ENERGY CONSERVATION & MANAGEMENT

CARRIAGE & WAGON WORKSHOP, NORTHERN RAILWAY, KALKA, HARYANA

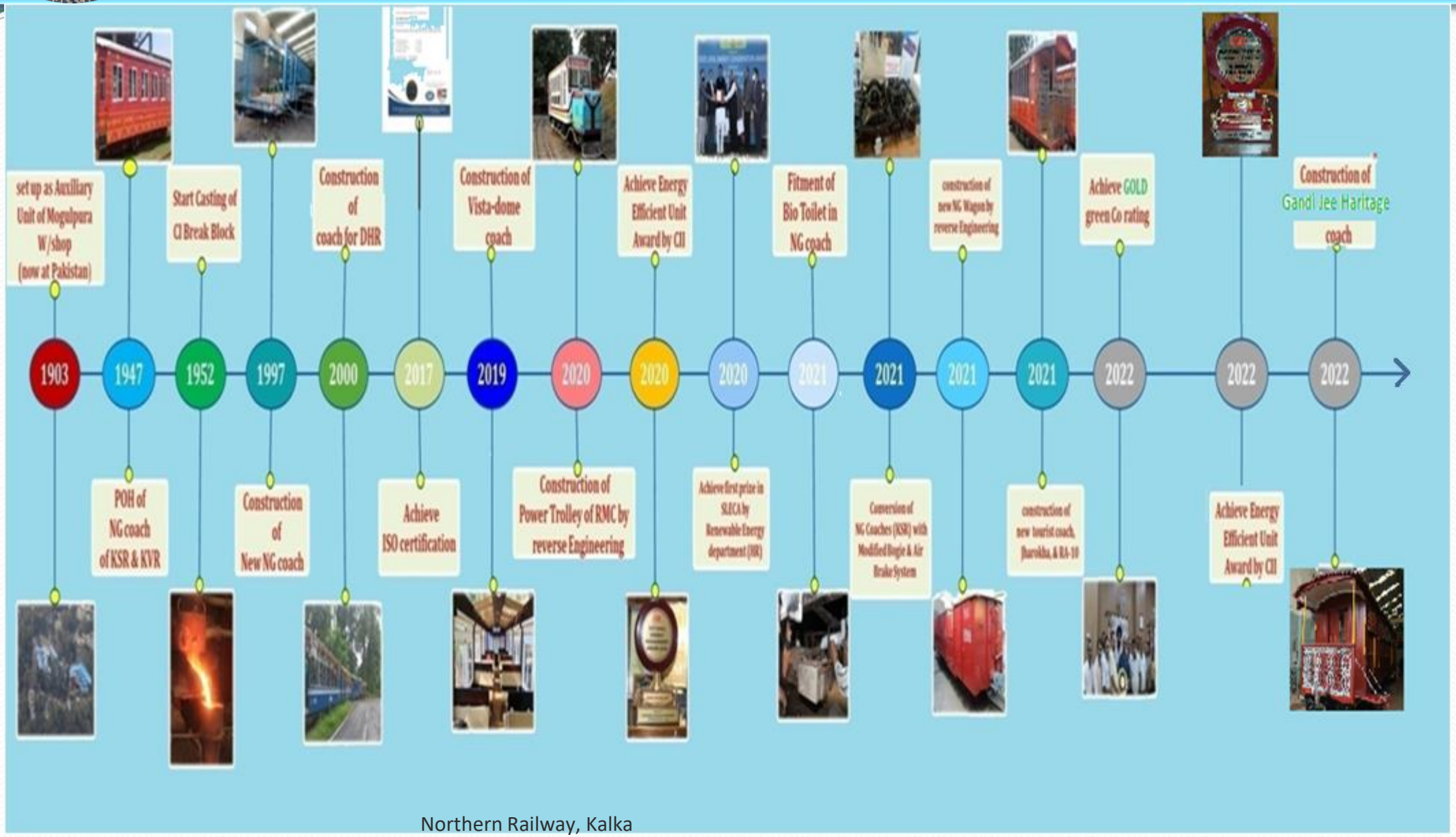
SUDHANSU PANWAR
Chief Workshop Manager

SHYAM BABU
Dy. Chief Mech. Engineer

Jyoti Sahu
Works Manager

Northern Railway, Kalka

MILESTONE OF KALKA WORKSHOP



ACTIVITIES PERFORMED & COMPANY PROFILE

OVERHAUL

NG COACHES

NG WAGON

Rail Motor Car

MANUFACTURING

NG COACHES

NG WAGON

BOGIE FOR NG ROLLING STOCK

Metal Casting

BREAK BLOCK

NG BRONZE BEARING

MISC. ITEMS

MISC

Sustaining heritage values of workshop

TURNING OF NG WHEEL

MISC. ITEMS LIKE FLAP DOOR, DUSTBIN & OTHER KEY PART

Description	Utility
TOTAL AREA	3.98 Acre
COVERED AREA	2.12 Acre
RAIL TRACK LENGTH	0.76 KM (Inside)
TOTAL M&P	156 Nos.
WORK FORCE	403
BUDGET ALLOTTED	Rs.34.56 Crore
RENEWABLE ENERGY SOURCE	300 Kwp SOLAR PANEL
TOTAL ENERGY CONSUMPTION (2022-23)	109.71 MTOE
TOTAL ELECTRICAL ENERGY CONSUMPTION (2022-23)	3.7 Lac KWH

MAJOR ENERGY CONSUMING EQUIPMENT

CUPOLA FURNACE ,
Cap : 1 & 1.5 ton
(53.3 % of Thermal Energy)

AIR COMPRESSOR
Cap: 535 CFM
(13.12 % of Elect Energy)

CNC WHEEL PROFILE CUTTING LATHE M/C
(17.36 % of Elect Energy)

LATHE MACHINE
(18 % of Elect Energy)

OIL FIRED FURNACE
(37.96 % of Thermal Energy)

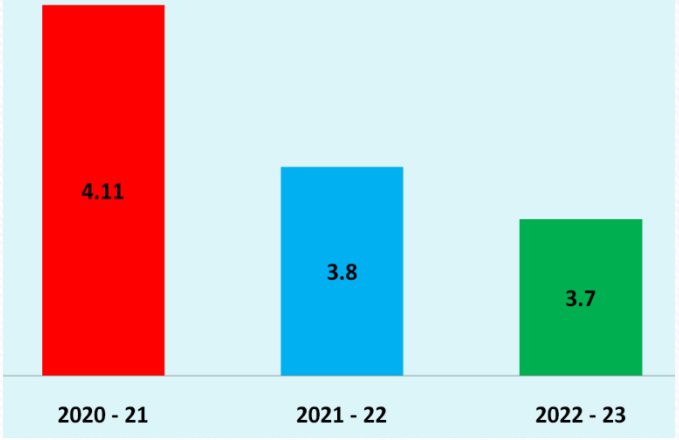
WELDING SETS
(12 % of Elect Energy)

AIR PLASMA CUTTING MACHINE

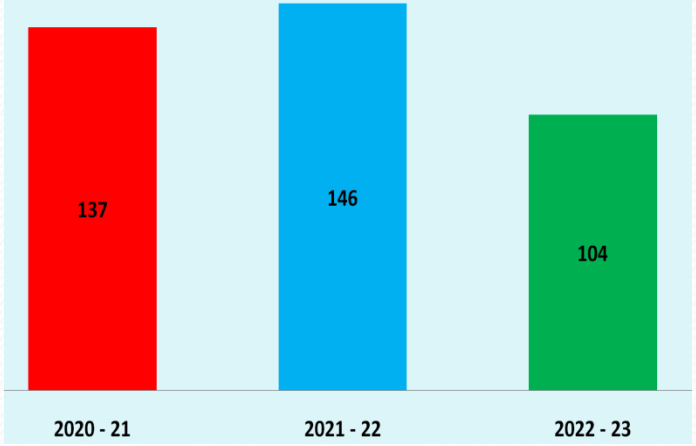
ACETYLENE & BMCG CUTTING

SOURCE WISE ENERGY CONSUMPTION PATTERN IN 3 YEARS

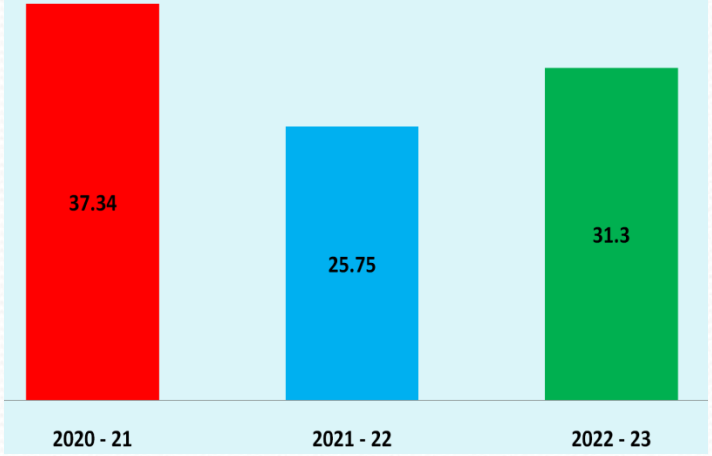
ELECTRICITY IN LAKH KWH



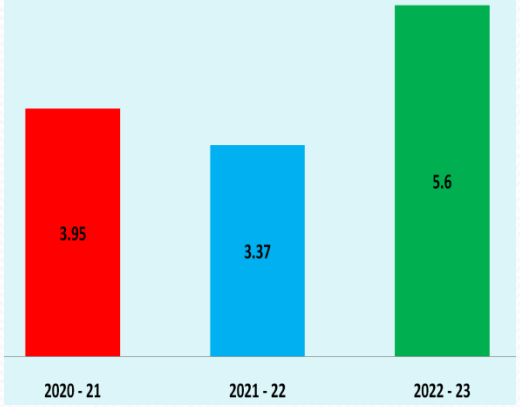
HARD COKE IN MT



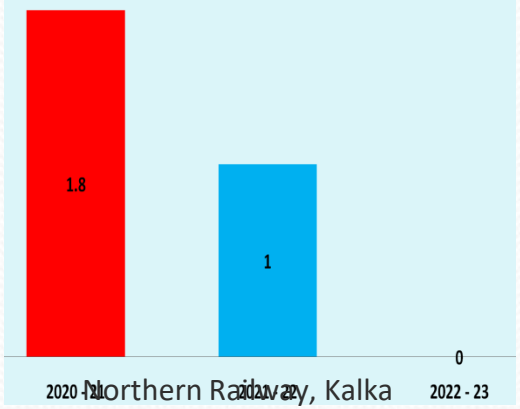
REFUSED OIL IN MT



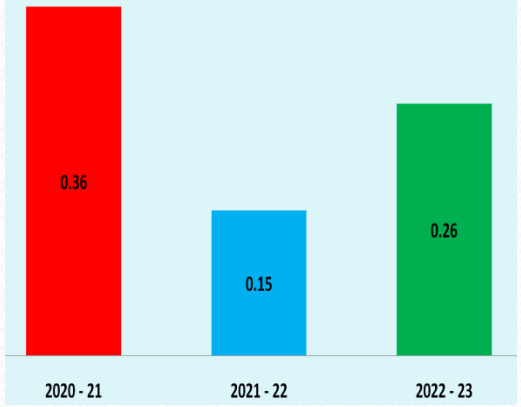
HSD OIL IN KL



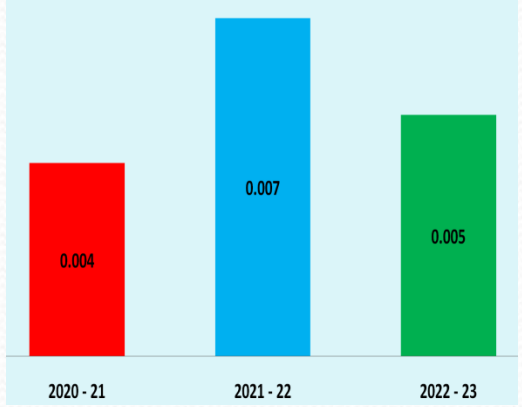
LDO IN KL



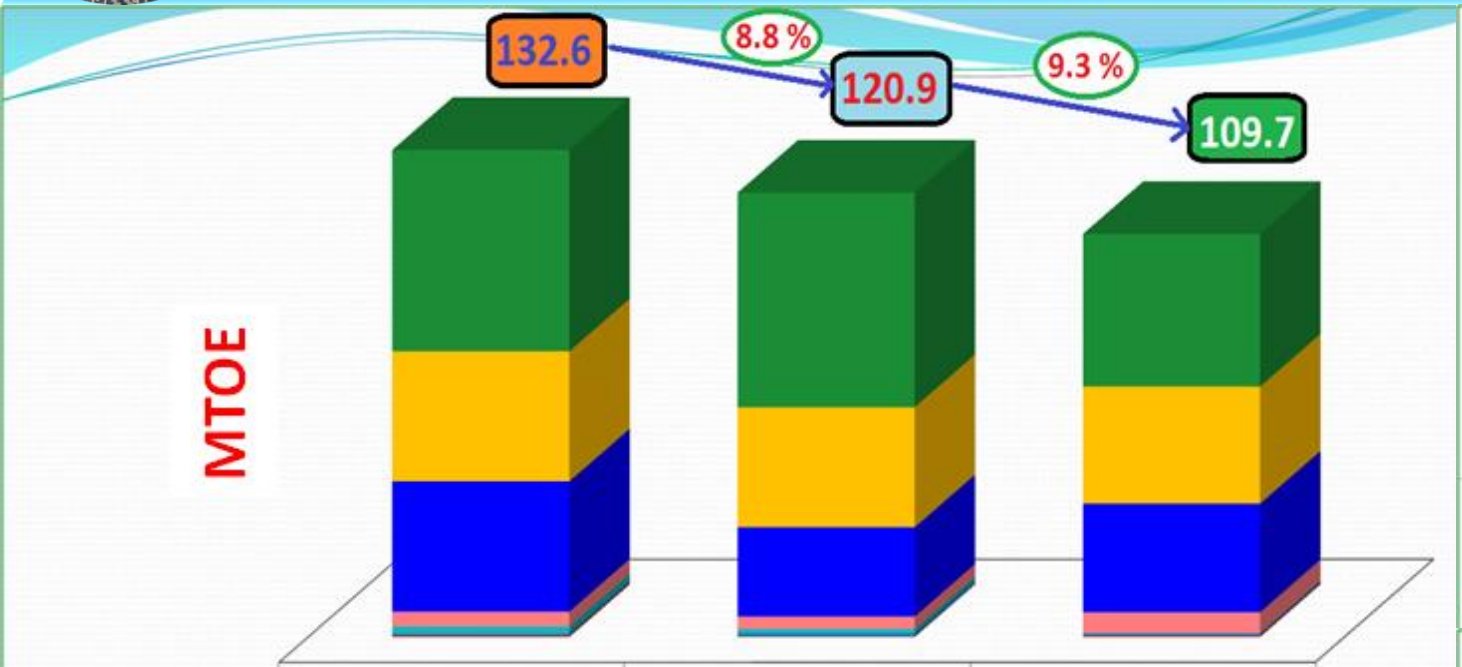
BMCG IN MT



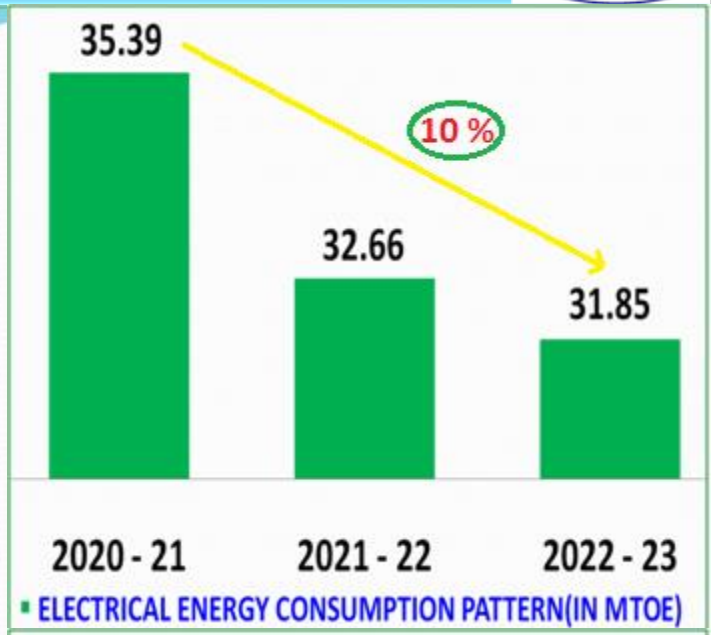
DA IN L CuM

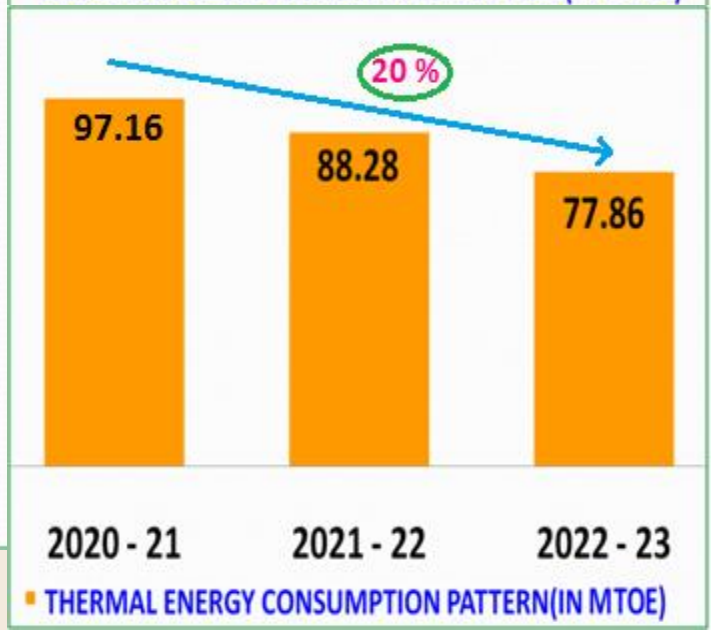


SOURCE WISE ENERGY CONSUMPTION PATTERN IN 3 YEARS (IN MTOE)



	2020 - 21	2021 - 22	2022 - 23
HARD COKE	54.8	58.4	41.56
ELECTRICITY	35.39	32.66	31.85
REFUSED OIL	35.46	24.32	29.56
HSD OIL	4.05	3.46	5.75
LDO	1.83	1.02	0
ACETYLENE	0.59	0.9	0.67
CUTTING GAS	0.43	0.18	0.32

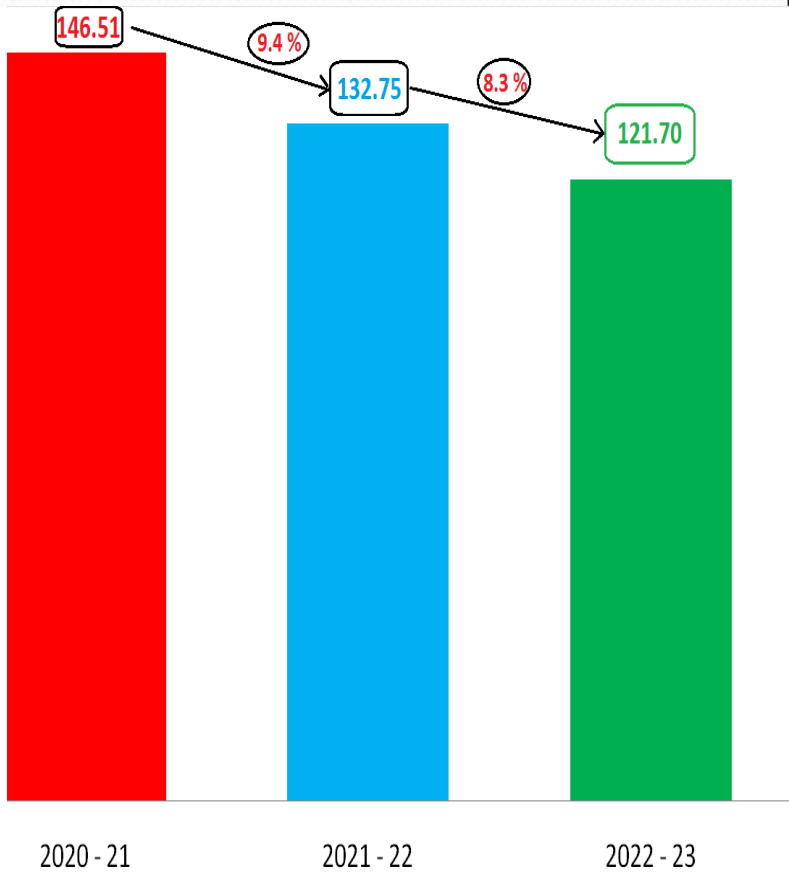




Reduction in Energy Consumption (in MTOE) w.r.t 2020-21 : 17 %

SPECIFIC ENERGY CONSUMPTION (KgOE / Eq. Outturn)

ENERGY EFFICIENCY	2020 - 21	2021 - 22	2022 - 23
Electrical Energy (in KWH)	411475	379800	370334
Electrical Energy (in MTOE)	35.39	32.66	31.85
Specific Electrical Energy (in KgOE/Eq. Outturn)	39.11	35.85	35.33
Thermal Energy (in MTOE)	97.16	88.28	77.86
Specific Thermal Energy (in KgOE/Eq. Outturn)	107.40	96.90	86.37
Total Energy Usage (in MTOE)	132.6	120.9	109.7
Specific Energy Consumption (in KgOE/Eq. Outturn)	146.51	132.75	121.70
%age Reduction in SEC w.r.t base year 2020 - 21		24.66	17.00
Equivalent Outturn Unit (in MT)	904.70	910.66	901.0

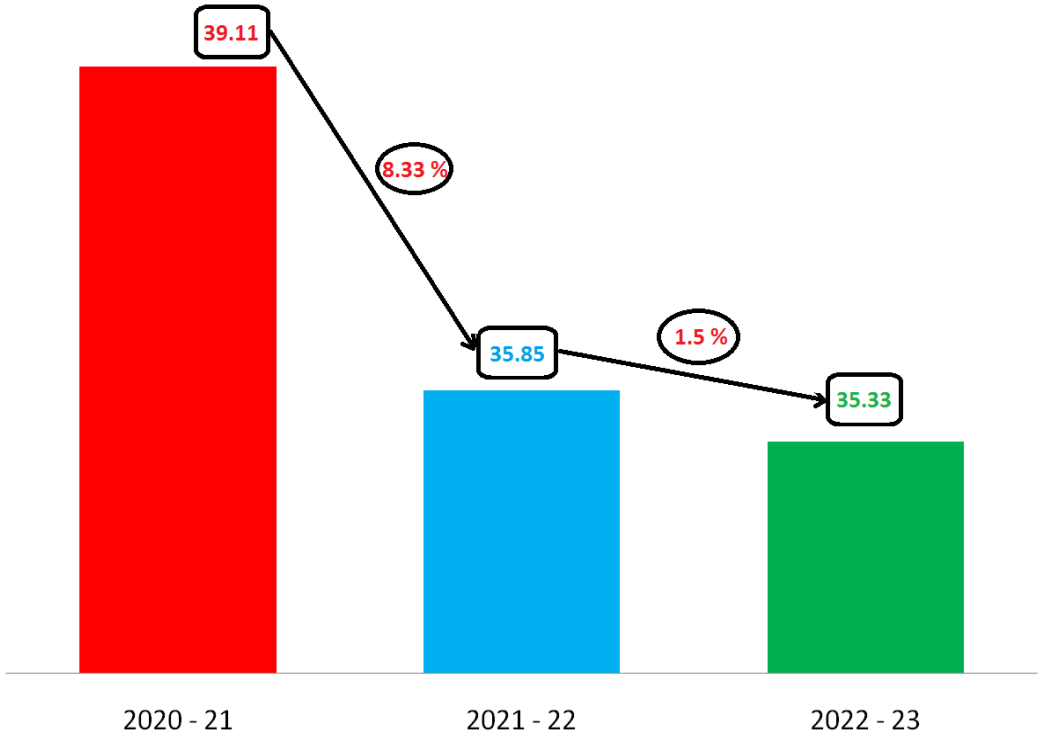


OVER ALL ENERGY CONSUMPTION (SEC)
(KgOE / Eq. Outturn)

% Reduction in SEC w.r.t 2020-21 : 17 %

SPECIFIC ELECTRICAL ENERGY CONSUMPTION (KgOE / Eq. Outturn)

REDUCTION IN ELECTRICAL ENERGY (SEC)



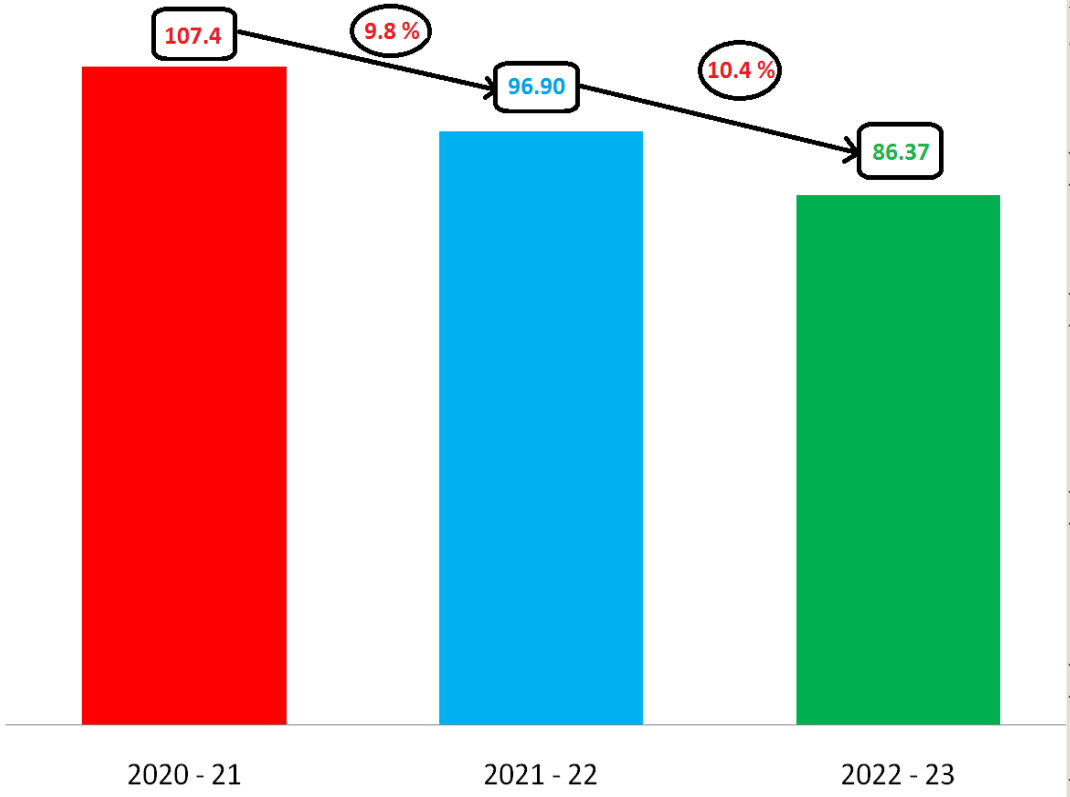
REDUCTION IN ELECTRICAL ENERGY CONSUMPTION (SEC)
(KgOE / Eq. Outturn)

SEC REDUCTION by 9.7 % w.r.t BASE YEAR 2020 -21 IS ACHIEVED THROUGH :

- **Replacement of 4** nos. conventional welding sets with **IGBT based welding set.**
- **Replacement** of 1 no. **old blower motor of Cupola furnace with new motor , IE 3 .**
- **Replacement** of 1 no. old Hoist crane with VFD drive
  Hoist Crane **.**
- **Review the construction Design** of Dustbin & Chlorination Box of Bio-digestive toilet
- Use of **Occupancy Sensor** in office's **lights**.
- **Replacement** of old aluminum wiring of Lab with copper wiring with provision of LED Light and low capacity office fan.
- Using of **renewable energy** – 300 KWp **solar plant**
- **Replacement of 2** nos. conventional AC with Energy
  efficient , BEE 5 star rated AC**.**

SPECIFIC THERMAL ENERGY CONSUMPTION (KgOE / Eq. Outturn)

REDUCTION IN THERMAL ENERGY (SEC)



THERMAL ENERGY CONSUMPTION (SEC)
(KgOE / Eq. Outturn)

SEC REDUCTION BY 19.54 % w.r.t BASE YEAR 2020 -21 IS ACHIEVED THROUGH :

- **Replacement** of 60 nos. **CI pulley** with **Fabricated type pulley**.
- Using of 01 no. **Air plasma cutting** in place of Oxy – acetylene cutting .
- **Replacement** of 1 no. **old Chimney** by new with provision of heat resistance paint of Cupola furnace.
- Using of **hand operated hydraulic fork lifter** for light weight job in place of Diesel operated fork lifter
- **Replacement** of 1 no. old blower motor of Cupola furnace with new motor , IE 3 **.**
- Using of **battery operated Material Stacker** for handling of material in place of Diesel operated fork lifter

NATIONAL BENCH MARKING & TARGET SETTING

S. No	WORKSHOP NAME	Specific Electrical Energy Consumption (KWH/ECU)	Specific Thermal Energy Consumption (Kcal/ECU)
1	JAGADHRI WORKSHOP, NR	409.88	195036
2	AJMER WORKSHOP, NWR	797	288939
3	DLMW, PATIALA	13600	14625336
4	KALKA WORKSHOP , NR	403	848167.92

Kalka Workshop's caters to POH activities of only Narrow Gauge Coaches. We strive to reduce the Specific consumption in coming years.

Target setting by Internal Bench making (in MOTE)

Details	2022-23		2023-24		2024-25		2025-26	
	SEC Target	SEC Achieved	SEC Target	Reduction w.r.t previous year	SEC Target	Reduction w.r.t previous year	SEC Target	Reduction w.r.t previous year
KLK/ELEC	31.77	31.33	30	4.3 %	28	6.6 %	25	**10.7 %**
KLK/THERMAL	85.61	77.86	70	10.1 %	67	4.3 %	65	**3%**
Kalka W/shop (TOTAL)	117.38	109.7	100	8.84 %	95	5 %	90	**5.2%**
Over All Targeted Reduction w.r.t Base Year 2022-23								**18 %**

ROAD MAP TO REDUCE SPECIFIC ENERGY CONSUMPTION

SHORT TERM TARGETS

SN	Project	Qty	Estimated Annual savings
1	Installation of APFC , Cap: 200 Kvar.(as recommendation of energy Audits report)	1	91391
2	Provision of Solar street lights	12	1577
3	Provision of Solar tube Lights	8	1489
4	Electric arc furnace.(as recommendation of CII Green Co rating team)	1	66 M Kcal
5	Energy (thermal & Electrical) Audits by BEE certified External auditor	-	-
6	Provision of Turbo Exhaust in Smart Ward Shed	-	1500
7	Water Audits	-	-

MID TERM TARGETS

1	Renovation of old spring testing machine with VVF drive control	1	-
2	Replacement Existing HT & LT switch gears with provision of cloud based monitoring system	2	-
3	Provision of Online EMS system	25	-
4	Replacement of reciprocating air compressor with energy efficient screw compressor	1	42316

LONG TERM TARGETS

1	Replacement Existing DG set, Cap : 500 KVA	1	3000 Ltrs HSD
2	Installation of 200kWp Solar PV panels on the roof tops of the shed (RESCO – Model)	-	2.0 Lakh

ENERGY SAVING PROJECT IMPLEMENTED IN 2021 -22

SN	ACTION TAKEN	QTY	ANNUAL SAVIN G (KWH)	SAVING @ RS. 8.7/ KWH (LAKH OF RS.)
1	Use of released 35cfm (14hp) air compressors for localize d use in place of large compressors. Nil Investment.	01 location	20000	1.74
2	Entered in PPA for Installation of 300 KWp rooftop SPV P anels and purchase of energy @ Rs 3.38 for 25 years. Nil I nvestment.	03 Sheds	347476	18.0
3	Use of fabricated pulley in place of CI pulley for alternato r driving in NG coach	50 Nos.	20 M kcal	0.089
4	Design change of pattern of aluminum bar casting for pre -shortener		5440	0.05
5	Replacement of old AC , 1.0 ton	1	2000	0.024
6	Replacement of old AC , 1.5 ton	1	2732	0.024
7	Replacement of oil cooled conventional type welding set with IGBT based welding set	4	25743	2.22
8	Provision of Air plasma cutting machine	1	-	-

ENERGY SAVING PROJECT IMPLEMENTED IN 2022 -23

SN	ACTION TAKEN	QTY	ANNUAL SAVIN G (KWH)	SAVING @ RS. 8.7/ KWH (LAKH OF RS.)
1	Replacement of old AC , 1.5 ton	2	5500	0.48
2	Entered in PPA for Installation of 300 KWp rooftop SPV P anels and purchase of energy @ Rs 3.38 for 25 years. Nil I nvestment.	03 Sheds	346235	17.69
3	Use of fabricated pulley in place of CI pulley for alternato r driving in NG coach	60 Nos.	27900(27M kcal)	0.17
4	Replacement of old burner of oil fired furnace	3	-	-
5	Replacement of oil cooled conventional type welding set with IGBT based welding set	4	25743	2.22
6	Provision of occupancy sensor in offices & meeting room	2	500	0.043
7	Replacement of old chimney of cupola furnace with provi sion of heat resistance paint	1	-	
8	Use of small capacity of magnetic drill machine for localiz ed use in place of large fixed type drill machine.	1	-	-
9	Improve day light and natural ventilation in offices	-	1000	0.087
10	Replacement of old type Hoist with VFD drive Hoist	1	-	-
	Northern Railway, Kalka		.4Mkwh	

UTILIZATION OF RENEWABLE ENERGY SOURCE

Provision of Renewable solar energy systems Onsite, 300 KWp at Kalka Workshop

Translucent roofing sheets (100 %) have been provided in sheds to use natural light.

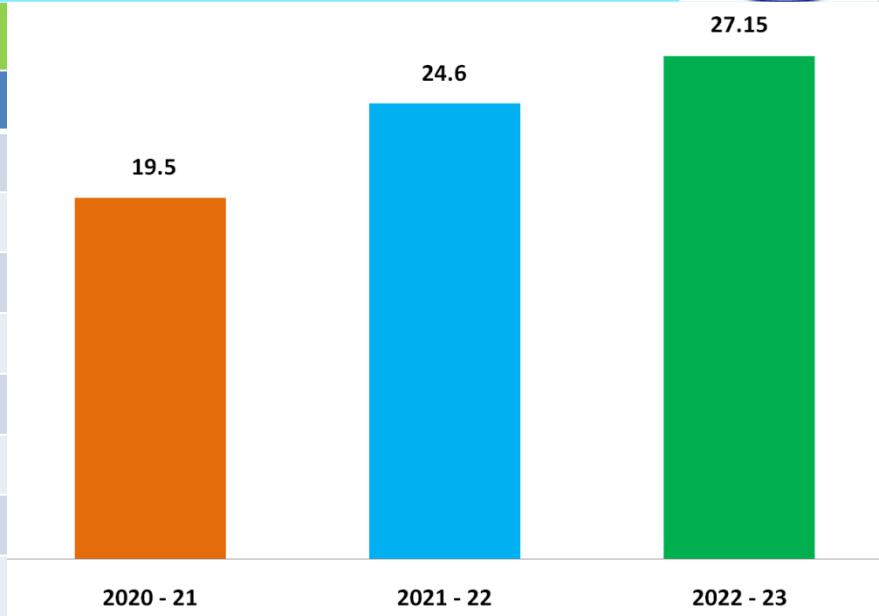
Annual Equivalent Savings : 3,000 KWh

UTILIZATION OF RENEWABLE ENERGY SOURCE

RENEWABLE ENERGY SYSTEM ONSITE IN LAST 3 YEARS

Year	2020 - 21	2021 - 22	2022 - 23
Thermal Energy (in MTOE)	97.16	88.28	77.86
Electrical Energy (in MTOE)	35.39	32.66	31.85
Total Energy Usage (in MTOE)	132.6	120.9	109.7
Equivalent Outturn Unit	904.7	910.66	901.
RE Utilized (in MTOE)	21.68	22.45	22.25
RE Generated (in MTOE)	25.82	29.73	29.78
% substitution of RE	19.5	24.6	27.15
% Increase in RE substitution w.r.t base year 2020 - 21		26.15	39.23

SOURCE OF RENEWABLE ENERGY	YEAR	INVESTMENT MODE	INSTALLED CAPACITY	ANNUAL POWER GENERATION (IN LAKH KWH)	% OF RE SUBSTITUTE OF TOTAL ELECTRICAL ENERGY CONSUMPTION
ONSITE ROOF TOP SOLAR PV PANEL	2020 - 21	UNDER RESCO MODEL	300 KWp	3.0	61.27
	2021 – 22			3.5	68.74
	2022 - 23			3.5	68.0
IN PIPE LINE (PROPOSAL OF SOLAR PV PANEL)	2023 - 24	UNDER RESCO MODEL	200 KWp	2.0 (ESTIMATED)	100



GHG EMISSION INVENTORISATION

Total specific CHG Emission (Scope 1 & 2)

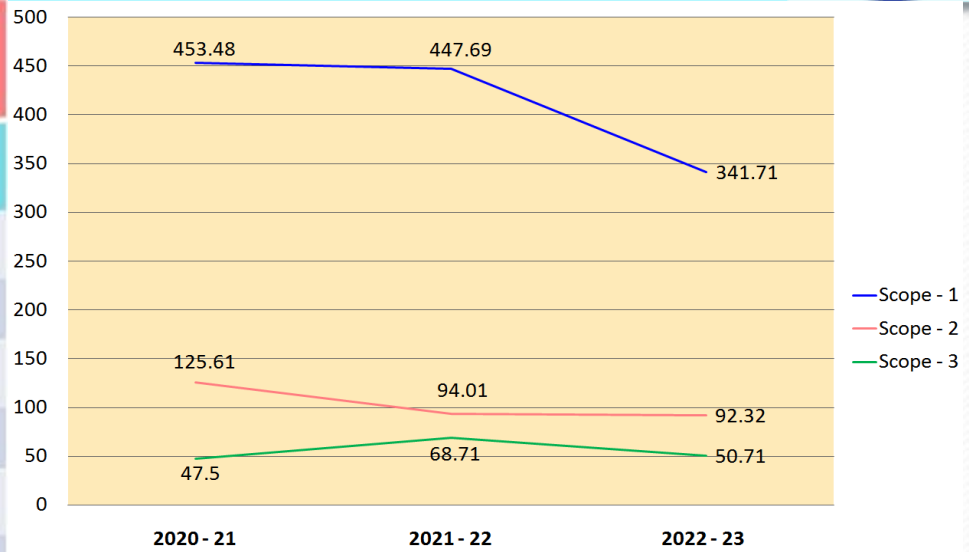
Description	Unit	2020 - 21	2021 - 22	2022 – 23
Scope 1 Emission	Ton of CO2 e	453.48	447.69	341.71
Specific CHG Emission of scope 1	MT of CO2 e/Outturn	0.50	0.49	0.38
Scope 1 Emission	Ton of CO2 e	125.61	94.01	92.32
Specific CHG Emission of scope 2	MT of CO2 e/Outturn	0.14	0.10	0.10
Total Emission (Scope 1 & 2)	Ton of CO2 e	579.09	541.70	434.03
Specific CHG Emission of scope 1 &2	MT of CO2 e/Outturn	0.64	0.59	0.48
Annual Outturn	MT	904.7	911	901

% Reduction in Specific CHG emission (Scope 1 & 2) w. r. t. 2020 - 21 = 25 %

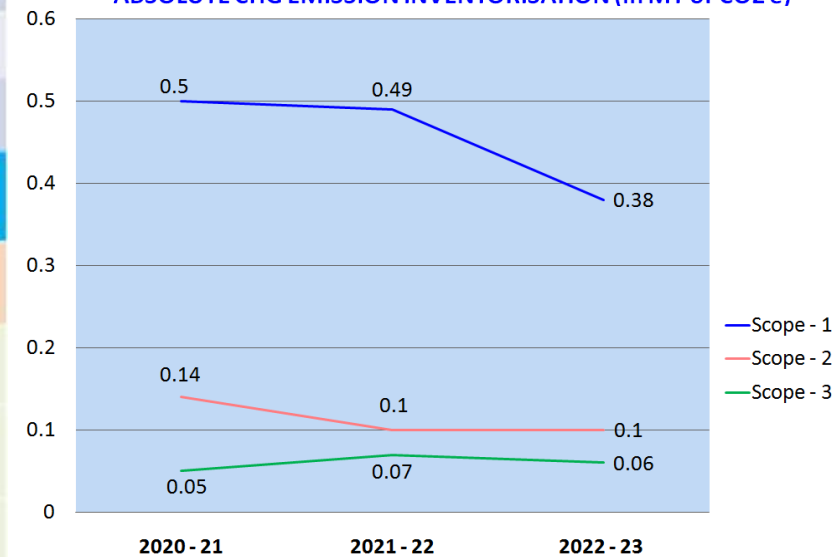
Total specific CHG Emission (Scope - 3)

Year	CHG Emission in MT of CO2 Eq.	Specific CHG Emission in MT of CO2 Eq.
2020 – 21	47.5	0.05
2021 – 22	68.71	0.07
2022 – 23	50.71	0.06

% Reduction in Specific CHG emission (Scope - 3) w. r. t. 2020 - 21 = 14.3 %



ABSOLUTE CHG EMISSION INVENTORISATION (in MT of CO2 e)



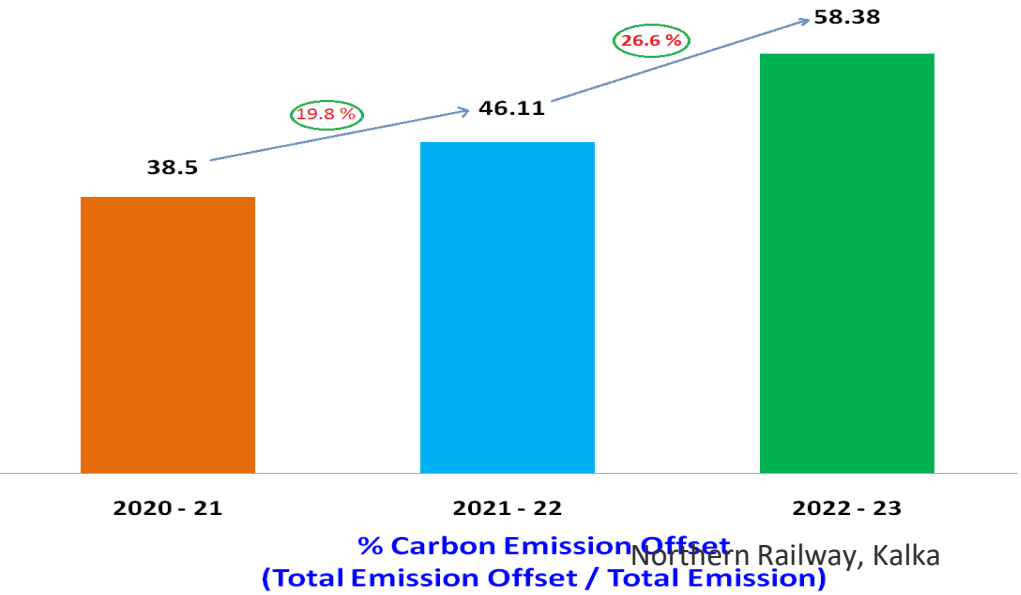
With the improvement in energy efficiency and utilization of renewable Solar energy , there is reduction in GHG intensity for scope – 1 emission intensity by 24 % , scope – 2 emission intensity by 28.5 % and Scope – 3 emission intensity by – 20 % in last 3 year

Specific CHG Inventorisation (in MT /Eq. Outturn of CO2 e)

GHG EMISSION INVENTORISATION

CARBON NEUTRAL APPROACH

Sr. No.	Emission /Offset Scope	Total Emission / offset (in MT of CO2)		
		2020 - 21	2021 - 22	2022 - 23
1	Scope – 1 (both coal and Thermal Energy)	453.48	447.69	341.71
2	Scope – 2 (both Electrical and Renewable Energy)	125.61	94.01	92.32
3	Scope – 3	47.5	68.71	50.71
	Total Emission (A)	620.59	610.41	484.74
1	Emission offset onsite Renewable Energy (B)	237	276.5	278
2	Emission offset offsite Solar & Wind Energy (C)	0	0	0
3	Carbon Sequestration from trees (D)	4	5	5
	Total Emission offset (E) = B + C + D	241	281.5	283
	NET Emission (F) = A - E	385.59	328.91	201.74
	Carbon Emission offset = (E/A) %	38.5 %	46.11 %	58.38 %



GHG MITIGATION EFFORTS :-

- **69 % substitution** of overall electrical energy consumption from RE (Solar PV) achieved through installation of **300 KWp roof top Solar Plant**. Further installation of 200 KWp Solar power plant is under process at HQ level under RESCO Model.
- **Online stack emission monitoring system (OCSMS)** and **Automatic Pollution control device (APCD)** has been installed on Furnace.
- Implementing **Paperless working** by using of Railway's digital portals like **WISE, IRMMS, UDM, AIMS, HRMS & E-office** etc.
- **100% Green Supply Chain** is implemented in procurement and disposal of material/scrap through IREPS.
- Emphasis is on **bulk purchase** of materials by increasing procurement powers of the officials and hence utilisation of full capacity of transport vehicles. Setting up of Divisional Store Depots having **three months stock holding capacity** to avoid frequent material logistics.
- Re-use of waste wherever possible. For e.g. **Waste refused Oil and Ferrous & Non Ferrous Scrap** used in foundry Shop ,Conversion of 01 Nos. Out lived NG coaches into Gandhi Jee Replica heritage coach , Conversion knuckle shim from scrap , BG Axel in to NG axel.
- 300 staff quarters are available at out-skirt of workshop and around 100 staff commute through **passenger trains** being suburban pass holders thereby **scope-3 emission** via employees commute is negligible.
- Replacement of Diesel operated fork lifter with **Battery operated fork lifter & Battery operated material stacker**

GREEN SUPPLY CHAIN MANAGEMENT

NORTHERN RAILWAY

C&W CUM DSL STORE DEPOT, KALKA

GREEN SUPPLY CHAIN POLICY

- ENCOURAGE SUPPLIERS TO OPT GREEN PRACTICES & GREEN CO CERTIFICATIONS.
- PROMOTE THE CONSERVATION OF NATURAL RESOURCES & LEGAL, STATUTORY & REGULATORY ENVIRONMENT COMPLAINCE.
- REDUCE THE OVERALL CARBON SIGNATURE AND THE IMPACT ON ENVIRONMENT BY MINIMIZING WASTE AND GREEN HOUSE GAS EMISSION WITH THE USE OF EFFICIENT PROCESSES, PRODUCTS AND SERVICES.

Assistant Materials Manager
Northern Railway Kalka

DISPLAY OF NG COACH ITEMS at C&W WORKSHOP STORE DEPOT KALKA FOR VENDORS

RESOURCE CONSERVATION THROUGH SUPPLY CHAIN MANAGEMENT SYSTEMS

INDIAN RAILWAY E-PROCUREMENT PORTAL (IREPS)

ALL THE TRANSACTIONS ARE DONE ON IMMS TO PROMOTE PAPER LESS WORKING.

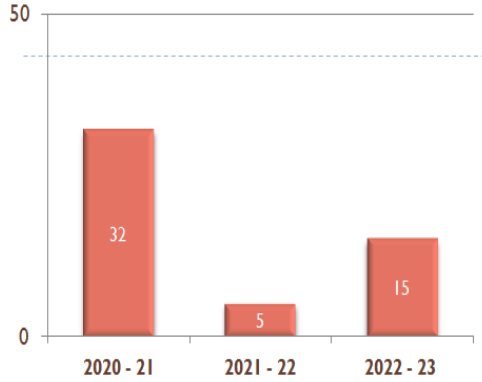
PROCUREMENT OF GOODS AND SERVICE THROUGH GEM HAS BEEN MADE COMPULSORY FOR THE ITEMS AVAILABLE ON GEM.

'USER DEPOT MODULE' TO COMPUTERIZE ALL THE MATERIAL MANAGEMENT ACTIVITIES AT CONSIGNEE END.

GREEN SUPPLY CHAIN MANAGEMENT

VENDOR TRAINING & AWARENESS PROGRAMME

NO. OF EMAIL FORWARDED TO VENDORS



SAMPLE OF MAIL/PAMPHLET

SOME OF THE FIRMS AGAIN CONTACTED IN 2022-23

S.No.	CODE	EMAIL ID
1	A.D.ELECTRO STEEL CO.PVT.LTD - KOLKATA	adec@adelectrosteel.net
2	HINDUSTAN WAGON - HOWRAH	hindustanwagon@rediffmail.com
3	HARSH INDUSTRIES - MOHALI	harshind73@gmail.com
4	G.B. SPRINGS PRIVATE LIMITED - DEHRADUN	gbslddn@gmail.com
5	CHEMIN SPRINGS INDIA PRIVATE LIMITED - HARIDWAR	care@cheminsprings.com
6	LAL BABA MACHINO IMPEX PVT.LTD.- KOLKATA	railway.lbmi@gmail.com
7	M.B. ENGINEERING WORKS - HOWRAH	mbengineering8@gmail.com
8	RAIL UDYOG - HOWRAH	rail_udyog@yahoo.co.in
9	RAMKRISHNA ENGINEERING INDUSTRIES - HOWRAH	sknikunj@yahoo.com
10	M G ENTERPRISES - KOLKATA	asishchakraborty505@yahoo.com
11	RANEY ENGINEERING CO. - HOWRAH	raneyengg@gmail.com
12	M/S ANAND LIME INDUSTRIES –KALKA	anandlimeindustries@gmail.com
13	M/S TIWARI ENTERPRISES –HOWRAH	arun.tiwari95@yahoo.in
14	M/S SAM INDUSTRIES – HOWRAH	sumitk10@hotmail.com
15	M/S AMEYAA – DELHI	ameyaa020@gmail.com

USE OF ONLINE PORTAL INDIAN RAILWAY E-PROCUREMENT SYSTEM

ONLINE PROCURMENT THROUGH DIGITAL PORTAL

	2020-21	2021-22	2022-23
E-PROCUREMENT (in No.)	71	82	87
E-PROCUREMENT (in Lac.)	47.91	79.48	95.85
GEM Procurement (in No.)	20	51	64
GEM Procurement (in Lac.)	2.47	31.74	46.5

Reduction of carbon in supply chain

	2020-21	2021-22	2022-23
No. of Consignments Received	193	241	302
No. of Travel Saved (in KM)	19300 KM	24100 KM	30200 KM
CO2 Emission Saved: (Emission factor 0.18931605 kg/km)	3.65 t	4.56 t	5.71 t

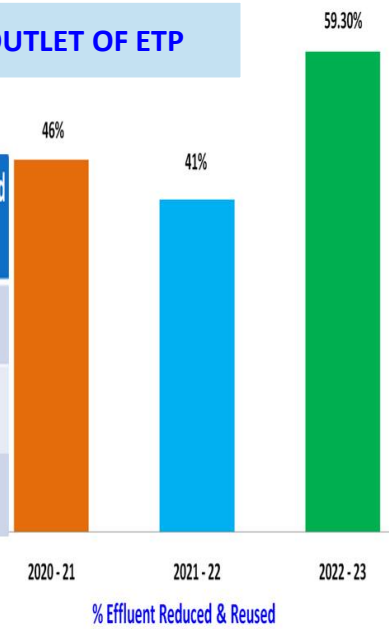
Due to implementation of online system firms representatives need not to visit this office. Taking average of 100 KM per receipt :

WASTE UTILIZATION & MANAGEMENT

LIQUID & GAS WASTE MANAGEMENT

SAMPLE COLLECTION OF WATER FROM OUTLET OF ETP

Sr. No.	Year	Total Effluent Generated (KL)	ETP Water Inlet (KL)	ETP Water Outlet (KL)	% Effluent Reduced & Reuse
1	2020-21	4.56	2.21	2.11	46%
2	2021-22	4.59	2.08	2.01	41%
3	2022-23	4.77	3.0	2.83	59.3%



SAMPLE COLLECTION OF STACK OF FURNACE & GENERAL AIR QUALITY

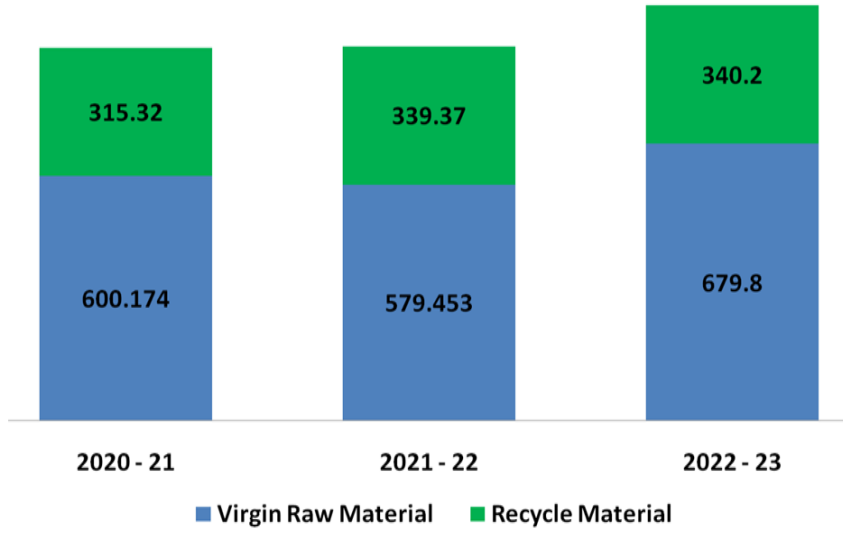
WASTE UTILIZATION & MANAGEMENT

SOLID WASTE MANAGEMENT

TYPE OF SOLID WASTE	YEAR WISE QTY (in MT)			METHOD OF DISPOSAL
	2020-21	2021-22	2022-23	
WASTE GENERATED IN WORKSHOP & THEIR DISPOSAL				
Ferrous Scrap	186.1	203.48	300	Auction to Recycle
Non Hazardous Waste	291.4	230.5	297.1	Auction to Recycle
Hazardous Waste	11.3	3.8	11.2	Auction to HSPCB approved Recycler
Released Grease mixed with Kerosene Oil	0.012	0.017	0.019	Reuse as lubricant at rail Junction Point
Zero Value Waste	0.064	0.072	0.135	Send to MC dump Yard
Hazardous waste (Sludge)	0.371	0.502	0.418	Disposal through HSPCB approved Recycler
WASTE COLLECTED FROM DIV AND USED IN FOUNDARY SHOP FOR CASTING				
Aluminium Scrap	0.91	40.4	37.3	WASTE COLLECTED FROM DIV AND USED IN FOUNDARY SHOP FOR CASTING or As FUEL
CI scrap	45.6	82	75	
Released / Refused Oil	37.54	25.75	35	

Replacement of Raw Material by Recycled Material

SN	TYPE OF MATERIAL	YEAR WISE QUANTITY (IN MT)		
		2020 – 21	2021 – 22	2022 – 23
1	Virgin Raw Material	600.174	579.453	679.8
2	Recycle Raw Material	315.32	339.37	340.2
3	Absolute Consumption Of Raw material	915.494	918.823	1020.3
4	% Replacement of Raw material by recycle material (Recycle Material/Raw Material)	34.44%	36.94%	33.34 %
5	Total Equivalent Outturn (MT)	904.7	910.66	901



INNOVATIVE PROJECT -1

Manufacturing of Metallic Dustbin & Chlorination Box

Objective:

To reduce **manufacturing time, production cost, and Welding process along with conservation of energy** by changing the profile of different parts of dustbin & Chlorination Box assembly from 4 nos. profile to 02 nos. profile avoids the welding process work & saves electrical energy involved in the welding work. This also saves Profile cutting work due to the less no. of profile.

Date of implementation : JAN -2023

Saving:

Energy:

Time saved in Welding work involved in profile welding = 40 min per piece.

Load of Welding Set = 10 KW

Total electrical energy save per unit product = 6.5 Kwh per piece

Total Time :

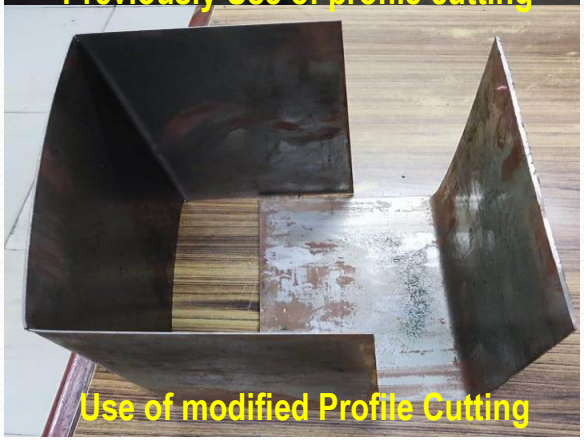
Total Time save = Time taken (previously) – time taken (mod.)

= 1.5 Hrs – 0.83 hrs. = 40 Min per unit product

Total Saving for

500 Nos. Dustbin : 6.5 KWh X 500 = 3250 Kwh

Previously Use of profile cutting


Use of modified Profile Cutting


Dustbin (final Product)

INNOVATIVE PROJECT -2

Manufacturing of "GANDHI Ji" Smriti Replica Heritage Coach

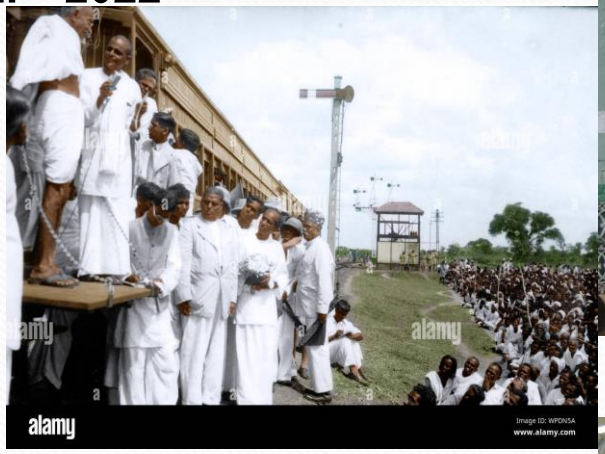
Objective: To Preserve the Heritage value of Indian Railway History

Date of implementation : SEP -2022

Savings:

Energy:

Riveting work = 13500 Kwh
Welding Work = 300 kWh
Drilling Work = 717 Kwh
Grinding Work = 100 Kwh
Cutting Work = 0.84 GJ



Carbon credit : @ 820 g/kWh = 11986 Kg

Waste : Reduce waste by 70 kg

Monetary : Rs. 6.0 Lac in initial Investment

Raw Material : Approx 3 MT saved virgin raw material by reusing Under frame & bogies of Scraped NG Coach / Gwalior Section

Gandhi Ji Smriti Heritage Coach

INNOVATIVE PROJECT - 3

Introduction of Newly manufacture NG coaches of KSR (UNESCO Heritage site)

Objective: To **overcome line failure** , Minimise journey time , Improve passenger safety, reduce POH time and **save Energy & man Hours** used for maintenance & POH work as existing MS & wooden Coach were removed and use **fabricated** Stainless Steel Under frame & shell of coach.

Advantages :

- Reduce **environment pollution as remove riveting work & wooden structure,** also decrease fuel consumption in traction
- Improve in Costumer Satisfaction & Attract the more tourist to use of rail transport
- Increase revenue as more influx of tourist
- Provision of Vacuum Bio Tank to ensure **healthy & hygienic** atmosphere to passengers and track maintenance staff and improving Aesthetics at Railway Stations UNESCO world heritage site .
- Preventing damages to tracks due to **Corrosion**

Fully Fabricated SS Shell NG coach with Modified bogie

INNOVATIVE PROJECT - 4

Provision of Fabricated type pulley in NG Coaches

Objective: To **overcome frequent failure** of CI cast type pulley (Wt -52 kg) and **save thermal energy** & **man Hours** used for casting of pulley as existing CI cast type pulley were removed and use **fabricated** type pulley (wt - 28.5 kg) for **alternator drive**.

Savings:

Thermal Energy: @104kg coal/per pulley
= 1.68 GJ per pulley

Total saving for 60 pulley = 101 GJ

Raw Material: @ 23.5 kg per pulley

Total saving for 60 pulley = 1410 Kg

Other Advantage:

- **Long life** & **easy** to repair / replacement
- **Reduce** the Tare weight of coach by 23.5 kg
- Save **CO_2 emission** as easy transportation

Existing Cast Iron Pulley (wt - 52 kg.)

Newly developed fabricated Pulley (wt - 28.5 kg.)

INNOVATIVE PROJECT - 5

Provision of Bio-Digestor tanks in NG coaches of KSR (UNESCO Heritage site)

Objective:

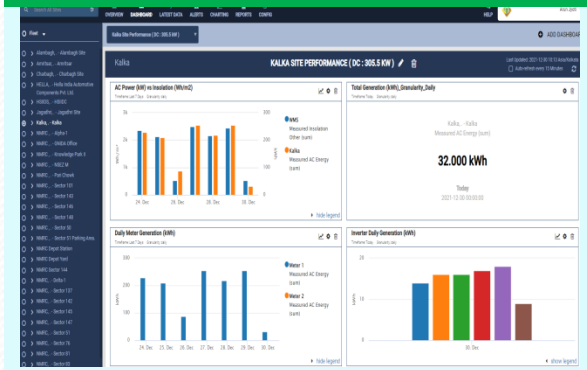
To Achieve **Zero - defecation** on ground & support to the IR project "Clean Rail-Clean India"

Advantages :

- Reduce **environment pollution**
- Railway Stations of **UNESCO world heritage site** and other NG Section is being now become clean which support "**Swachh Bharat Abhiyan**" of Government of India.
- Improved Aesthetics at Railway Stations Railway Stations of UNESCO world heritage site
- Provides **healthy & hygienic** atmosphere to Track maintenance staff & those who manually clean the toilet Seat at the platforms
- Preventing damages to tracks due to **Corrosion**

TEAM WORK, EMPLOYEE INVOLVEMENT & MONITORING

ON LINE MONITORING OF SOLAR POWER GENERATION



ON LINE monitoring of solar generation of On site PV SOLAR Panel, Cap; 300 KWp

MICRO MONITORING OF MACHINE

20 Nos. energy meters are provided in energy intensive machines for micro level monitoring

ENERGY MANAGEMENT TRAINING

EMPLOYEES

100 % employees were given training regarding energy efficiency measures in their respective area of work

SUPERVISORS (27 Nos.)

All supervisors are trained on energy efficiency and management

15 supervisors are trained on Internal Audit of Energy Management System

OFFICERS (3 Nos.)

Awareness and the requirements of Energy Management System by out side expertise

TEAM WORK, EMPLOYEE INVOLVEMENT & MONITORING

WEEKLY PERFORMANCE REVIEW MEETING CHAIRED BY WM/KLK

(CONDUCTED EVERY FRIDAY TO REVIEW ENERGY PERFORMANCE AND OUTTURN OF WORKSHOP)

S N	Suggestion/Activities	Environmental saving	Suggested by	Year of imp
1	**Change in manufacturing process of dustbin & Chlorination Box**	Save welding work 40 Min / per product & 6.5 Kwh electrical energy per piece	**Sh. Vinay Yadav, Tech-II**	2023
2	**Improve day light & natural ventilation in office**	-	**WM /KLK**	2023
3	**Use of Occupancy sensor in Office**	Save 1 hrs/day operational time of light	**Sh. Dev Raj, SSE**	2023
4	**Use of under frame & Bogie of condemned NG coach in Gandhi Replica Coach.**	Save electrical Energy – 14617 Kwh Save Virgin Raw Material – 3 MT	**Sh. Gurdeep Singh, JE**	2022
5	**Use of scrap non ferrous material in casting of heritage item of Gandhi Replica Heritage Coach**	Save Virgin Raw Material – 1 MT	**Sh. Baldev Singh, Sr. Tech**	2022
6	**Shower testing for testing of leakage from coach shell**	Improve safety of employee, save water	**Sh. Surender Kumar, SSE**	2021
7	**Use of Bio Toilet In NG Coach**	Minimize environment pollution, Provides healthy & hygienic atmosphere	**Sh. Gurdeep Singh, JE**	2021
8	**Use of fabricated pulley in NG Coach**	Save Energy & raw martial.	**Sh. Mukesh meena, SSE**	2019
9	**Use of Solar panel in NG Coach**	Improve safety, Minimize the use of LA Battery, save energy,	**Sh. Dhrub Kumar, SSE**	2019

IMPLEMENTATION OF ISO 50001 / GREEN CO/IGBC

KALKA WORKSHOP ACHIEVED GOLD GREEN CO RATING

INTERCERT

CERTIFICATE OF REGISTRATION

INTERCERT hereby certifies that the Energy Management System of

CARRIAGE & WAGON WORKSHOP KALKA

CARRIAGE & WAGON WORKSHOP-NORTHERN RAILWAY,
KALKA - HARYANA---133302, INDIA

Has been successfully assessed as per the requirements of

ISO 50001:2018

For the scope of

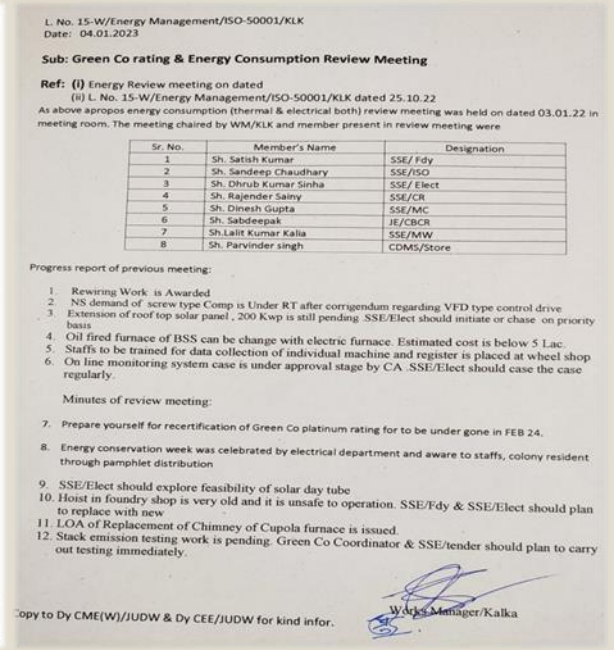
Workshop's activities for Narrow Gauge Coaches under Carriage & Wagon Kalka.

Initial Certification Date	: 21-12-2020
Certificate Issue Date	: 21-12-2020
Surveillance Validity Date	: 20-12-2021
Recertification Date	: 20-12-2023

Registration Number : IC-En-2012105

Issued on behalf of InterCert
Head - Certifications

ISO 50001:2018



L. No. 15-W/Energy Management/ISO-50001/KLK
Date: 04.01.2023

Sub: Green Co rating & Energy Consumption Review Meeting

Ref: (i) Energy Review meeting on dated
(ii) L. No. 15-W/Energy Management/ISO-50001/KLK dated 25.10.22

As above apropos energy consumption (thermal & electrical both) review meeting was held on dated 03.01.22 in meeting room. The meeting chaired by WM/KLK and member present in review meeting were

Sr. No.	Member's Name	Designation
1	Sh. Satish Kumar	SSE/ Fdy
2	Sh. Sandeep Chaudhary	SSE/ISO
3	Sh. Dhrub Kumar Sinha	SSE/ Elect
4	Sh. Rajender Sainy	SSE/CR
5	Sh. Dinesh Gupta	SSE/MC
6	Sh. Sabdeepak	JE/CBCR
7	Sh.Lalit Kumar Kalia	SSE/MW
8	Sh. Parvinder singh	CDMS/Store

Progress report of previous meeting:

1. Rewiring Work is Awarded
2. NS demand of screw type Comp is Under RT after corrigendum regarding VFD type control drive
3. Extension of roof top solar panel , 200 Kwp is still pending .SSE/Elect should initiate or chase on priority basis
4. Oil fired furnace of BSS can be change with electric furnace. Estimated cost is below 5 Lac.
5. Staffs to be trained for data collection of individual machine and register is placed at wheel shop
6. On line monitoring system case is under approval stage by CA .SSE/Elect should case the case regularly.

Minutes of review meeting:

7. Prepare yourself for recertification of Green Co platinum rating for to be under gone in FEB 24.
8. Energy conservation week was celebrated by electrical department and aware to staffs, colony resident through pamphlet distribution
9. SSE/Elect should explore feasibility of solar day tube
10. Hoist in foundry shop is very old and it is unsafe to operation. SSE/Fdy & SSE/Elect should plan to replace with new
11. LOA of Replacement of Chimney of Cupola furnace is issued.
12. Stack emission testing work is pending. Green Co Coordinator & SSE/tender should plan to carry out testing immediately.

Copy to Dy CME(W)/JUDW & Dy CEE/JUDW for kind infor.

Works Manager/Kalka

Minutes of energy review meeting

ALLOCATION OF FUNDS FOR ENERGY CONSERVATION PROJECT

- REVENU FUND
- MODERNISATION PROGRAMME
- M & P PROGRAMME
- ENVROMENT FUNDS
- ROLLING STOCK PROGRAMME

- % INVESTMENT OF ENERGY SAVING PROJECTS ON TOTAL TURN OVER OF WORKSHOP : 0.3
- 1% VALUE OF EVERY ON GOING PROJECT IS UTILIZED IN ENERGY / ENVIORMENT SAVING PROJET

AWARDS & ACCOLADES

C & W Workshop, NR, Kalka is awarded as "Energy Efficient Unit" in CII 23rd & 21st National Award for Excellence in Energy Management 2022 & 2020 respectively

C & W Workshop, NR, Kalka – Team receiving Award as "First Prize" in State Level Energy Conservation award (SLECA-2020) by New & renewal Energy Department (Haryana) & HAREDA

ROAD MAP TO NET ZERO

- INDIAN RAILWAY HAS SET A TARGET OF BECOMING NET ZERO CARBON EMITTER : BY 2030

ACTION PLAN

(A) IMPLEMENTATION OF RE POLICY

(i) Expansion of Solar Panel ,
200 Kwp : 2024

(B) IMPLEMENTATION of E-mobility POLICY

(ii) EV Charging facilities develop : 2024

(iii) EV induct in office use : 2025

(C) IMPLEMENTATION OF EMS POLICY

(i) ECBC Implementation : all 30 KW or above
(ii) IGEA : 2023 - 24
(iii) Installation of IOT : 2023 -24
(iv)Finding of IGEA shall be Implemented through ESCOS : 2024 -25
(v) Capacity Building : In progress at 3 level

LEARNING FROM AWARDS PROGRAMME

- Learn About Various Techniques & Ideas To **Control** & **Monitoring** Of **Wastage** Of Energy.
- How Maintain The **Energy Score Card** Of Machine And Employee.
- **Kaizen Philosphy** And Its Benefits.
- Role Of **Training Programme** And Evaluation Of Its Impact On Energy Saving.
- Know About **Next Gen Energy Efficient Appliances.**
- Learn The **Daily Variance Analysis** & Its Benefits.
- Better **Awareness** Among Employees.
- **Motivate** For Further Improvement In Own Idea To Save Energy.

PLEASE CONTRIBUTE TO SAVE ENEGRY

Thanks