CII Energy Excellence Awards

Rane NSK Chennai Heartly Welcome CII Team

10 -12 September , 2024

Presented by : RNSS - CHENNAI

Team Members

M Venkataathri
(DGM - Operations)

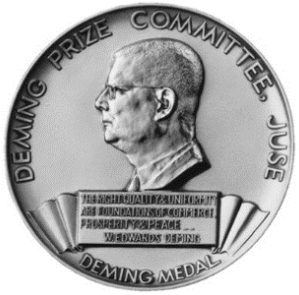
B Muralikrishnan
(Sr. Manager – PLE)

A Aravinth
(Engineer – PLE)

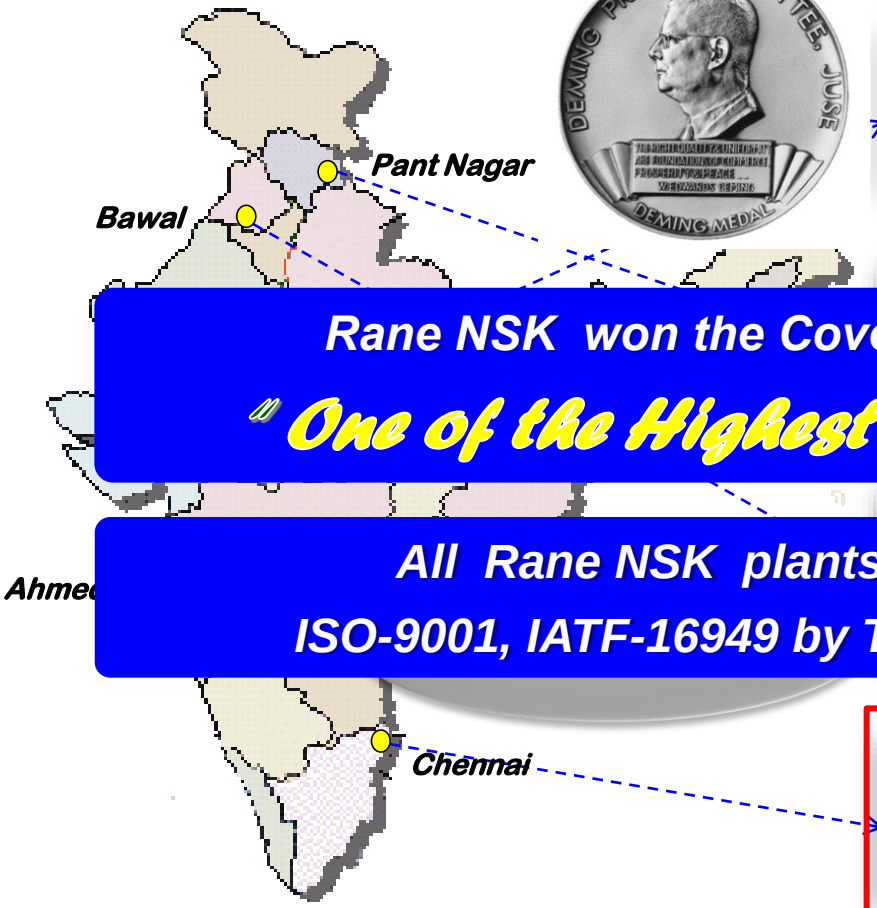
2024

1. Company Profile & Product Details

Rane NSK Plant Locations



- Gujarat plant (Plant-4)
- Established : 2018
- Employees : 235 (51+184)
- Capacity per Month – 62,000 Column EPS



- Pant Nagar plant (Plant-3)

Rane NSK won the Coveted 'DEMING' Prize from JUSE in 2018

" One of the Highest Awards on TQM in the World "

- Bawal plant (Plant-2)

All Rane NSK plants Certified for ISO-45001, ISO-14001, ISO-9001, IATF-16949 by TUV-Nord and ISO/IEC-27001 by TUV-SUD

- **Chennai plant (Plant-1), Corp.Office & R&D**
- **Established : 1997**
- **Employees : 210 (60+150), (83)**
- **Capacity per Month – 75,000 Columns**

Plant	Products / Variants			Application	Major Customers
Plant-1 (Chennai)	Column-MSC	Manual Steering		• Passenger Cars • Utility Vehicles, LCV, MCV & HCV	❖ MSIL, TML, VE, Toyota, Honda ❖ ISUZU (Thaiand)

- MSC – Manual Steering Column

(XX+XX) – Indicates No.of. Employees (Management Staff + Operators & Trainees)

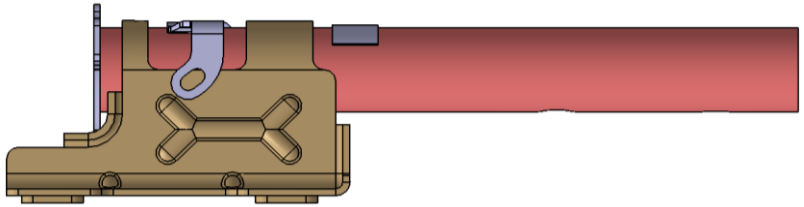
2. Manufacturing Process

PROCESS FLOW DIAGRAM

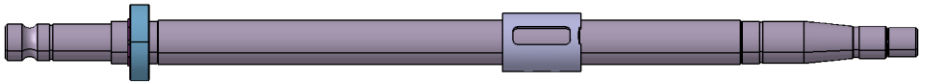
In-house Assembly Process Flow

Sub contract Process

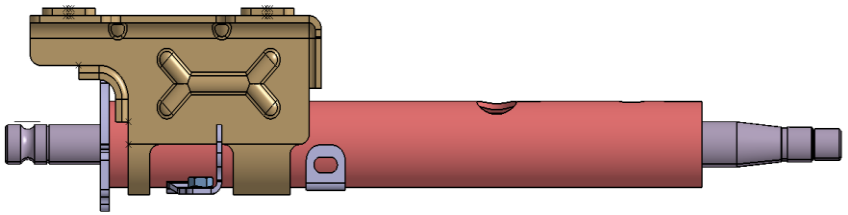
Outer tube assy → Pre-boring – Both end → SAS Bkt welding @ Robo → Final boring – both end → Robo Welding → Phosphating and Painting

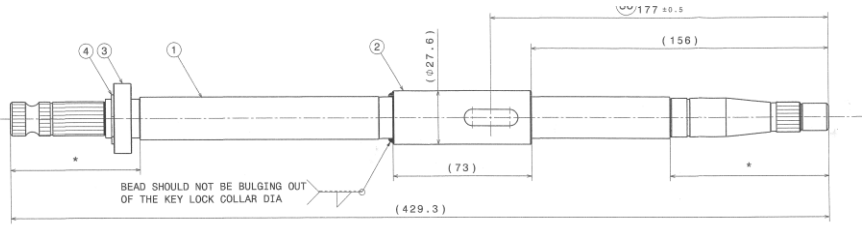


Stg Shaft Assy → CNC Machining → Back end Rolling → Front Serration and thread rolling → KLC Welding → Brg & Circlip Assy

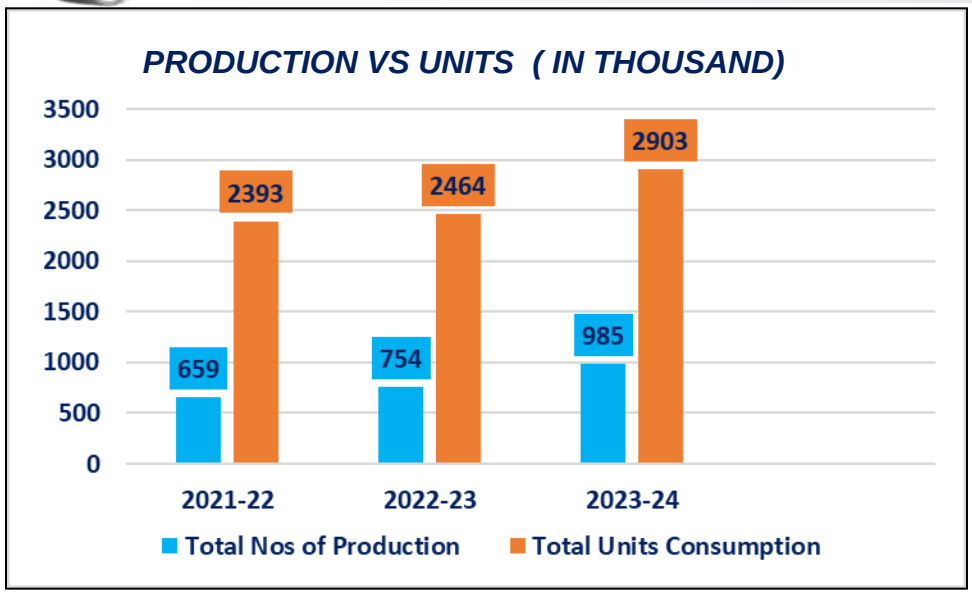


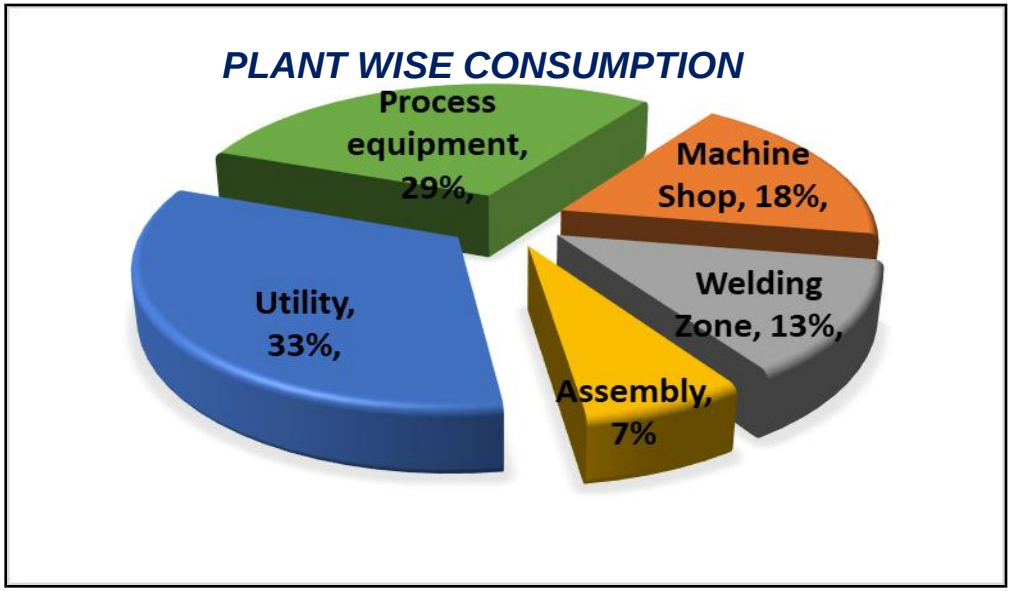
Column assy → Brg Clinching → Puller Assy → Final inspection → Packing

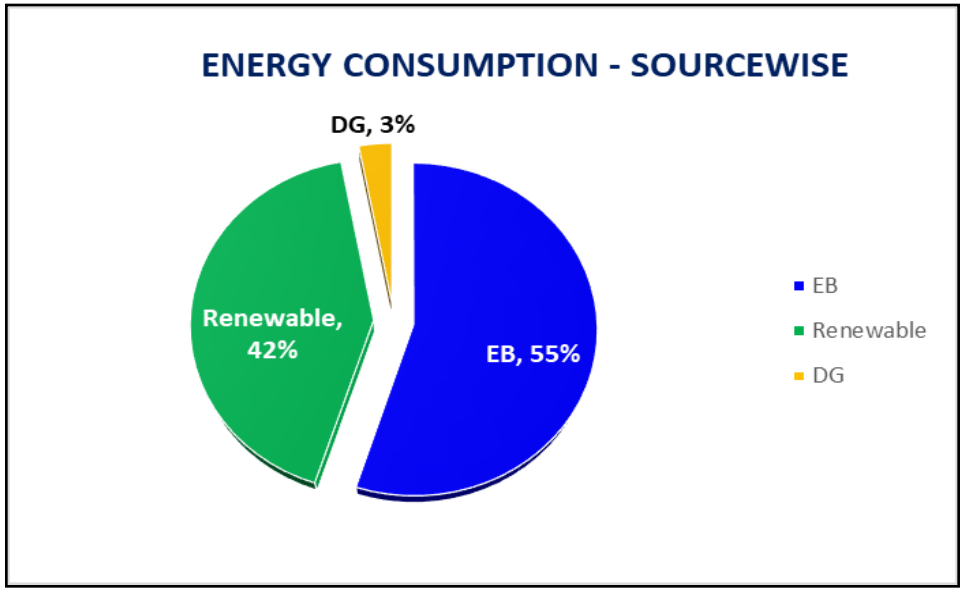




3. Sp. Energy Consumption (FY 2021 -24)







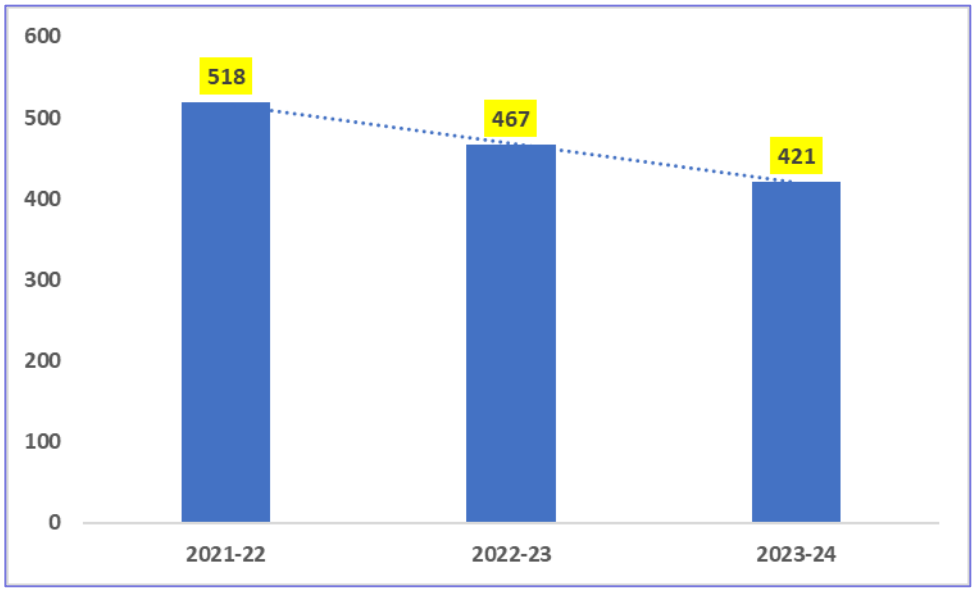
Variations

- *Common utilities are working even production load is low*
- *Variation in product size and quantity as per market scenario*

2.1 SPECIFIC ENERGY CONSUMPTION ELECTRICAL (FY 2021-24)

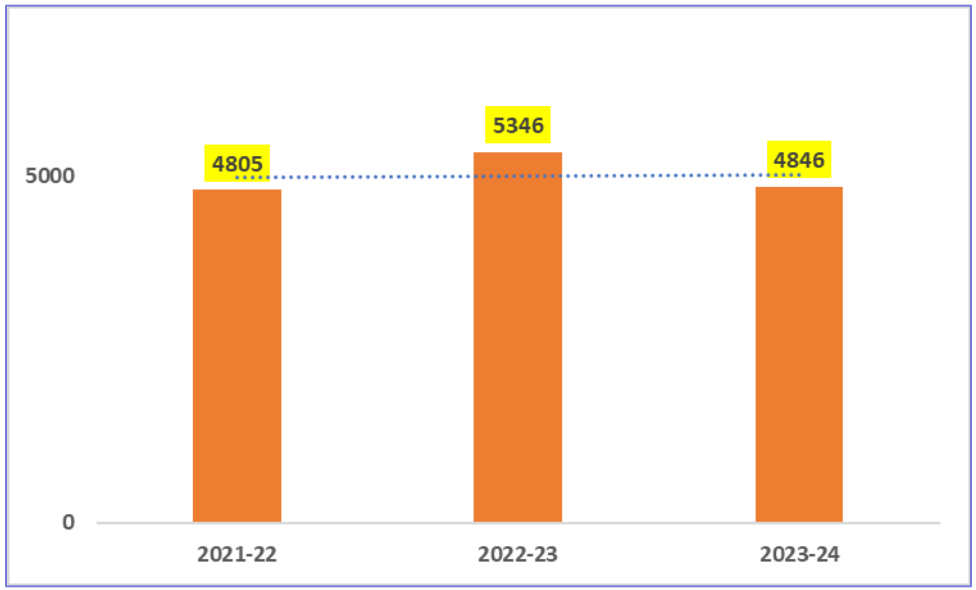
SEC – ELECTRICAL (Kwh / Ton Production)

BETTER



SEC – THERMAL (Kcal / Ton Production)

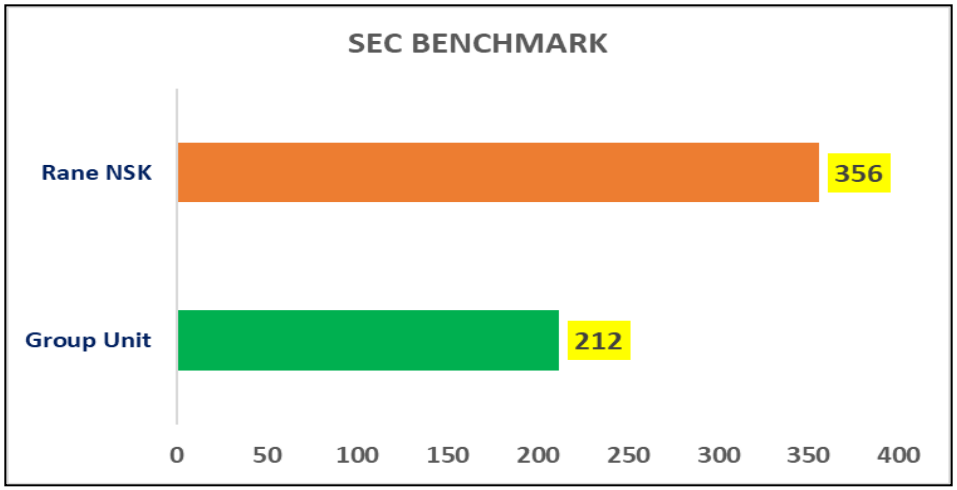
BETTER



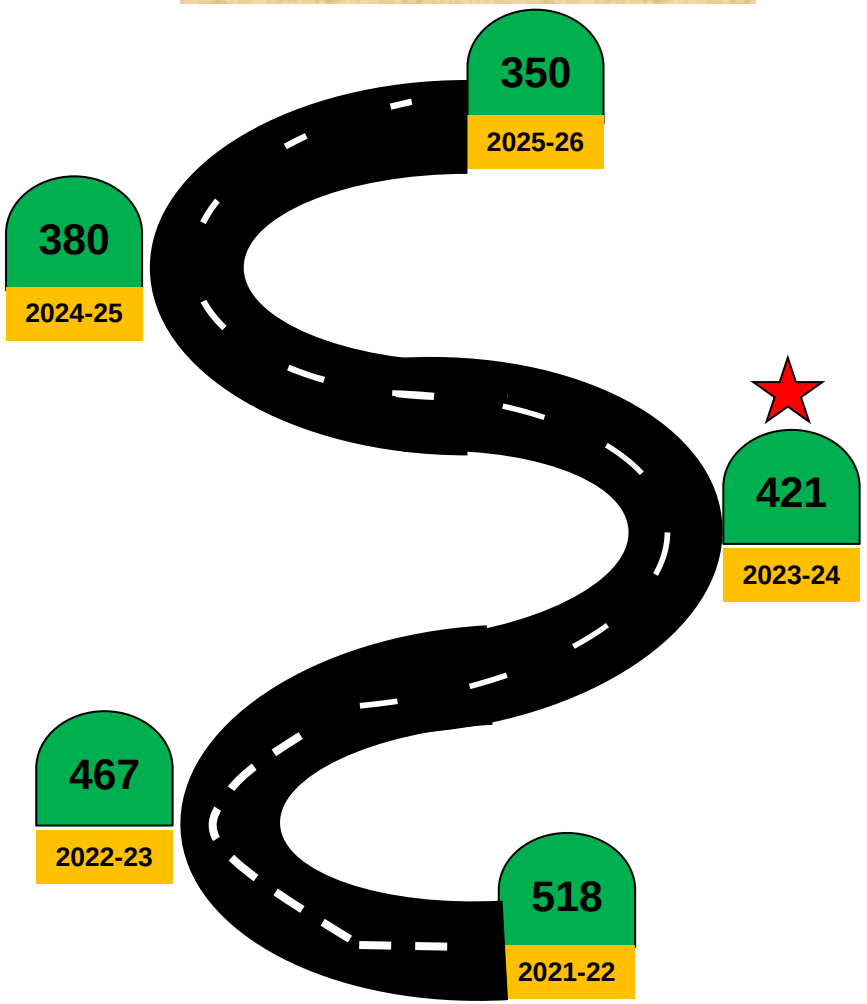
- *Specific Energy Consumption 14.36% to 30.65% from 2021 to 2024*
- *Thermal SEC Increased 2022-23 due to more power cuts*

4. Information on Competitors , National & Global benchmark

SEC BENCHMARK - ELETRICAL



ROAD MAP TO ACHIEVE SEC

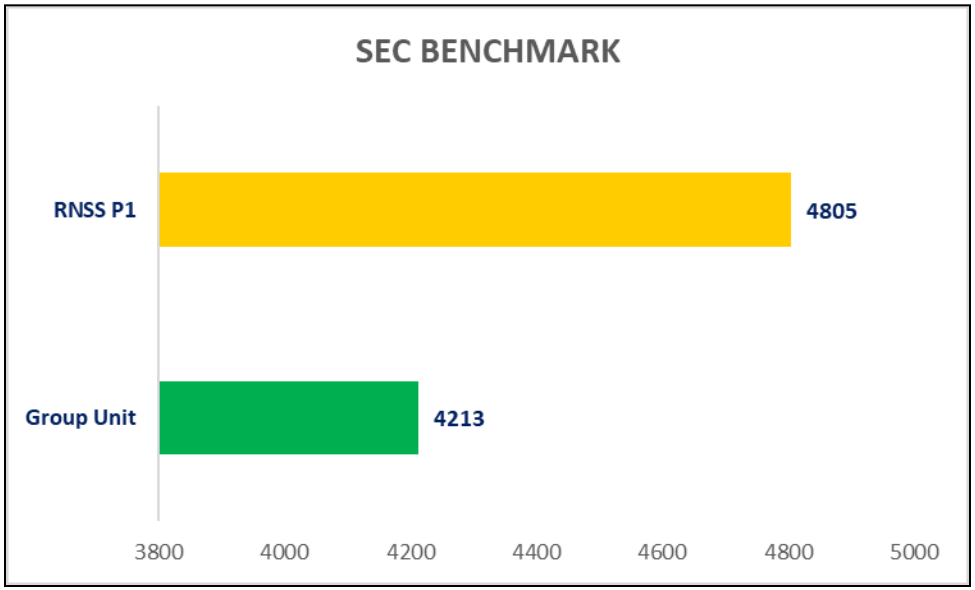


Long Term Plan to achieve Target SEC

- *All Motors in IE4 Class*
- *VFD for Production Equipments*
- *Energy Purchase Vs Renewable - 35% : 65%*
- *Compressed Air Usage reduction by 28%*

4. Information on Competitors , National & Global benchmark

SEC BENCHMARK - THERMAL



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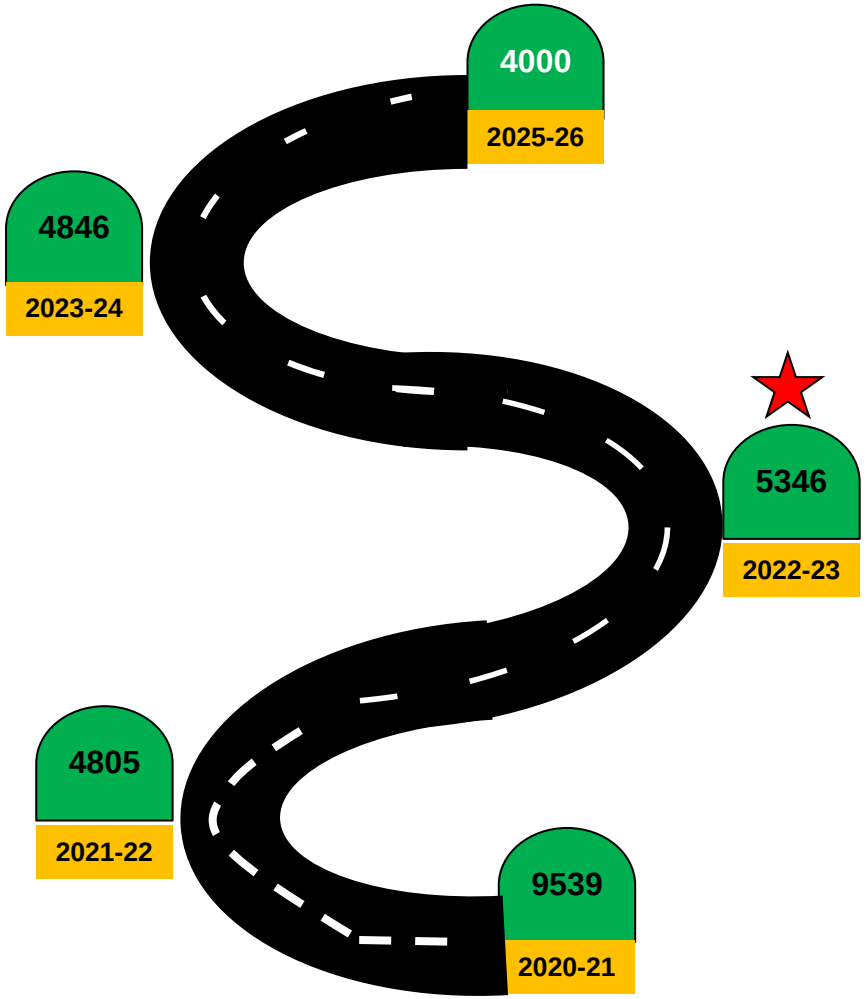


Long Term Plan to achieve Target SEC

- *Dedicated Feeder*
- *Roof top Solar for Process Equipment*
- *Dual Fuel (Diesel + PNG) for DG*

5 ENCON PROJECTS FY 2024-25

SL. NO	PROJECT TITLE	ANNUAL SAVING (KWH)	ANNUAL SAVING (INR MN)	INVESTMENT (INR MN)	ROI IN MONTHS
1	VFD for Production Machines	18276	0.161	0.3	20
2	Motor Class conversion IE1 to IE4	22656	0.192	0.4	24
5	BLDC Air circulator fan	22882	0.194	0.3	13
6	Plant Air reduction – Welding Shop & Machine Shop	16200	0.140	0.2	14
7	Thyristor to invertor Control power source	16480	0.138	0.25	20
8	Heat Pump for Paint shop Heaters	76368	0.65	0.5	8
	Total	172862	1.47	1.95	15

Total Saving 172862 Units/ Year	Total Investment 1.67Lakhs	Total cost Saving 14.7 lakhs	ROI 15 Months	Co2 Reduction 121 MT

4. Energy Saving projects Summary (FY 2021-24)

YEAR	NO OF ENERGY SAVING PROJECTS	INVESTMENS (INR Mn)	ELECTRICAL SAVINGS (Mn kwh)	THERMAL SAVINGS (Mn kcal)	SAVINGS (INR Mn)	PAYBACK PERIODS (In Months)
2021-2022	6	1.72	0.246	211.71	2.04	8
2022-2023	6	6.73	0.467	402.02	3.68	20
2023-2024	7	1.24	0.149	128.33	1.23	12
TOTAL	**19**	**9.69**	**0.86**	**742.06**	**6.95**	**15**

Total Investment – 9.96 Mn , Savings of – 6.95 with ROI 15 Months

4.1 ENCON PROJECTS FY 2021-2022

SL. NO	PROJECT TITLE	ANNUAL SAVING (KWH)	ANNUAL SAVING (INR MN)	INVESTMENT (INR MN)	ROI IN MONTHS
1	Air conditioner external temperature controller -64 Nos	38336	0.33	0.52	17
2	Servo Static Stabilizer for Shop floor lighting	30210	0.25	0.11	4
3	Motor Class Conversion IE1 to IE3	31493	0.263	0.38	16
4	VFD For Hydraulic & Blower motor	57695	0.482	0.56	13
5	IGBT Controlled air heater	3325	0.03	0.03	12
6	Energy Consumption reduction through productivity improvement - Paint shop JIG Modification	85000	0.688	0.125	2
	Total	246059	2.04	1.72	8

Total Saving 246059 Units/ Year	Total Investment 17 Lakhs	Total cost Saving 20.4 lakhs	ROI 8 Months	Co2 Reduction 103 MT

4.1 ENCON PROJECTS FY 2022-23

SL. NO	PROJECT TITLE	ANNUAL SAVING (KWH)	ANNUAL SAVING (INR MN)	INVESTMENT (INR MN)	ROI IN MONTHS
1	Welding Power Source Inter lock with Machine operation	15000	0.093	0.22	27
2	Heat pump system in phosphating plant	121800	0.966	2.1	25
3	BLDC Air Circular Fan	7176	0.061	0.4	30
4	Motor class conversion IE1 to IE4	66000	0.524	0.5	9
5	Compressor Ring Line & Capacity improvement	132912	1.054	1.8	19
6	VFD Installation for Machines	67128	0.532	1.2	26
	Total	410016	3.23	6.22	22.6

Total Saving 410016 Units/ Year	Total Investment 62 Lakhs	Total cost Saving 32 lakhs	ROI 22.6 Months	Co2 Reduction 195 MT

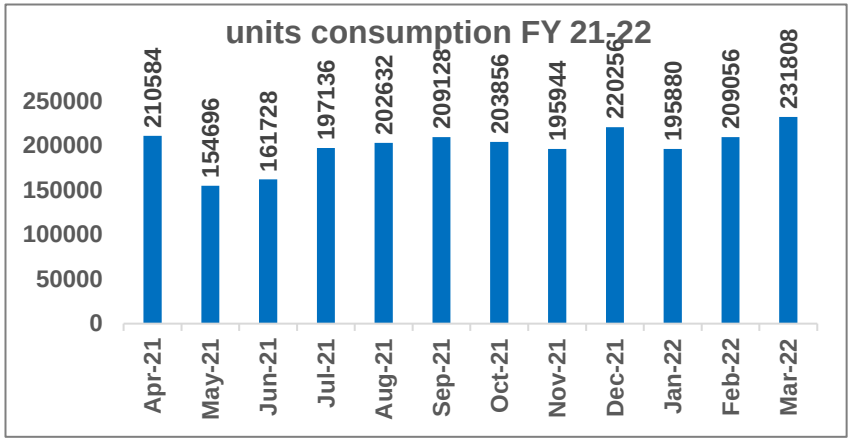
4.1 ENCON PROJECTS FY 2023-24

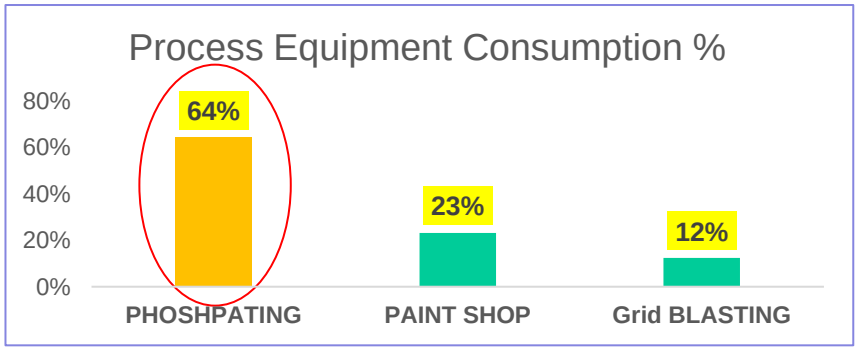
SL. NO	PROJECT TITLE	ANNUAL SAVING (KWH)	ANNUAL SAVING (INR MN)	INVESTMENT (INR MN)	ROI IN MONTHS
1	VFD for Machines	32000	0.27	0.3	13
2	Motor class conversion IE1 to IE4	9600	0.081	0.2	28
3	Thyristor to invertor Control power source	21600	0.18	0.3	18
4	Job Cleaner air Gun design Change	2400	0.02	0.02	12
5	Machine air shut off valve (Idle Cut off)	18500	0.15	0.15	12
6	BLDC Fan implementation	3158	0.02	0.12	30
7	Phosphating Scrubber inter lock	19890	0.16	0.05	3
	Plant Air Reduction at Assembly line	42000	0.35	0.1	3
	Total	149148	1.23	1.24	14

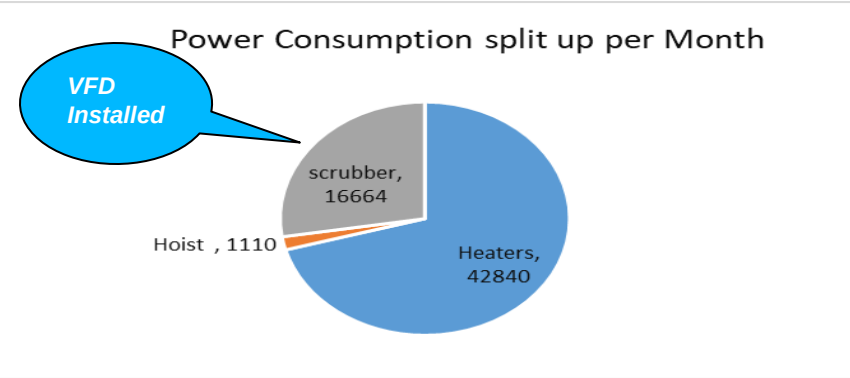
Total Saving 149148 Units/ Year	Total Investment 12.4 Lakhs	Total cost Saving 12 lakhs	ROI 14 Months	Co2 Reduction 62 MT

5. INNOVATIVE PROJECT -1 To Reduce Power Consumption in Process Equipment

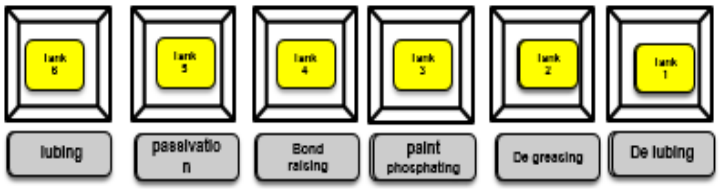
Trigger for Implementation

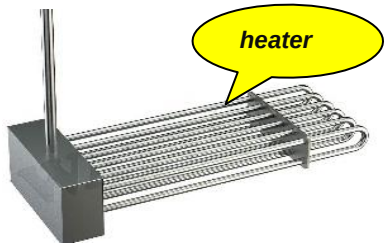






Existing system

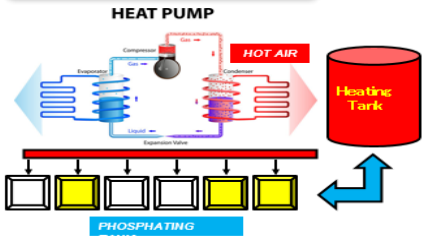




Industrial Heaters for to maintain the bath temperature as per Process requirements

Capacity	Heat delivered/day	Energy consumption/month
15kw x 6nos Total 90kw	1315800 Kcal	42840 units

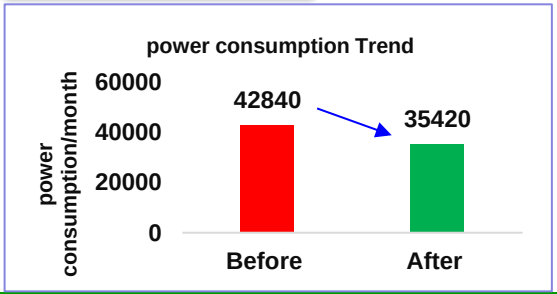
Proposed system

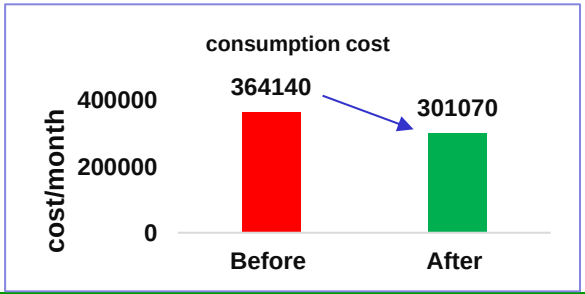


- *A heat pump is a standalone, two-component appliance that uses refrigeration technology and electricity to provide heating*
- *It extracts heat from the outside Air amplified and transfer to the hot water system*

Capacity	Heat delivered/day	Energy consumption/month
45kw + 56 kw	1621100Kcal	35420 units

Outcome



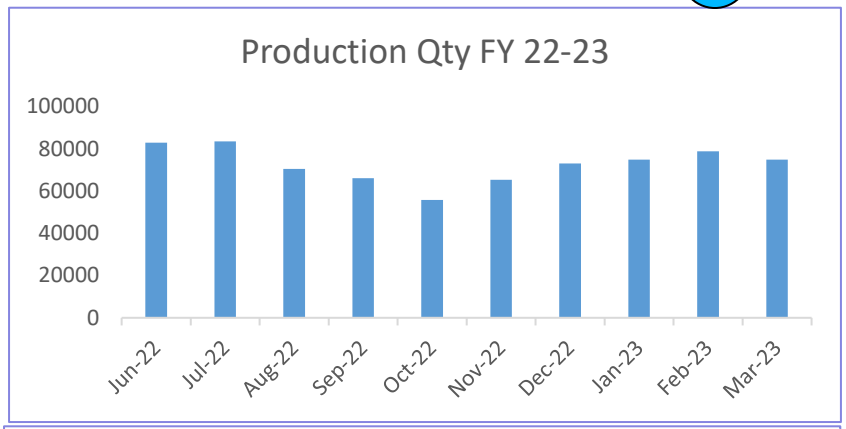


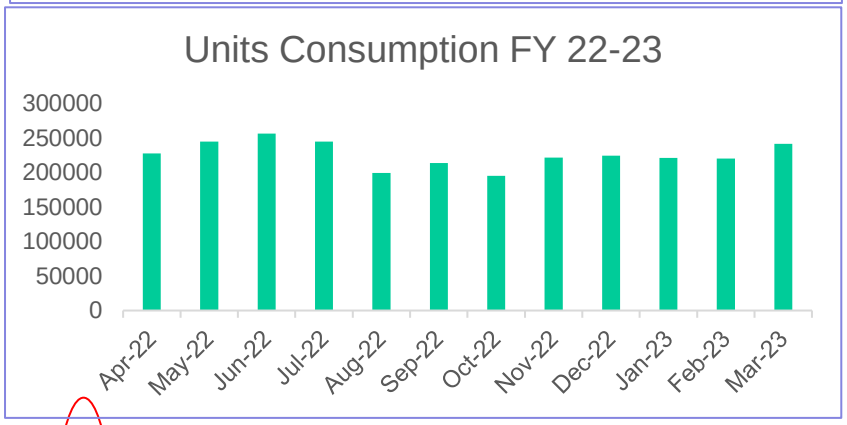
Cost saving per annum 0.7 Mn and ROI 10.5 months & Co2e reduction of 63MT

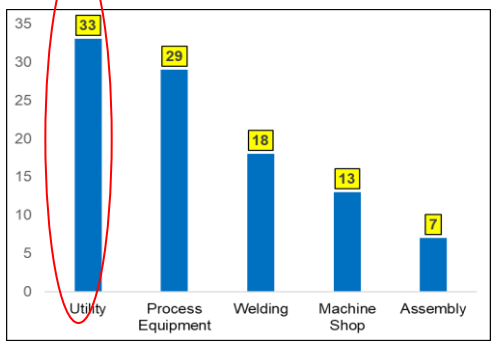
6 INNOVATIVE PROJECT - To Reduce Power Consumption Utility

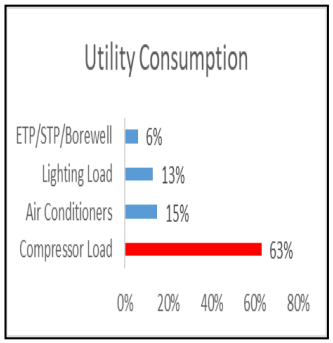
Trigger for Implementation

1

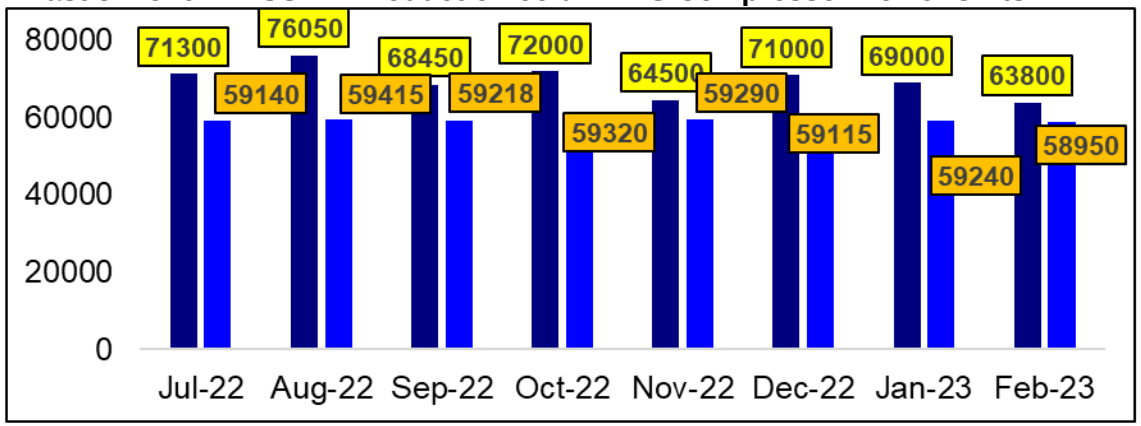








Past 8 month RNSS-P1 Production column VS Compressor Power Units



From the above graph
Compressor Power is fixed even production quantity decreases / Increases
Lowest Production column 63800 : Power consumption : 58950
Highest Production column 76050 : Power consumption : 59415

Target : To Reduce Utility Units from Avg 58952 to 47161

Plan several measures….

- ***Purchase of New Variable speed machine***
- ***Compressor Pressure setting switch not working***
- ***Compressor improper maintenance***
- ***Receiver tank capacity inadequate***
- ***Inadequate pipe capacity***
- ***Leakage in compressor air pipe line***
- **Usage of compressed for continuous cleaning**
- ***Efficiency of drier***

Based on the Validation we plan to implement 4 Countermeasures

6. INNOVATIVE PROJECT -To Reduce Power Consumption Utility

1

1- Low / 2 – Medium / 3 - High

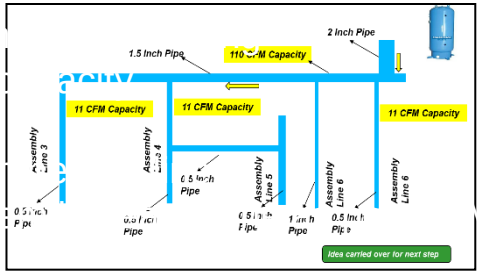
S.no	Idea	Energy saving	Cost Impact	Ease of maintenance	Lead time	Feasibility score	
1	Purchasing new machine	3	1	3	1	9	
2	To increase Receiver tank capacity	3	2	3	3	54	A
3	To Eliminate air leakage in over head line	2	3	1	1	6	
4	To increase pipe capacity in header line	3	1	3	2	18	B

From the feasibility study purchasing machine idea is dropped out due to high investment and high lead time . Out of 4 idea 2 were recommended activity in the end of feasibility study.

A *Receiver Tank Capacity*

Total Nos of Compressor - 3 compressors (375 / 243 / 113 CFM)
Air Receiver tank capacity - 1000 Ltr
Total Compressor Capacity - 748 CFM
Conversion of CFM to volume - 0.588
Total m3/L for 748 CFM - 748/0.588 = 1272 Ltr

B *Over head Pipe Size & Leakage*



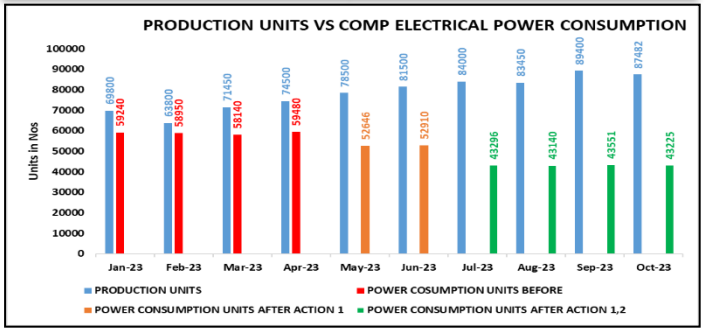
1.During Air Audit We h found minor leakages in many area due to Pipe Inside rust and minor crack 2 Over head pipe distribution different sizes and without closed loop

Min. required Tank Capacity - 1272 Litres

ACTIONS

Before	After
	
- 1000 Litres receiver tank - loading time -45 secs - unloading time -4 secs	- 3000 Litres receiver tank - loading time - 49 secs - unloading time -18 secs

Before	After
	
Existing air line system pipe with inner rust and un organized piping for machines	New air line ring main system with adequate pipe capacity for each machines



Utility Consumption reduction by 28%

7a.Utilization of Renewable Energy Sources

Onsite

Roof Mounted Ventilators installed Shop floor – 58 Nos
Annual Savings 13282 Kwh
Investment : 2.8 Lakhs

Translucent roofing sheets (25%) provided in sheds to use natural light.
Annual Equivalent Savings: 21060 KWh
Investment : 1.25 Lakhs

Solar water heater for Dish washing
Annual Savings 3744 Kwh
Investment : 1.0 Lakhs

7b. Utilization of Renewable Energy Sources Offsite

YEAR	Technology (Electrical)	Type of Energy	Onsite / Offsite	Installed Capacity (MW)	Generation (million kWh)	% of overall electrical Energy
2021-2022	PV Module Ground mounted	Solar	Offsite	10.5	0.56	38%
2022-2023					0.723	41.4%
2023-2024					0.80	45.3%

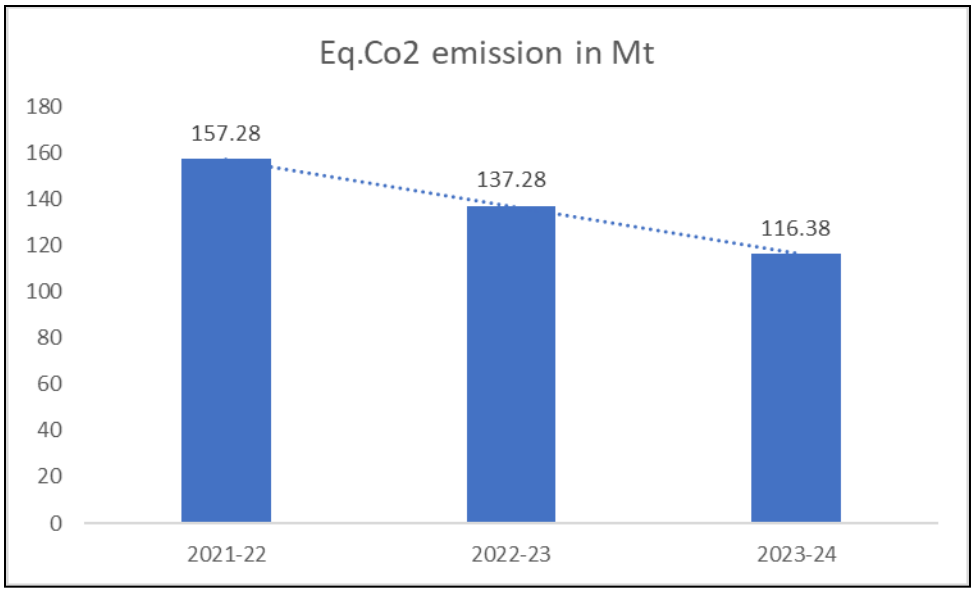
Renewable Energy	Solar	Wind
Source	Radial Renewables, Mumbai	MTK Textiles Pvt.Ltd
Type	**Group Captive @ 30% Equity Share**	**Group Captive @ 26% Equity Share**
Capacity	**10.5MW for Group / 0.5 MW RNSS -Chennai**	**11.35MW for Group / 0.5 MW RNSS – Tamil Nadu**

Fuel type	units of Fuel type	metric tons CO2 eq
Acetylene(LPG values are used until the acetylene values is obtained)	kg	0.0029
Natural Gas	M3	0.00202
LPG	kg	0.0029
Diesel (B5 or 100% mineral diesel)	Litre	0.0027
Fuel Oil (or) furnace oil	Litre	0.00318
Iso-propyl Alcohol	Litre	0.00000901
Methanol	Litre	0.00000676
Propane	kg	0.00299
Petrol (E5 or 100% mineral petrol)	Litre	0.00234

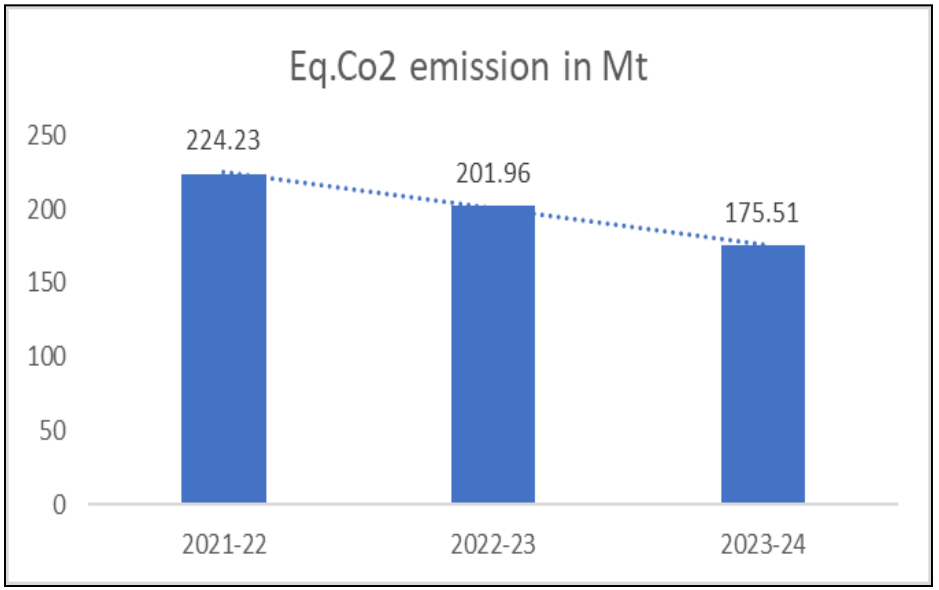
Rane Group has formed following Sub Committee as a part of ESG

1. ***Air Pollution Prevention Sub Committee***
2. ***Energy Conservation Sub Committee***
3. ***Waste Management Sub Committee***
4. ***Water Conservation Sub Committee***
5. ***Standards Management Sub Committee***

Scope 1

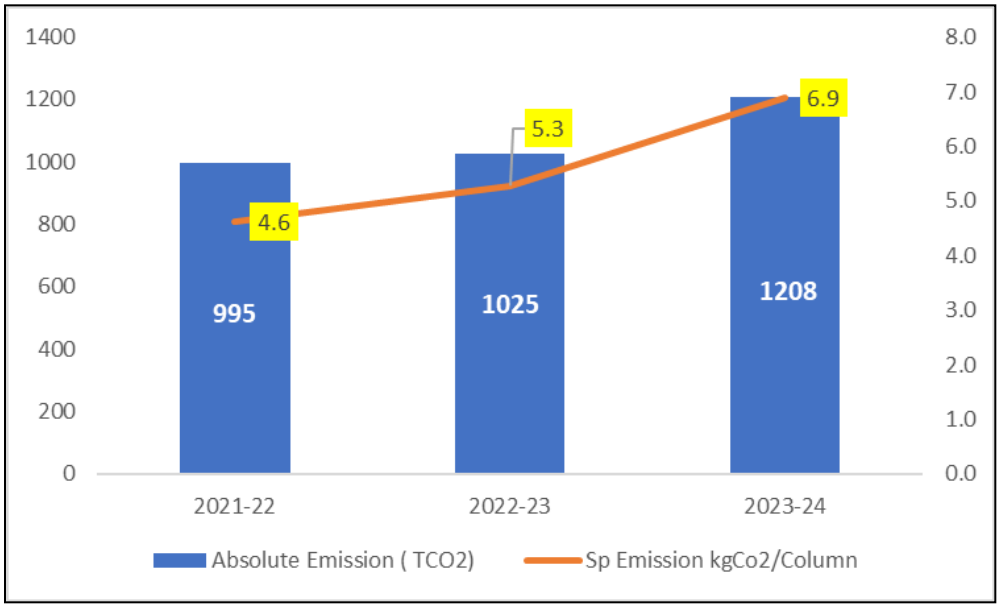


Scope 2



8.GHG inventorisation

ABSOLUTE EMISSION & EMISSION INTENSITY



% of Reduction of GHG emission 25%

SHORT TERMS GOAL (Within 2 Years 2024-26)

- Paper Usage reduction through I4.0
- Solar light implementation for Shop floor & Periphery
- Paint Shop technology advancement for elimination of heater load in the Oven
- Fixed Speed Compressor replaced with Variable Speed

LONG TERM GOALS (Within 4 Years 2022-26)

- Dual fuel (Diesel + PNG) implementation for DG
- Centralized Air Conditioner Implementation
- Exhaust Duct Design change for Paint Shop
- Paint Wastage reduction through automation

DAILY EMISSION DATA UPDATED TO PUBLIC VIEW IN FRONT OF THE FACTORY GATE

9. Waste Utilization and Management

Sl.no	YEAR	Type of Waste Generated	Quantity of Waste generated (MT/Year)	Disposal Method
1	2021-22	Hazardous Waste	10553	➢ Hazardous Waste Sent to TNPCB authorized Vendor ➢ Solid Waste sent to Scrap Dealer through Auction
		Solid Waste	153440	
2	2022-23	Hazardous Waste	24834	
		Solid Waste	182728	
3	2023-24	Hazardous Waste		
		Solid Waste	194806	

Chemical Consumption reduction through Chemical Change in Phosphating Plant – Concept finalization under progress

Hazardous waste

- ***Paint ,Phosphating , ETP ,Oil Soaked Cotton waste***

Solid waste

Metal Scrap from process , Alu. Oxide

Complete Waste Management carried out through Eco Track System, NSK Portal

9. Waste Utilization and Management

Waste	Conversion	UOM	Qty	Utilization	Before	After
Used Hydraulic Oil	Recycle & Reuse	Ltr per Year	1800	Used oil sent to Refiners for filtration		
Carton Box	Change to PP Reusable Box	MT	47.86	Model VECV LD & AL MBP G91 Model		
Paper	Elimination through I 4.0 & Google forms	MT	2.8	Work Permit , PO,PR , Near Miss and SBO		
ETP Permit Water	DM Water plant Installation	Ltr per Day	3200	Reusing for Phosphating Process DM water Tank	-	
Drinking RO Rejection water	Reuse	Ltr per Day	1000	Rest room flushes	-	

10. Green Supply Chain Management

Green Procurement Policy

Rane NSK Steering Systems	STANDARD OPERATING PROCEDURE	Doc No.: CPUR SOP-S2 Rev No.: 0 Date: 10 Apr 2017 Page No.: 1/1
	Green Procurement	

PURPOSE: To check supplier's Environmental Safety Status

SCOPE: To control Harmful Substances Waste in environment

RESP: Role holder for the position

PROCEDURE:

1. Use the template "NSK Environmentally harmful Substance Management System Ver.1.2(Apr.2014)" for referance.
2. Send NSK Environmentally harmful Substance Management System Ver.1.2(Apr.2014) check sheet to all supplier for self evaluation.
3. Get the check sheet filled from suppliers.
4. Plan Audit accordingly with suppliers.
5. Visit the supplier with self evaluation sheet and verify the same with all other required documents (Refer GP FORMS & FORMATS CHECK SHEET (Ver. 01))
6. Get the NSK Form 1, Form 2 and Form 3 filled from the supplier (Refer NSK Group Green Procurement Standard Edition E001)
7. Compile the report and share it with the department heads.

Reviews and approvals:

1. Reviewer to review the report.

Sl.No	Rev.level	Rev.Date	Rev.Details	Updated By

Prepared By	Approved By
Kanwaljeet Singh	ManojMalkothra

Supplier Evaluation Sheet

Rane NSK	PROCESS AUDIT CHECK SHEET		Format No Q4321-F04-1CQA-R401-4 Rev.No 00 Rev.Date 01.04.2023
Supplier Name :	Advance Forgings	Part Name :	Double Carden Joint Yoke
Supplier Address :	Advance Forgings Pvt Ltd. Faridabad	Part Number & Rev No. :	B11364 yoke [Rev-00] B11115 yoke [Rev-B]
Vendor Code :	28298	Audit Date :	29.03.2024

S.No	Class	Audit Items	Comments	Point
1	R/M Sub-Vendor Control	Check if R/M, BOP & Consumable sources are as per declaration.	RM procured from the declared suppliers only. Verified found ok.	3
		Is incoming inspection adequate (availability of inspection standard & adequacy of frequency)	- Incoming inspection record updated on regularly. - Incoming inspection of RM is inadequate. Verified the MTC for B11364 Heat number available in the incoming report. Supplier Mill TC & 3rd party verification for every heat during incoming inspection.	3
		The supplier has clear process for traceability from raw materials to shipped goods. The supplier demonstrates visual factory management, allowing for FIFO inventory management.	- RM bar stored properly in the identified rack. - Dedicated place identified available for storing the forging materials received from suppliers.Storage area defined. - FIFO inventory management need to be improved.	2
		Are machine selection and process parameter ok (check against PCS)	- Process parameter verified in the Process Parameter PLC controlled. process as per the operating standard. -Process parameter [As per control plan] not checked & recorded. Parting height variable data not recorded.[Evident FH/FN/9.4.12]	2
		Check clarity of operation standard & correctness of display location.(Simple and pictorial)	- Operational standard clearly defined and displayed in the work stations. - Periodical sampling inspection and tool change timing (before and after)inspection performed & recorded.	3
		Check Tool, Fixture & work flow for possibility of part miss, wrong part, and wrong placement.	- Tools and fixtures are placed in the identified locations only. - Machining tool not periodical change as per decided frequency. Evident B11115 Eye bore data. U drill life 150 actual 190 used. U drill 2 life 300 actual 150 used.	1
	ess	The supplier ensures that all gauges are available for use as identified in the control plan. The gauge calibration and	- .Air gauge unit available for eye hole diameter.	

Year	Projects / Measures	Remarks
2021-22	VFD installed for Punching machine	Bench Mark from RNSS Press machine
2022-23	IE4 Motor – 2.2 KW implementation	During Supplier audit input from RNSS
2023-24	Carton Box converted to PP reusable Packing Box implemented	During Supplier audit input from RNSS

Expand the Green Supply Chain Activities

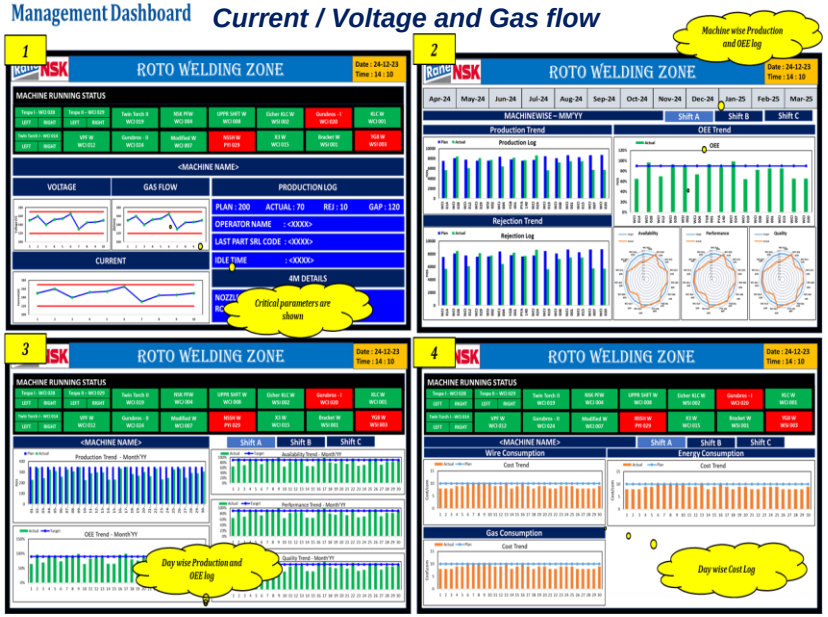
- ***Procurement – Eco friend practices***
- ***Work with Supplier to reducing the Carbon emission and Minimizing the waste***
- ***Sharing Knowledge about best practices***
- ***Environmental, Social and Governance performance monitoring***

11. EMS System and Other requirements

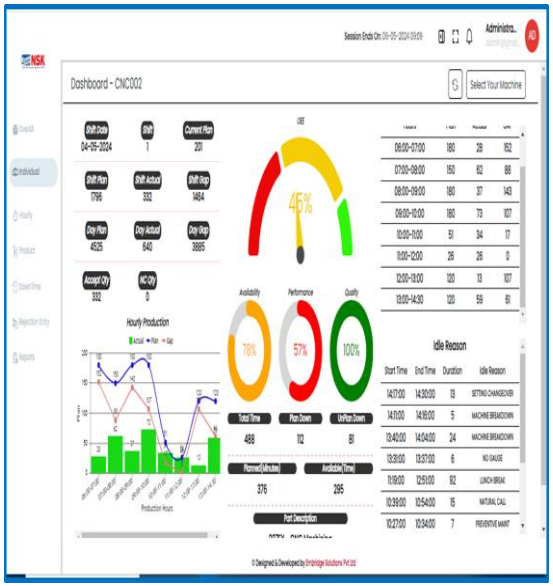
IOT BASED WELDING PARAMETER MONITORING

Management Dashboard

Current / Voltage and Gas flow



Plant OEE Monitoring



EMS Dashboard

Challenges

1. Integration with Machine
2. Data Capture
3. Hardware & Software Support
4. People Understanding

Upgradation

1. Old PLC & HMI upgraded to latest version
2. Panel Wiring Upgradation

Learning & Implementation from CII & Other Award program

1. Industrial Heaters replaced with Heat Pump from CII platform
2. External Temperature Controller implemented for Air Conditioners from CII

11. Implementation of ISO 50001 / IGBC rating

GreenCo Certification	Target	Status
GreenCo Certification	FY 2024 Q3	Mou Sign off with IWMA
ISO 50001	FY 2025 Q1	Under Discussion
Life Cycle Assessment	FY 2025 Q2	Under Discussion

Approach

- **Developing an Energy Management System.**
- **Continual Improvement Energy Management System.**
- **Facilitate a holistic approach to create environment friendly buildings.**
- **Improve indoor Environmental quantity enhancement.**
- **Calculate life cycle.**
- **Optimize water Usage.**

CII – 2022-23

Sustainability thro. Social Initiatives

LEARNING FROM CII

- Cross Company Learning
- Easy to implement Proven projects

GPTW Certified

Great Place To Work® Certified JUN 2024-JUN 2025 INDIA ™

DEMING' PRIZE FROM JUSE

QCC

Suggestion

Zero PPM Award

14. Environmental Initiatives….

Environmental Day Celebrations




Factory – Green Environment

Tree Sampling & Jute Bag Distribution to all Employees



Green Environment - awarness

Thank You

We heart fully thank CII for

- ***Giving us wonderful platform to learn and share our best practices***
- ***We have picked up many projects from CII and we have implemented in our plant and horizontally shared to our other three plants.***

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