwh/TCS	397	600	610
Ash (C Coal)	10.98	11.19	A.P.P	SP. ENERGY CONS:	G.CAL/TCS	5.80	6.93	6.91
VM (Coke)	0.59	0.60	TPP	OIL CONSUMPTION	KL	167	0	0.0
Ash (Coke)	15.39	14.88		On and Nil	Nos/HCS	298	454	454
Fuel Rate	-988.0	COG Yld		-2.1	WHR-CDQ	-88.86		
Power Cons	-486.77	BFG Yld		219.4	WHR-TRT	-70.22		
BF Heat	-7.17	LD G Yld		29.7	WHR-NEDO	-31.58		-406.61

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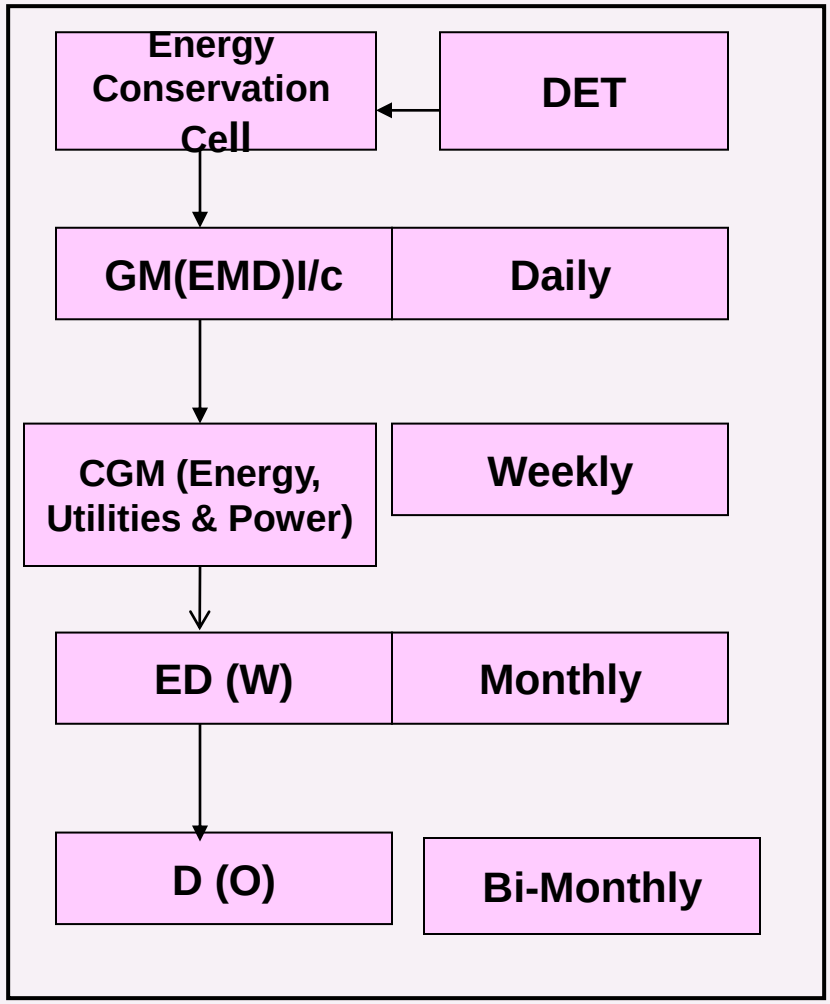


-Energy Savings are quantified with respect to displacement of Boiler Coal
-Electrical Savings are quantified by pegging with Electricity imported.
-Savings are certified by Energy Auditors

Energy Management System ISO:50001

Features:

- Significant Energy Use
- Developing Energy Management programmes.
- Operational control of identified energy aspects
- Monitoring and Measurement
- Risk & Opportunities
- Internal Audit
- Management Review
- *Certified for ISO: 50001,Ver 2018 in July'21.*

BUREAU VERITAS

Bureau Veritas Certification

RASHTRIYA ISPAT NIGAM LIMITED
VISAKHAPATNAM STEEL PLANT

VISAKHAPATNAM – 530 031, ANDHRA PRADESH, INDIA.

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organization has been audited and found to be in accordance with the requirements of the Management System Standard detailed below.

Standard

ISO 50001:2018

Scope of certification

PRODUCTION OF IRON AND STEEL, COKE AND COAL CHEMICLAS, UTILITY GASES AND GENERATION OF POWER

Original cycle start date:	**28 December 2010**
Expiry date of previous cycle:	**27 December 2019**
Recertification Audit date:	**16 November 2019**
Recertification cycle start date:	**27 December 2019**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **27 December 2022**

Certificate No. **IND.19.7645/EN/U** Version: **2** Revision date: **13 July 2021**

Signed on behalf of BVCH SAS UK Branch
Jagdheesh N. MANIAN
Head – CERTIFICATION, South Asia
Commodities, Industry & Facilities Division

UKAS MANAGEMENT SYSTEMS 0008

Certification body address: 5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom.

Local office: Bureau Veritas (India) Private Limited (Certification Business) 72 Business Park, Marol Industrial Area, MIDC Cross Road "C", Andheri (East), Mumbai – 400 093, India.

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization. To check this certificate validity please call +91 22 6274 2000.

Implementation of Corrective/Preventive actions

Bureau Veritas (India) Pvt. Ltd. — RASHTRIYA ISPAT NIGAM LT

To be completed by Bureau Veritas

Date	Organization		Contract n°	Report n°
18-06-2022	RASHTRIYA ISPAT NIGAM LTD		12079424	50kS5VSS-IN01
Non Conformity Observed During	5th Surveillance audit			
Process	MMSM - Medium Merchant & Structural Mill			
Standard	ISO 50001:2018			
Clause	50k-8.1 Operational planning and control			
Site Name	HEAD OFFICE			

Non Conformity Description

STANDARD REQUIREMENT: 8.1 Operational planning and control
The organization shall plan, implement and control the processes, related to its SEUs (see 6.3), needed to meet requirements and to implement the actions determined in 6.2, by:

c) implementing control of the processes in accordance with the criteria, including operating and maintaining facilities, equipment, systems and energy-using processes in accordance with established criteria;

DESCRIPTION OF THE NON-CONFORMITY: The process of implementing the operational controls as per the defined critera is not effective

OBJECTIVE EVIDENCE: Air fuel Ratio is maintained from 1:2.44 to 1:2.46 since Jan till May 22 as recorded in operatio daily logbook. However, same to be maintained at 1:2 to 1:2.2 ratio for mixed gas with calorific value of 2000 K Cal/Ncu and 1:5 to 1:6 in case of Coke oven gas with CV of 4000 to 4500 K Cal/Ncum as per Work instruction QSHE-I-Q-MSM-(E Issue date: 20 Jan 2021.

Grade	Lead Auditor		Auditor		Organization Rep.
Minor	V S SATISH KUMAR		V S SATISH KUMAR		Mr. Saibal Sen / Mr. A V S Satyanarayana
To be completed before					
31-07-2022	VSS-IN	1-1CM9LMJ	VSS-IN	1-1CM9LMJ	

To be completed by the organization

Root Cause Analysis (What failed in the system to allow this non conformity to occur ?)

Evidence of maintaining Air Fuel ratio as per procedure is not available as maintaining air fuel ratio depends upon calorific value of mixed gas. As per procedure, indicative ratio of 1:2.0-1:2.2 is given for mixed gas CV of 2000 Kcal/Ncum. Though procedure explicitly mentioned of adjusting air fuel ratio dynamically, the actual air fuel ratio with relation to CV is not defined due to misinterpretation

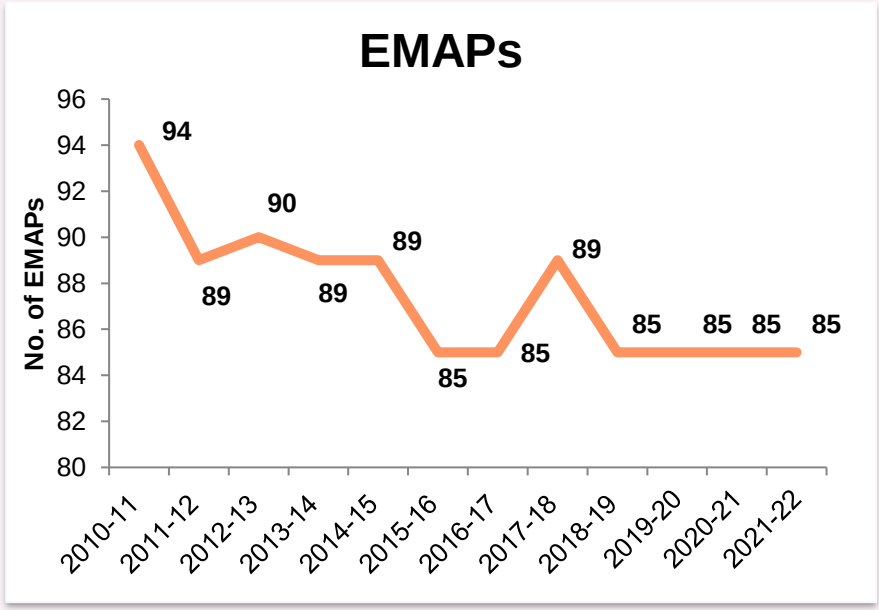
Correction (What is done to solve this problem)

The air fuel ratio is defined in the procedure based on CV of mixed gas, and procedure is amended. The copy of procedure is attached. Air fuel ratio up dated in data collection plan record which is also attached.

Corrective Action (What is done to prevent reoccurrence)

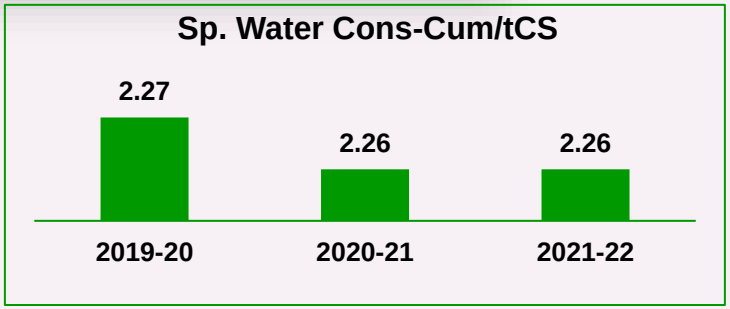
Awareness session conducted to all concerned on the revised procedure and data collection plan.

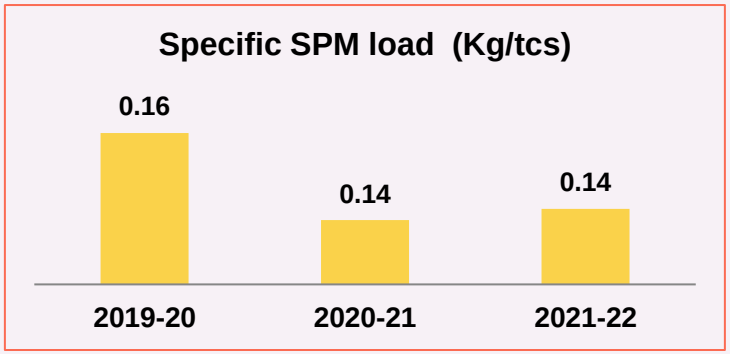
- Plant has taken up Energy Objectives and Energy Management Action plans(795 Nos) to reduce energy consumption.
- **DEPARTMENTAL ENERGY TEAMS** were constituted in various departments. The teams identified specific projects
- Departments conducted energy audits at various equipment through Departmental Energy Audit Teams

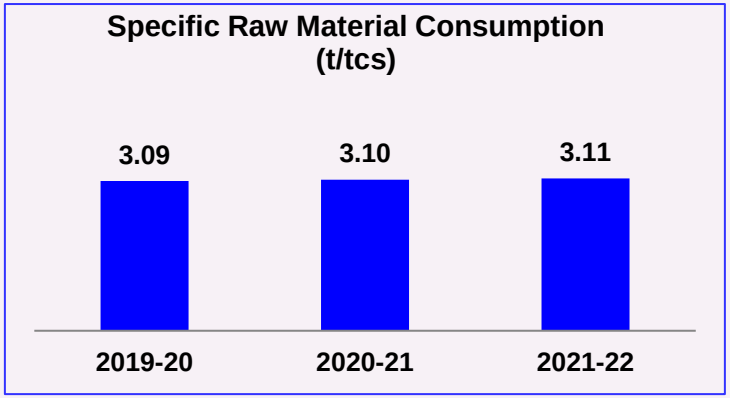


Environmental Projects & Projects linking with Carbon Emission Reduction

Projects	Benefits
Revamping of Burden handling & Cast House FE system of Blast Furnace-1.	Reduce Dust emissions
Balacheruvu, Waste Water Treatment Plant - Commissioned in July 2014.	253 Million Gallons
Commissioning of Appikonda Waste Water Treatment Plant	220 Million Gallons
The Digital display board at Main Gate was inaugurated by CMD on 5th June 2014 for displaying the CAAQM and Stack analyzers.	Awareness
Dry Fog Dust Suppression System (DSS) in Expansion area of Raw Material Handling Plant, Sinter Plant & Blast Furnace.	Reduced fugitive emissions
Rain water harvesting scheme near 18 MLD plant	Ground water recharging







Energy Conservation Projects identified for next three years

Sl No	Name of Energy Conservation Activity	Year	Impact (Mcal/tCS)
1	Recommissioining of LD Gas holder-2	2022-23	**14.9**
2	To improve Pulverized coal injection at BF-1 from 107.2 Kg/tHM to 121 kg/tHM at Blast Furnace	2022-23	**8.7**
3	To improve Pulverized coal injection at BF-2 from 100.3 Kg/tHM to 121 Kg/tHM at Blast Furnace	2022-23	**12.9**
4	To improve power generation at SHRPP from 1.69 MW to 5 MW.	2022-23	**13.2**
	Total Savings		**49.8**

Environmental Projects & Projects linking with Carbon Emission Reduction

Name of Projects	Registration Number	Expected CERS
BF3 Top Pressure Recovery Project	9613	60410
COB-4 Turbine at Battery-4	9988	68540
Waste Heat Recovery from Stoves of BF-3	10024	44932

- **4 No. of projects registered (TRT, COB4, BF3-WHR).**
- **UNFCCC issued 1,71,929 CERs to RINL for three CDM projects.**

Adoption of Green Technologies

Name of Technology	Features	Energy Savings(TOE)	GHG redn(tCo2)
Coke Dry Quenching Plant	Power gen: 2X7.5MW	115285	689586
Top Pressure Recovery Turbine	Power gen; 2x12 MW	21257	127152
LD Gas Recovery System	80000 Cum	58022	347060
Evaporative Cooling System	13 ata steam: 19 t/hr	12173	72814
Preheating of combustion air at CRMP	Air preheating: 250degc	3469	21062
Gas and air recuperators in ROLLING MILLS	Air : 450 degC Gas:250 degC	16105	57088
Reducing GHG emission by about 13 lakh tons annually			

Adoption of Energy Efficient Technologies-Unique Features of RINL

Name of Technology		Level of Diffusion
Coke Dry Quenching Plant	First Time in India(1990)	13.5%
Top Pressure Recovery Turbine	First Time In India(1993)	13.9%
LD Gas Recovery System	First Time in India(1991-93)	50%
Evaporative Cooling System	First Time in India(1993)	25%
Sinter Cooler Waste Heat Recovery(Power Gen)	First Time in India(2014)	5%

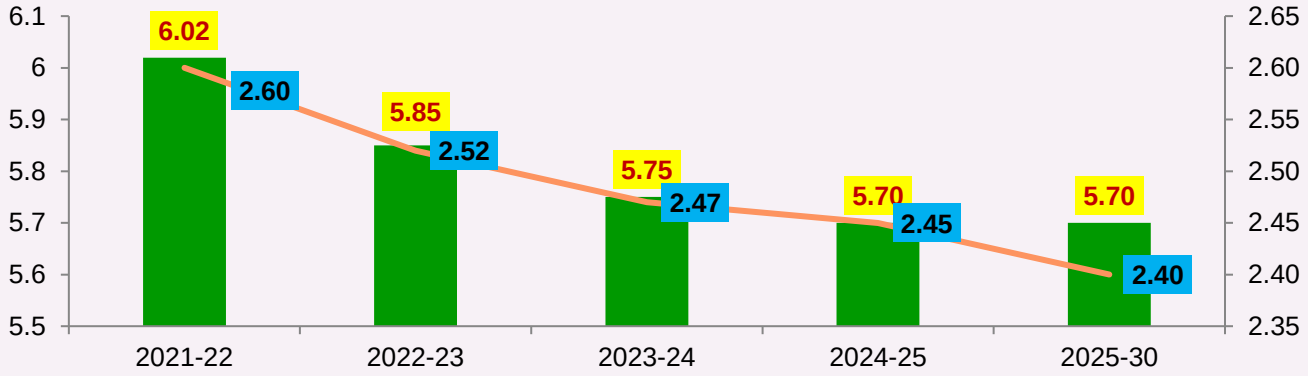
Action Plan to Achieve “NET ZERO-2070”

Parameters	2021-22	2030	2030 (with policy intervention)	2047	2047 (with policy intervention)
GHG Emissions	2.60	2.40	2.10	2.30	2.00

Action plan (With policy intervention)

- Usage of Natural Gas based on availability and cost
- Usage of more scrap based on availability of quality Steel Scrap
- Installation floating Solar Power Plant reservoirs (KBR) with financial assistance from National Clean Energy (NCEF)
- Installation of WHR systems like regenerative burners in reheating furnaces and Coal Moisture Control with financial assistance from National Clean Energy (NCEF)
- Usage of hydrogen in Blast furnace based on availability and cost

Roadmap for reduction of Energy Consumption & GHG emissions.



Action plan to achieve 2.40 tCO2e/tCS by 2030,

a. Increasing Pulverized Coal Injection in Blast Furnace up to 150 Kg/tHM
b. Optimizing power generation from Waste Heat Recovery system like CDQ, SHRPP & TRT
c. Process optimization (combustion improvement, installation of VFD drives, optimizing fuel rate in BF)

De-carbonising Options for Iron & Steel

Parameters	Unit	Present		Target	Impact (tCO2/tCS)
GHG emissions	tCO2/tCS	2.60		2.10	0.50
Waste Heat Recovery	MW	BPTS , COB4,COB5	28	33	0.04
		GETS	5	10	
		SHRPP	1.85	8	
		TRT	6.28	10	
Usage of Scrap at SMS	Kg/tCS	80		200	0.240
PCI Rate	Kg/tHM	94		150	0.034
Natural Gas(If Available)	Cum/tHM	0		120	0.07
Power Optimization	Kwh/tCS	402		350	0.04
Heat Optimization	Mcal/tCS	1834		1700	0.07
Yields Improvement (Coke)	%	72.5		74.5	0.06

Net Zero Ideas For Steel Industry

- Usage of Hydrogen in place of PCI coal
- Injection CO Gas in BF, Syngas injection into BF
- Carbon Capture usage and Storage (CCU&S) technology

Awards

- CII National Award for Excellence in Energy Management & National Energy Leader Award-2021
- CII National Award for Excellence in Energy Management & National Energy Leader Award-2020
- National Energy Conservation Award-1st Prize from Ministry of Power-2019
- CII National Award for Excellence in Energy Management & National Energy Leader Award-2019
- CII National Award for Excellence in Energy Management-2018
- CII National Award for Excellence in Energy Management-2017

Thank you

राष्ट्रीय इस्पात निगम लिमिटेड

RASHTRIYA ISPAT NIGAM LIMITED

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