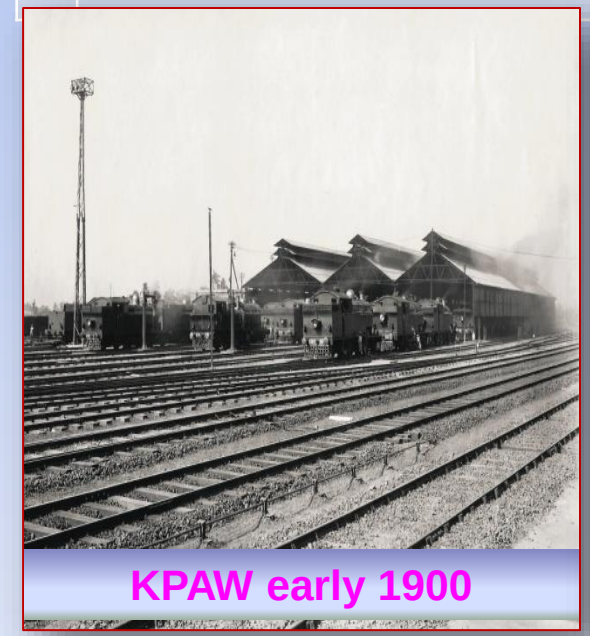
1. Activity of Kanchrapara Workshop

- **Kanchrapara Workshop (KPAW) is 2nd oldest Railway workshops in the country.**

- **Set up in the year 1863 at the present Loco Complex site in Kanchrapara and developed as an integrated shop to carry out repairs to Steam Locomotives, wooden body Carriage and Wagons.**



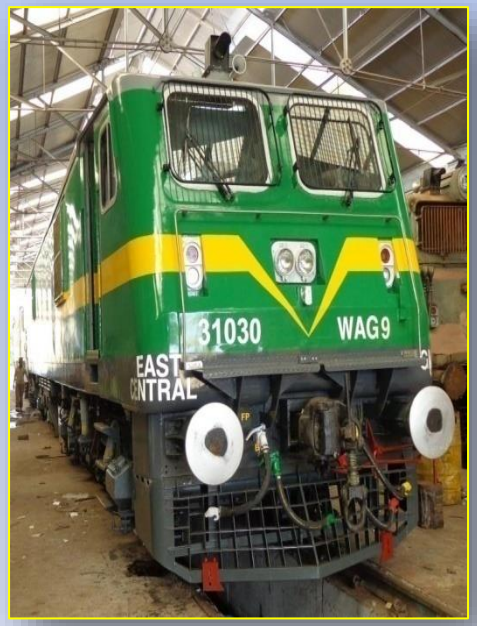
KPAW early 1900

C&W Workshop

Air craft Maintenance at KPAW

1. Activity of Kanchrapara Workshop

- **Loco Complex: Year of commissioning : 1863**
  - **POH of Electric Locomotive: Conventional & 3-Ph Locos**
  - **POH of EMU Motor Coaches**
  - **Re-winding of Traction Motor Armatures**
  - **IOH NAC ICF Bogies for divisions**



1. Activity of Kanchrapara Workshop

- **Carriage Complex: Year of commissioning : 1914**
  - POH of EMUs & MEMUs – Motor Coaches and Trailer Coaches
  - POH of Non-AC ICF & LHB Coaches
  - IOH of NAC ICF Bogies for divisions
  - POH of Tower Car
  - POH of DEMUs

1. Brief Introduction of Kanchrapara Workshop

Certifications

The workshop is accredited with various certifications

Accreditations	Acquired	Valid upto
5-S	04.12.2022	03.12.2025
ISO: 3834	12.04.2021	11.04.2024
IMS	10.08.2021	09.08.2024
ISO: 50001	15.11.2021	14.11.2024
SIX SIGMA	19.03.2020 (One time requirement)	
IRIS	26.04.2022	25.04.2024
National Conservation Energy Award	Awarded in the year 2020	
NABL	26.04.2022	25.04.2024
Green-Co Rating	28.03.2023	27.03.2026
CII - IGBC Green Existing Building	2023	2026

2. Manufacturing Process

HOG Modification

Commissioning of 2x500 KVA HOG Converter





HOG ALLOTMENT						DONE in 2022-23		
Target	ER	WCR	NR	TOTAL	ER	WCR	NR	TOTAL
WAP7	26	14	0	40	17	6	11	34
WAP5	20	0	0	20	11	0	0	10
	46	14	0	60	28	6	10	44

Commissioning of Composite Converter in WAP5 Loco

1st time in IR other than PU, Commissioning of IGBT base Composite Converter with MICAS based VCU in 30096/WAP5/HWH

Composite Converter commissioned in 11 Nos. of Locos in 2022-23

Technical Up gradation – WAG - 9




Conversion of GTO based locomotive into IGBT based 3-phase electric locomotives in Loco No. 30612/BWN/WAG9

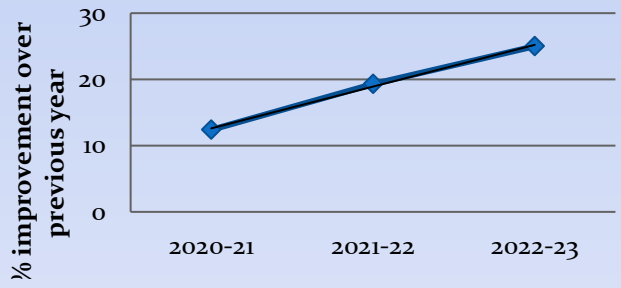
Type of Loco	RB's Target 22-23	Done till date
WAG 9	Nil	1

3. Sp. Energy Consumption of KPAW in last 3 Years

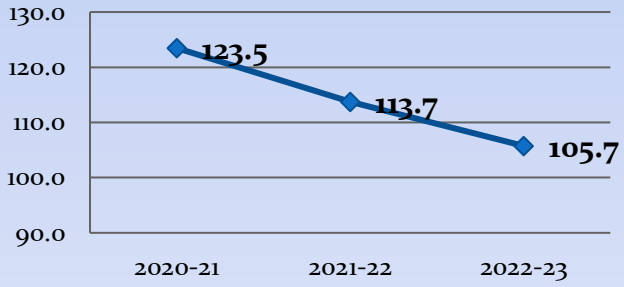
Energy Consumption and Trends

Year	Electrical Energy (in KWh)	Electrical Energy (in TOE)	Thermal Energy (in TOE)	Total Energy (in TOE)	Equated Out Turn (in Carriage Units)	Sp. Energy Consumption/Equated Out Turn (in KOE)
2020-21	4974073	427.7	90.7	518.4	4198	123.5
2021-22	5214466	448.3	96.3	544.6	4789	113.7
2022-23	5417242	465.8	107.6	573.4	5424	105.7

SEC % Improvement over Year wise



Over All SEC in KOE/ECU



3. Sp. Energy Consumption of KPAW in last 3 Years

Section/Process Wise Energy Consumption Variations and Savings

Section / Process	Action Done in Qty	Yearly Saving
Welding Plant- Replacement of conventional plant with IGBT based plant.	96 Nos.	596170 kWh
Replacement of Conventional Air Conditioners with 5 star rated DC Inverter type ACs	95 Nos.	129500 kWh
Water Pumping - Replacement of Conventional Pump Motor sets with efficient IE3 Motor driven Pump-Sets ,	3 Nos.	36500 kWh
Provision of 100% LED lighting in place of various types of conventional lights.	11000 Nos.	245000 kWh
Replacement of old and conventional bulk Compressors of 185 KW by localized baby compressor of 10.5 KW X 80 Nos.	5 Nos.	354000 kWh

3. Sp. Energy Consumption of KPAW in last 3 Years

Section/Process Wise Energy Consumption Variations and Savings

Section / Process	Action Done in Qty	Yearly Saving
Provision of Auto Turbine Ventilator replacing old electric exhaust.	384	115000 kWh
Replacement of old and conventional ceiling fan by energy efficient BLDC Fan of 28-30 Watt	1700 Nos.	127500 kWh
Transportation - Intensive use of electric listers in place of diesel operated fork listers. (75x2.0 Lts x250 days)	75 Nos.	37500 Litre HSD

4. Information on Competitors and Bench Marking

❖ **Specific Energy Consumption of various similar workshops in Indian Railways**

Internal Benchmarking	
Kanchrapara Workshop	125.2 KOE/ECU (2020-21)
Kanchrapara Workshop	113.1 KOE/ECU (2021-22)
Kanchrapara Workshop	105.7 KOE/ECU (2022-23)
External Benchmarking (Indian Railways) Year 2020-21	
Central Workshop Golden Rock	111 KOE/ECU
Mysore Workshop	126.81 KOE/ECU
Liluah Workshop	120.88 KOE/ECU
Matunga Workshop	213.62 KOE/ECU

4. List of Major Encon projects planned for 2023-24

Sl. No	Energy efficiency Project	Financial Implication (Lakhs)	Saving (KWH)	PDC
1.	Replacement of Conventional Air Conditioners with Energy Efficient 5 star rated and DC Inverter type ACs (34 Nos.)	13.6	46350	Dec 2023
2.	Replacement of Conventional Pump Motor sets with efficient IE3 Motor driven Pumps. (7 Nos.)	11	280000	Jan 2024
3.	Replacement of Conventional EOT Cranes with efficient VVVF driven Cranes. (9 Nos.)	225	7110	Feb 2024
4.	Provision of CNC Heavy Machine (2 nos.)	900	50000	Nov 2023
5.	Replacement of old and conventional ceiling fan by energy efficient BLDC Fan of 28 Watt, Qty = 1000 Nos.	21.3	60000	Jan 2024
6.	Procurement of IGBT Welding Plant in place of Conventional welding machine . Qty = 70 Nos.	22	121100	Feb 2024

4. List of Major Encon projects planned for 2023-24

Sl. No	Energy efficiency Project	Financial Implication (Lakhs)	Saving (KWH)	PDC
7.	Provision of Solar water heater at Shop No. 10 Loco Complex, Capacity = 2000 LPD.	8.9	38,400	May 2023
8.	Installation of Rooftop Solar Plant , Cap= 3.25 MWp	293 + PPP	20,18,250	Dec 2023
9.	Provision of Solar street light , Qty = 10 Nos.	1.3	795	Nov 2023
10.	Provision of Solar High Mast Tower light, Qty = 23 Nos.	46	30,110	Oct 2023
11.	Provision of Auto Turbine Ventilator, Qty = 50 Nos.	3.60	15,000	Oct 2023

5. Energy Saving Projects implemented in during 2020-21

Sl.	Energy efficiency Project	Financial Implication (Lakhs)	Saving (KWH)
1	Replacement of Conventional Air Conditioners with 5 star rated and DC Inverter type ACs , Qty = 40 Nos.	16	54528
2	Provision of LED lights ranging 18 watt to 200 watt. Qty = 1640 Nos.	24	135200
3	Procurement of IGBT Welding Plant in place of Conventional welding machine. Qty = 35 Nos.	43.3	211925
5	Regulation of submersible pumps Pump Motors by TIMERS switches , Qty = 9 Nos.	0.81	3600
6	Replacement of Conventional EOT Cranes with efficient VVVF driven Cranes, Qty = 1 No.	20	790
7	Provision of CNC Heavy Machine = 1 No.	360	15000
8	Provision of Auto Turbine Ventilator , Qty = 85	61.2	25500
9	Provision of SKY PIPE Day Lights in shops, Qty = 5	2.5	1500

5. Energy Saving Projects implemented in during 2021-22

Sl. No	Energy efficiency Project	Financial Implication (Lakhs)	Saving (KWH)
1	Replacement of Conventional Air Conditioners with 5 star rated and DC Inverter type ACs , Qty = 20 Nos.	8	27264
2	Procurement of IGBT Welding Plant in place of Conventional welding machine .Qty = 15 Nos.	18.5	90825
3	Replacement of Conventional EOT Cranes with efficient VVVF driven Cranes, Qty = 1 No.	20	790
4	Provision of CNC Heavy Machine, Qty = 2 Nos.	720	30000
5	Replacement of old and conventional ceiling fan by energy efficient BLDC Fan of 28 Watt , Qty = 200 Nos.	4.26	12000
6	Provision of LED lights ranging 18 watt to 200 watt. Qty = 380 Nos.	5.53	30700
7	Provision of Auto Turbine Ventilator , Qty = 130	93.6	39000

5. Energy Saving Projects implemented in during 2022-23

Sl. No	Energy efficiency Project	Financial Implication (Lakhs)	Saving (KWH)
1	Replacement of Conventional Air Conditioners with 5 star rated and DC Inverter type ACs , Qty = 20 Nos.	8	27264
2	Procurement of IGBT Welding Plant in place of Conventional welding machine .Qty = 44 Nos.	49	266420
3	Replacement of Conventional EOT Cranes with efficient VVVF driven Cranes, Qty = 1 No.	20	790
4	Replacement of Conventional Pump Motor sets with efficient IE3 Motor driven Pumps. , Qty = 2 Nos.	23.4	146000
5	Provision of CNC Heavy Machine, Qty = 2 Nos.	720	60000
6	Replacement of old and conventional ceiling fan by energy efficient BLDC Fan of 28 Watt , Qty = 1500 Nos.	35	97200
7	Provision of Solar street light , Qty = 10	1.3	725
8	Provision of Auto Turbine Ventilator , Qty = 169	121.68	50700
9	Installation of Wind Turbine, Cap = 3 KW	5	6570
10	Provision of SKY PIPE Day Lights in shops, Qty = 25 Nos.	12.5	7500

6. Innovative Projects Implemented

Project Title	Dual Mode Shunting Car
Date of Commencement	19/12/2021
Date of completion	29/3/2022
Trigger for the project	Conversion of 02 no overaged coach (MC- 11281 & 11289) to Shunting car
Outcome Expected	Smokeless diesel free shunting operation.
Why the project is innovative	KPA Workshop became 1st workshop in IR to implement diesel free shunting
Benefits derived	Utilization of overaged coach
Environmental benefits	Saving of fuel cost for Shunting Operation
Economic Benefits	Reduction in Carbon Foot print -1000 MT CO2 /year

Diesel free Shunting in Workshop premises Conversion of Over Age EMU MC into Dual Mode Shunting Car

6. Innovative Projects Implemented

Jalvaayu (aqua gas) on site oxy-Hydrogen fuel gas generator, used for gas cutting purpose. It will reduce about 50kg of CO_2 per day.

6. Innovative Projects Implemented

HSD OIL

- Replacement of Diesel operated platform trucks by Battery Operated Trucks for Material Handling.
- Strict permit and movement of BS1V vehicles with PUC certificates
- Condemnation of old fired furnace and replacement by electric furnace
- Replacement of Diesel Engine shunting cars by Dual mode battery and electric operated shunting cars
- Replacement of Giant diesel generators by smaller generators

Metal Cutting Gas

- Less corroded Stainless Steel coaches replacing Corten Steel.
- Allkyd paint replacing by long lasting PU Painting of coaches .
- Jalvaayu (aqua gas) on site oxy-Hydrogen fuel gas generator, used for gas cutting purpose
- Replacement of acetylene by Bharat metal cutting gas
- Introduction of thickness based cutting based nozzles to minimize the consumption of cutting gas

7. Utilization of Renewable Energy Resources

Onsite Generation				
Year	Installed Capacity (MW)	Technology (solar/wind/biomass etc)	Consumption (million kWh)	% of overall electrical energy consumption
2020-21	0	0	0	0
2021-22	0.010	Solar	0.003401	0
2022-23	0.610	Solar	0.115	3%
Offsite Generation				
2020-21	Nil	Nil	Nil	Nil
2021-22	Nil	Nil	Nil	Nil
2022-23	Nil	Nil	Nil	Nil

8. Waste Utilization and Management

Inventorization for Hazardous Waste

Sl	Type of Hazardous waste	Hazardous Waste disposed in MT				
		2019-2020	2020-2021	2021-2022	2022- 2023	Recyclability
(i)	Grease	17.765	13.59	15.63	13.26	**10%**
(ii)	Paint and Pigment-Sludge	3.405	4.19	8.59	4.51	**10%**
(iii)	Glue & Varnish	4.9	1.50	1.28	1.14	**10%**
(iv)	Scrap used Oil	122.43	112.78	161.36	86.57	**50%**
(v)	Scrap Copper Electrolytic with Insulation	43.237	42.57	35.55	36.28	**100%**
(vi)	Scrap Copper Cable with Insulation	86.217	92.52	30.44	29.28	
(vi)	Scrap Alloy(Copper Segment)	5.3060	5.26	5.53	4.46	
(vii)	Scrap Boring. (Copper +Bronze)	2.07	7.46	0.254	1.943	
	Total HzW disposed in MT	**306.931**	**279.87**	**258.634**	**177.443**	
(viii)	Battery(in nos.)	6073	5945	6017	6336	40%

*ETP sludge had been tested by NABL accredited lab and found non hazardous and can be disposed off normally

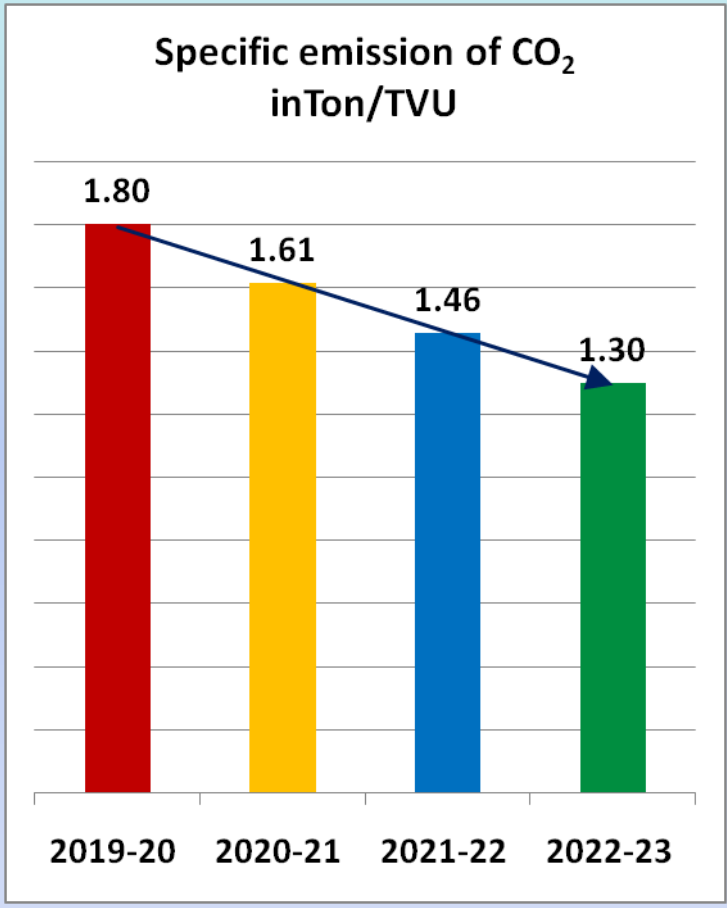
8. Waste Utilization and Management

Inventorization for Non-Hazardous Waste(in MT)

Sl	Type of Scrap	2019-20	2020-21	2021-22	2022-23	Recyclability
1	Non Ferrous	134.17	79.18	119.04	106.6	100%
	Specific ferrous dispose Ton/TVU	0.031	0.019	0.025	0.02	
2	Ferrous	8804	8047.39	7490.12	7473.4	100%
	Specific non-ferrous dispose Ton/TVU	2.03	1.92	1.56	1.38	
3	Rubber(sold for auction)	480	404.5	433.4	376.8	50%
	Specific rubber dispose Ton/TVU	0.11	0.096	0.09	0.069	
Total Non Hazardous Waste Disposed		9418.17	8531.07	8042.56	7956.8	
Total Outturn (in TVU)		4345	4198	4789	5424	

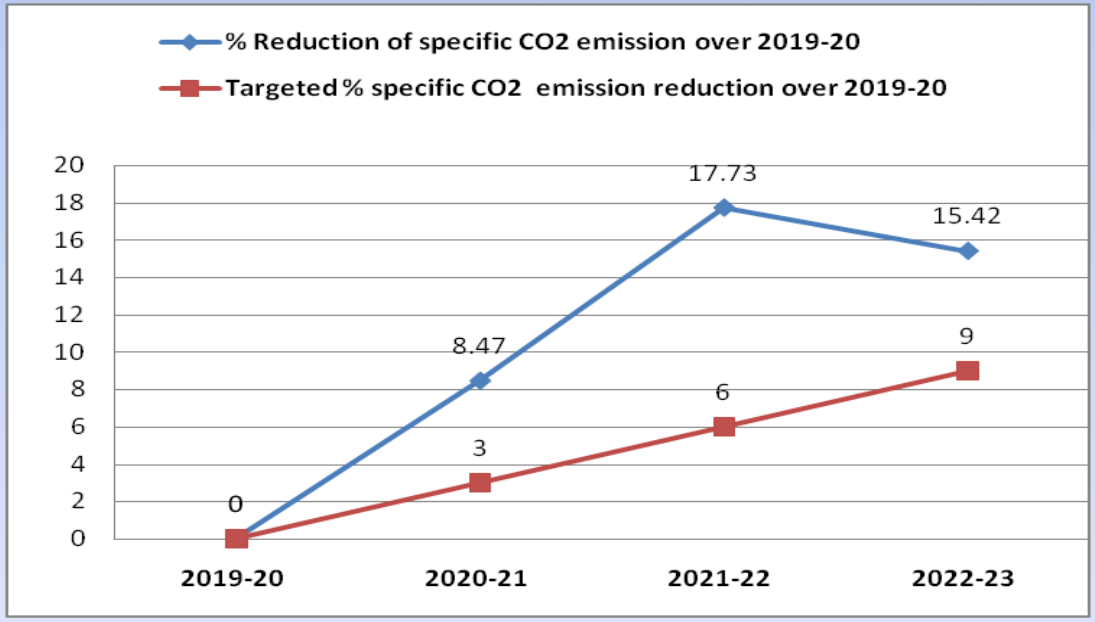
9. GHG Emission Inventorization

Emission of CO_2	Units	2019-20	2020-21	2021-22	2022-23
Scope 1, Thermal Energy	MT of CO2	261.81	231.51	237.38	276.43
Scope 2, Electrical Energy	MT of CO2	4681.26	3929.52	4119.43	4312.04
Scope 3, Transportation	MT of CO2	2891.91	2617.21	2616.28	2465.1
Scope 1, Specific Thermal Energy	MT/ TVU	0.060	0.055	0.050	0.051
Scope 2, Specific Electrical Energy	MT/ TVU	1.077	0.936	0.860	0.795
Scope 3, Specific Transportation	MT/ TVU	0.666	0.623	0.546	0.454
Total Ton CO_2 emission due to Scope 1, 2 and 3	MT of CO2	7834.98	6778.24	6973.09	7053.57
Total Equated outturn	TVU	4345	4198	4789	5424
Specific emission Ton/TVU		1.80	1.61	1.46	1.30
% Reduction wrt 2019-20		0	10.5%	19.3%	27.9%



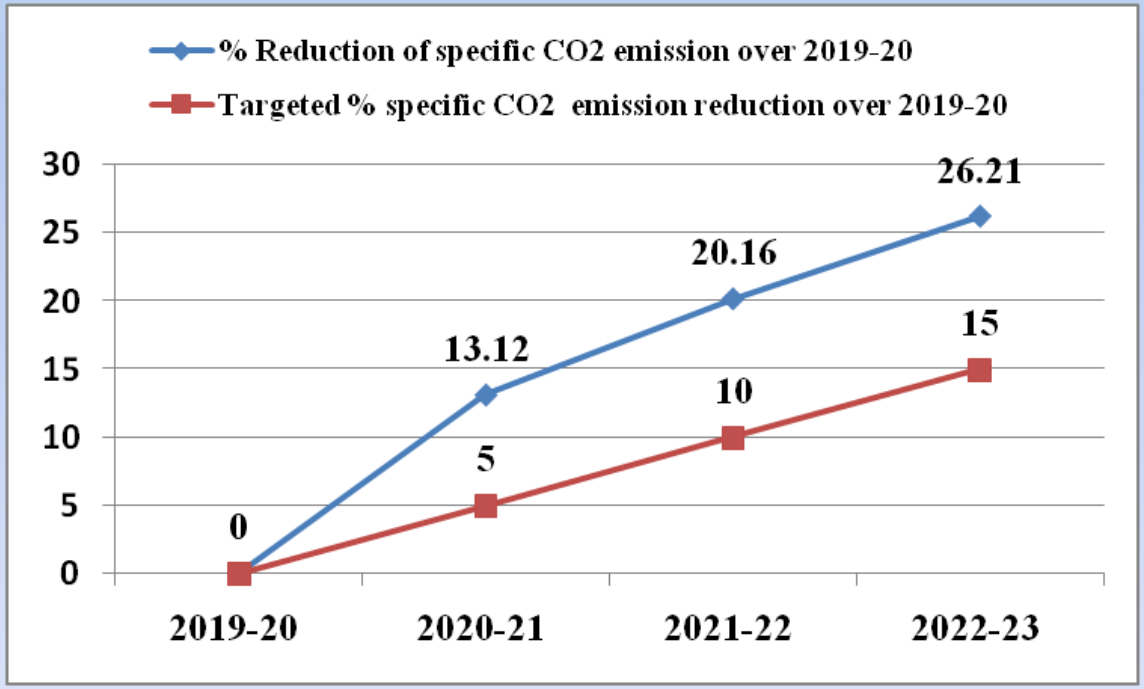
9. GHG Target Setting Scope 1

Source	2019-20 (base year)	2020-21	2021-22	2022-23 **
Total Specific Emission in kg CO_2 / Eqv. CU for Scope-I (Thermal emission)	60.2	55.2	49.6	51.2
% Reduction of specific CO_2 emission over 2019-20	0	8.47	17.73	15.42
Targeted % specific CO_2 Emission reduction over 2019-20	0	3%	6%	9%



9. GHG Target Setting Scope 2

Source	2019-20	2020-21	2021-22	2022-23
Scope - 2	4681.26	3929.52	4119.43	4312.04
Total Specific Emission in Ton CO_2 / Eqv. CU for Scope 2 (Purchase electricity)	1.0774	0.9360	0.8602	0.7950
% Reduction of specific CO_2 emission over 2019-20	0	13.12%	20.16%	26.21%
Targeted % specific CO_2 emission reduction over 2019-20	0	5%	10%	15%



10. Green Supply Chain Management

GENRAL STORES DEPOT, HALISAHAR

(ATTACHED TO KANCHRAPARA RAILWAY WORKSHOP)

GREEN CHAIN SUPPLY POLICY

THE STORE DEPARTMENT HALISAHAR, KANCHRAPARA WORKSHOP IN EASTERN RAILWAY IS COMMITTED TO ENHANCE SUSTAINABILITY PERFORMANCE AND MINIMIZE ENVIRONMENTAL, SOCIAL AND FINANCIAL RISK WITH IN STORE SUPPLY CHAIN PROCUREMENT AND SERVICE THROUGH THE FOLLOWING MEASURES.

(i) REDUCE ENVIRONMENT FOOTPRINT BY MEAN OF CONSERVATION OF ENERGY & WATER & OPTIMIZAITON OF MATERIAL USAGE.
(ii) SHIFTING MORE AND MORE TOWARDS PAPERLESS PROCESS.
(iii) PROMOTE A SAFE AND HEALTHY WORKPLACE FOR EMPLOYEE.
(iv) CULTIVATION OF PLANT AND GREENERY.
(v) ENCOURAGING SAVING WATER AND ENERGY.
(vi) ADHERING TO THE ENVIRONMENT AND SAFETY COMPLIANCE.
(vii) MAXIMIZATION OF MOVEMENT OF MATERIALS WITHIN DEPOT THROUGH GREEN TRANSPORT i.e. BATTERY OPERATED VEHICLES.

No. HLR/POLICY/GREENCO/DATED-20-08-2020.

Dy. Chief Material Manager
GENRAL STORES DEPOT
Halisahar, Eastern Railway

उप मुख्य सामग्री प्रबंधक
Dy. Chief Materials Manager
पूर्व रेलवे, हालिशहर
Eastern Rail... Halisahar

GREEN SUPPLY CHAIN POLICY OF KANCHARAPARA WORKSHOP

10. GREEN SUPPLY : TARGETS , ACTION PLAN AND RESOURCE ALLOCATION

TYPE OF SUPPLIER	Short Term (2021-23)		LONG TERM TARGET (2023-25)	
	Action	Result targeted	Action	Result targeted
Type I (Green Co certified)	Encouraging for up gradation in rating	All Type-I Vendors	Monitoring of performance	Strict compliance of green packaging, GPS route optimization
	To be active on e- platform like e –procurement e-payment & e- auction	**SUCESSFULLY IMPLEMENTED (PAPERLESS PROCEDURE)**		
Type II (RDSO approved but capable of Green co certification	Periodic Audits of suppliers though questionnaire Performance monitoring and plant visit of critical suppliers Pushing them for Green Co certification	Increase by 10 % every year Visit 01 firms every month	Encourage for Promotion of Type II Vendors to Type I Physical/e-invites to critical vendors	10% of the critical vendors every year Encourage vendors to participate in vendor meets for implementation of green practices
	To be active on e- platform like e –procurement e-payment & e- auction	**SUCESSFULLY IMPLEMENTED (PAPERLESS PROCEDURE)**		
Type III (MSMEs)	Increase communication through mails and pamphlets Involving and pushing for green supply and practices	Increase by 25%	Encourage for Promotion of Type III Vendors to Type II	50% of the critical vendors
	Encourage to get Green Certifications like Green CO, Green pro, ISO etc	Increase by 10% (Three firms already certified recently with Green Pro and ISO)	Encourage to get Green Certifications like Green CO, Green Pro, ISO	Organize vendor awareness Program/workshop Every 6 months

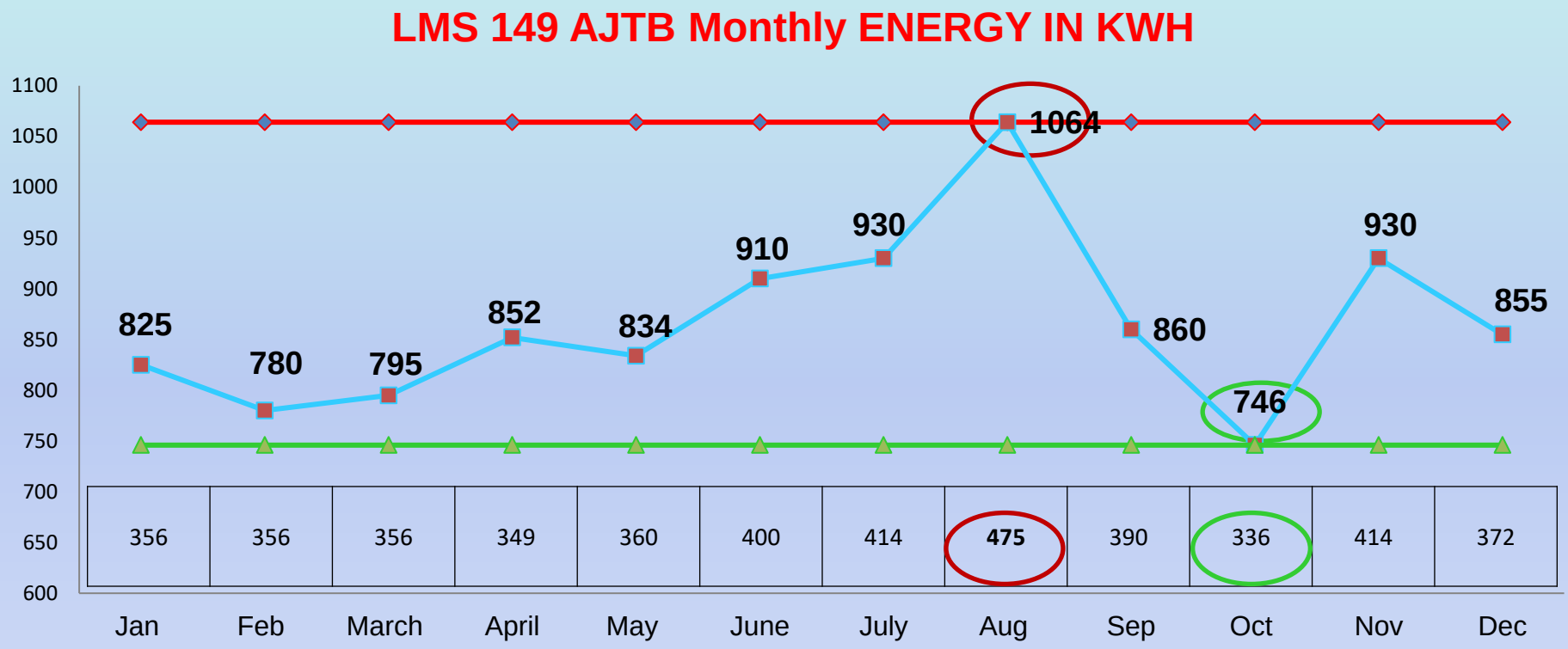
11. Energy Monitoring System

Electrical Consumption in KWH Loco Complex

SL. NO	Machine no	Target	Machine reading Year 2022 in KWH											
			JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	AVG
1	L/MS-149(AJTB) shop-2A	900	825	780	795	852	834	910	930	1064	860	746	930	855	865
2	L/MS-156(CNC Surface Wheel Lathe) shop-2A	3200	2622	2671	3025	3197	3466	3622	3411	3704	3689	3223	2931	2537	3175
3	L/MS-158(Wheel Press) shop-2A	600	443	577	620	552	683	636	529	608	564	555	587	570	577
4	L/MS-172(Wheel Press shop-2A	550	310	0	0	615	660	700	598	715	845	360	621	684	509
5	L/MS-153(CNC ATL) shop-2A	25	16	10	12	15	26	35	36	20	40	18	33	20	23
6	Vacuum Pressure Impregnation Plant shop - 14	2100	1215	1095	2207	2735	2837	3303	2927	2596	2235	1497	1147	1200	2083
7	Vacuum Drying Plant shop - 14	5600	5302	5263	3981	5042	5125	6051	4026	5824	5398	6189	7360	7200	5563
8	Water Pumps	90000	91000	76000	94000	99000	100023	97000	98000	102000	81840	68310	66186	93575	88911

11. Energy Monitoring System

Consumption of Major plants in Loco Complex



Variation in Energy Consumption directly related to monthly out turn

12. NET ZERO Commitment

Source	2019-20	2020-21	2021-22	2022-23	2023-24 Projection	2024-25 projection	2025-26 Projection	2026-27 Projection
Electrical Energy in kWh	5925649	4974073	5214466	5417242	5315854	5315854	5315854	5315854
Electrical Energy in TOE	509.5	427.7	448.3	465.8	457.1	457.1	457.1	457.1
Thermal Energy in TOE	103.1	90.7	96.3	107.6	102	102.0	102.0	102.0
Total Energy in TOE	**612.6**	**518.4**	**544.6**	**573.4**	**559.1**	**559.1**	**559.1**	**559.1**
Total Renewable Energy Generation/ Harnessing (kWh)	48000	50000	58401	179774	2420318	3056318	4625000	5625000
Total Renewable Energy in TOE	4.1	4.3	5.0	15.5	208.1	262.8	397.7	483.6
After neutralizing by all renewable energy , Net Grid Electricity Consumption in (kWh)	608.5	514.1	539.6	557.9	351.0	296.3	161.4	75.4
Total Equivalent Carbon Foot Print by Grid Energy in Ton of CO2	1399.46	1182.37	1241.12	1283.21	807.20	681.43	371.22	173.47
Nos. of Tree Planted inside Workshop for absorbing CO2	39659	40109	40609	41609	42000	43000	43000	43000
Tree Plant Absorbing CO2 in Ton	287.5	290.3	293.1	299.0	302.0	309.0	310.0	310.0
Net Zero Emission of Carbon Foot Print in CO2 Ton	1111.92	892.11	947.99	984.19	505.20	372.42	61.22	**-136.53**

CARBON NEUTRAL BY **2027**