CII National Award for Excellence in Energy Management - 25th Edition

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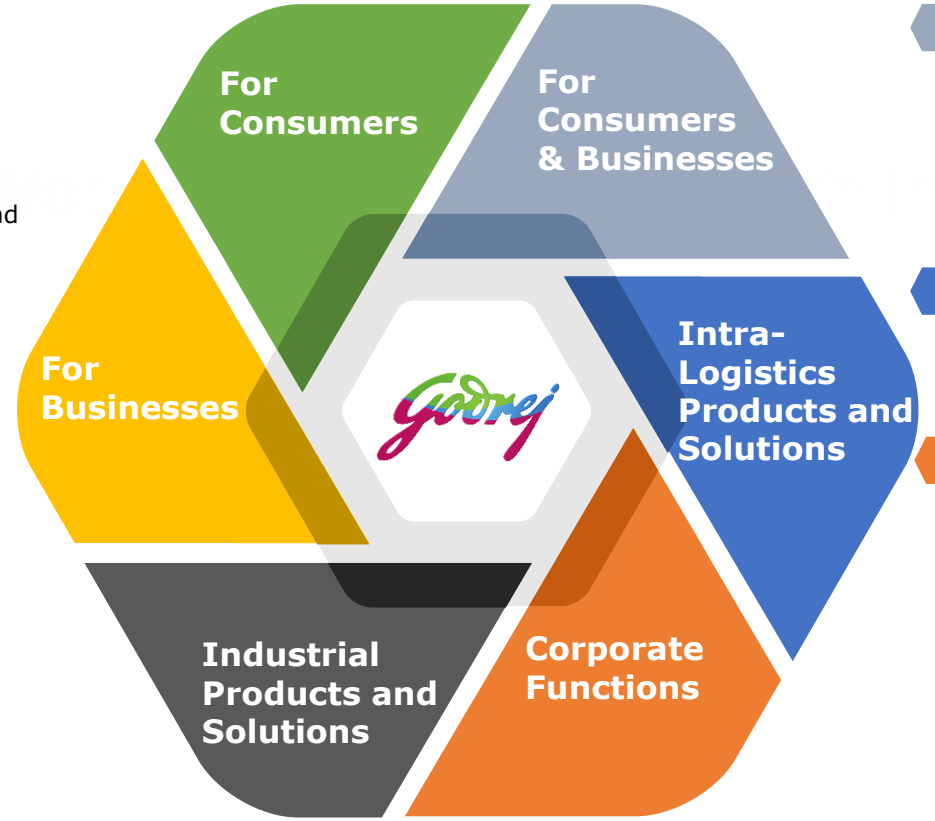
LAWKIM MOTORS

Godrej and Boyce- Who are we.....

Company Profile



- Godrej Appliances

- Godrej Electricals and Electronics
- **Godrej Lawkim Motors**
- Godrej Construction
- Godrej Prima

- Godrej Process Equipment
- Godrej Precision Engineering
- Godrej Aerospace
- Godrej Tooling

- Godrej Interior
- Godrej Locking Solutions and Systems
- Godrej Security Solutions

- Godrej Storage Solutions
- Godrej Material Handling

- Godrej Commercial
- Corporate Legal
- Personal and Administration
- G&B Finance
- Corporate Secretariat
- Internal Audit
- Corporate Business Excellence
- Brand and Strategic Insights
- Godrej Digital
- Corporate Business Excellence

G&B Lawkim Motors- Who are we.....

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CII Confederation of Indian Industry

Hermetic Motors

- Induction & BLDC motors for domestic & commercial refrigeration compressors
- Induction motors for unitary type and commercial air-conditioner compressors

Lamination & Components

- Laminations
- Stacks
- Wound stators
- Die-cast rotors

Specialized Motors

- Motors for Specialized application and General-purpose application
- Single phase & 3-phase motors

Calibration Services

- Calibration of working level and high-end measuring instruments
- Services include Electro-technical calibration, Flow calibration, Medical equipment calibration, etc.

Manufacturing Process

Punching → Annealing → Die Casting → Steam Bluing → Winding → QA Inspection → Packing → Dispatch

Press Shop

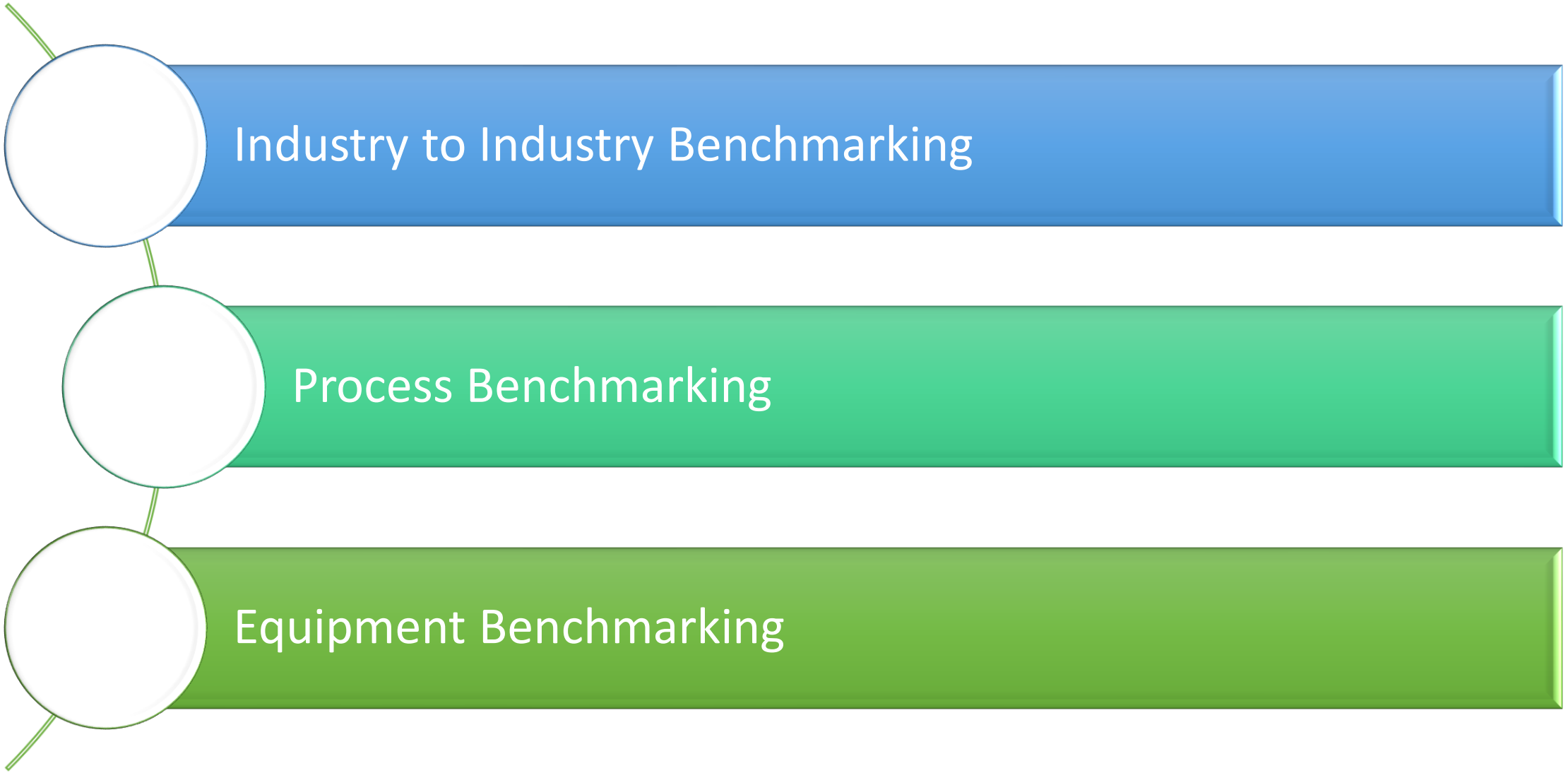
Annealing Furnaces

Diecasting

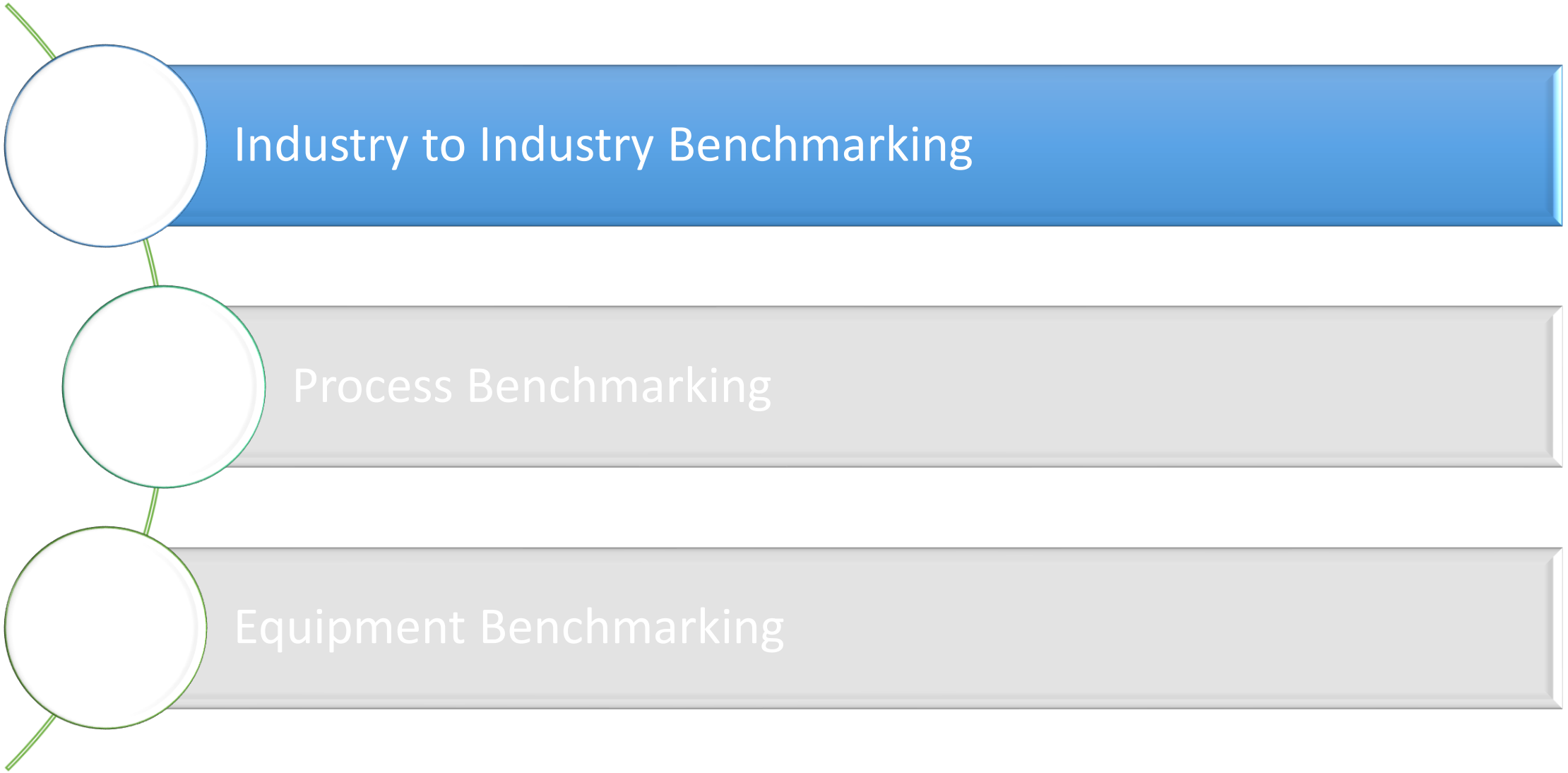
Steam bluing

Winding

Approach for Benchmarking

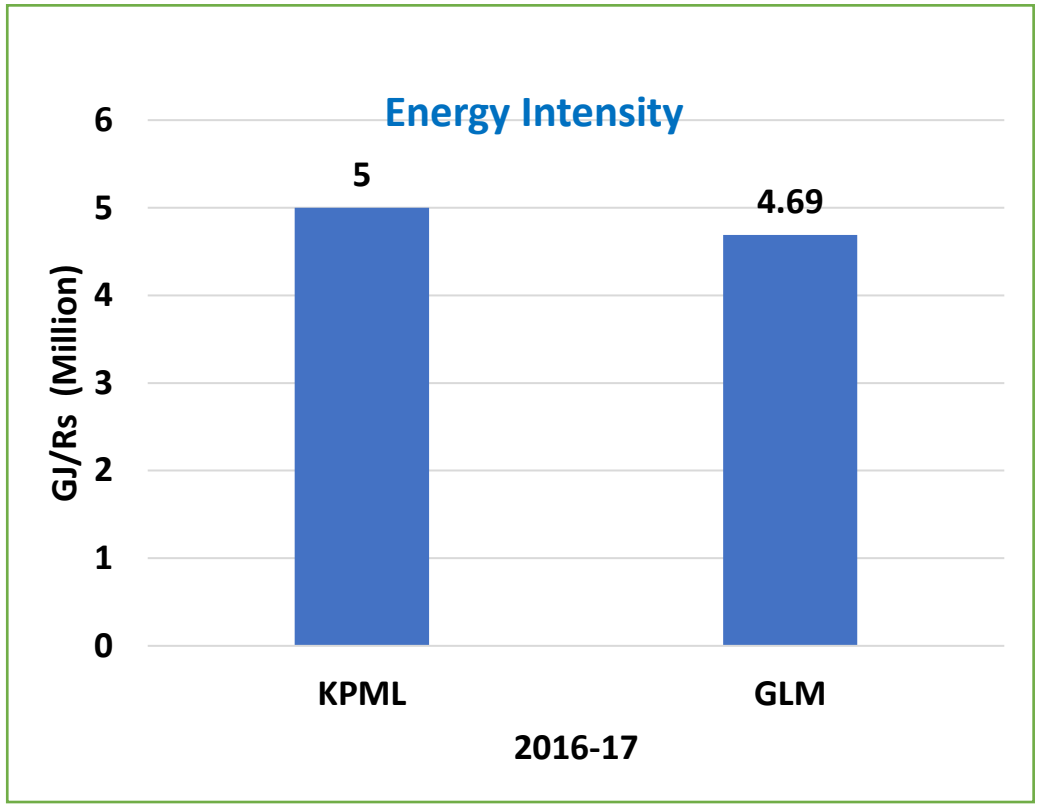


Approach for Benchmarking



Industry to Industry Benchmarking

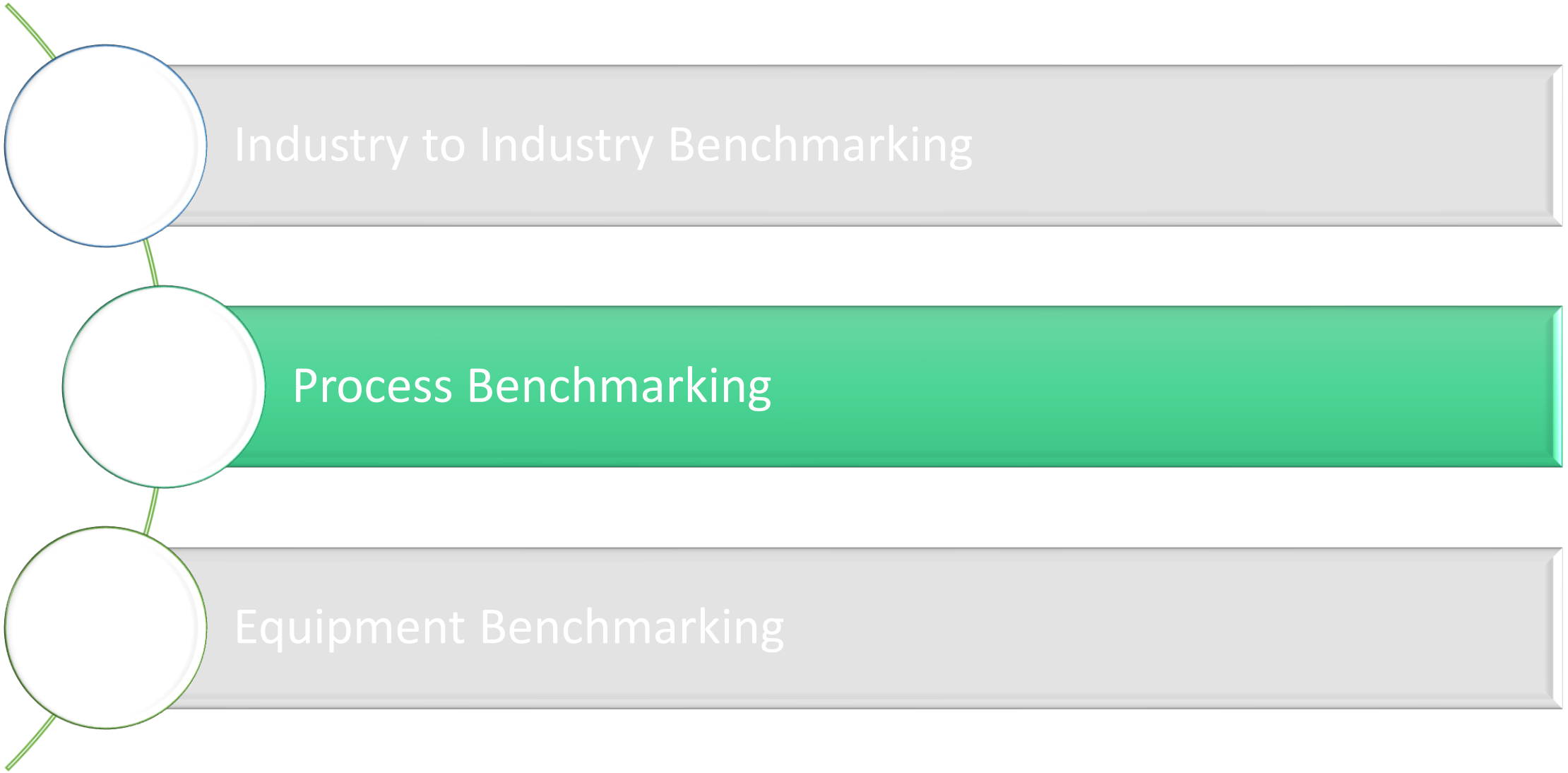
Comparison of Energy Intensity Benchmarking



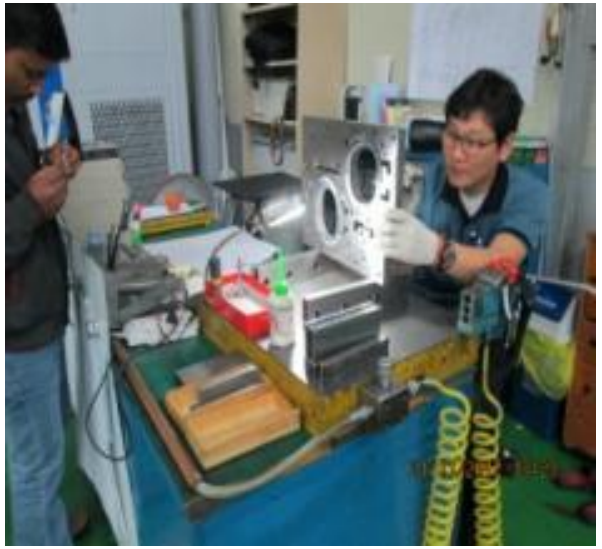
As per data available on Competitor website, we were able to benchmark ourselves with respect to FY 2017
Considering Base year as 2017, we have improved 35%.

Our division releases Sustainability Reports periodically. Recently it has been released at a Corporate Level

Approach for Benchmarking



Process Benchmarking



H系列C槽型模具（11509#）培训保养总结

Training for H series C slot die (11509)

2016.08.8~10

LAWIKIM: Sanjay Kamane Vijay

SHIC: Ping Xu

ZHENGYU: Zhiqiang Niu Jianding Wang

一 模具整体保养存在问题和培训

The question of die Maintenance

模具保养前检查：

Please check things as blew before maintenance:

保养前需测量刃口的总高度，检查凹模是否有爆口等不良处，如果凹模爆口深度大约0.15mm以上的，需更换部件或在凹模背面增加垫片，然后在整体研磨

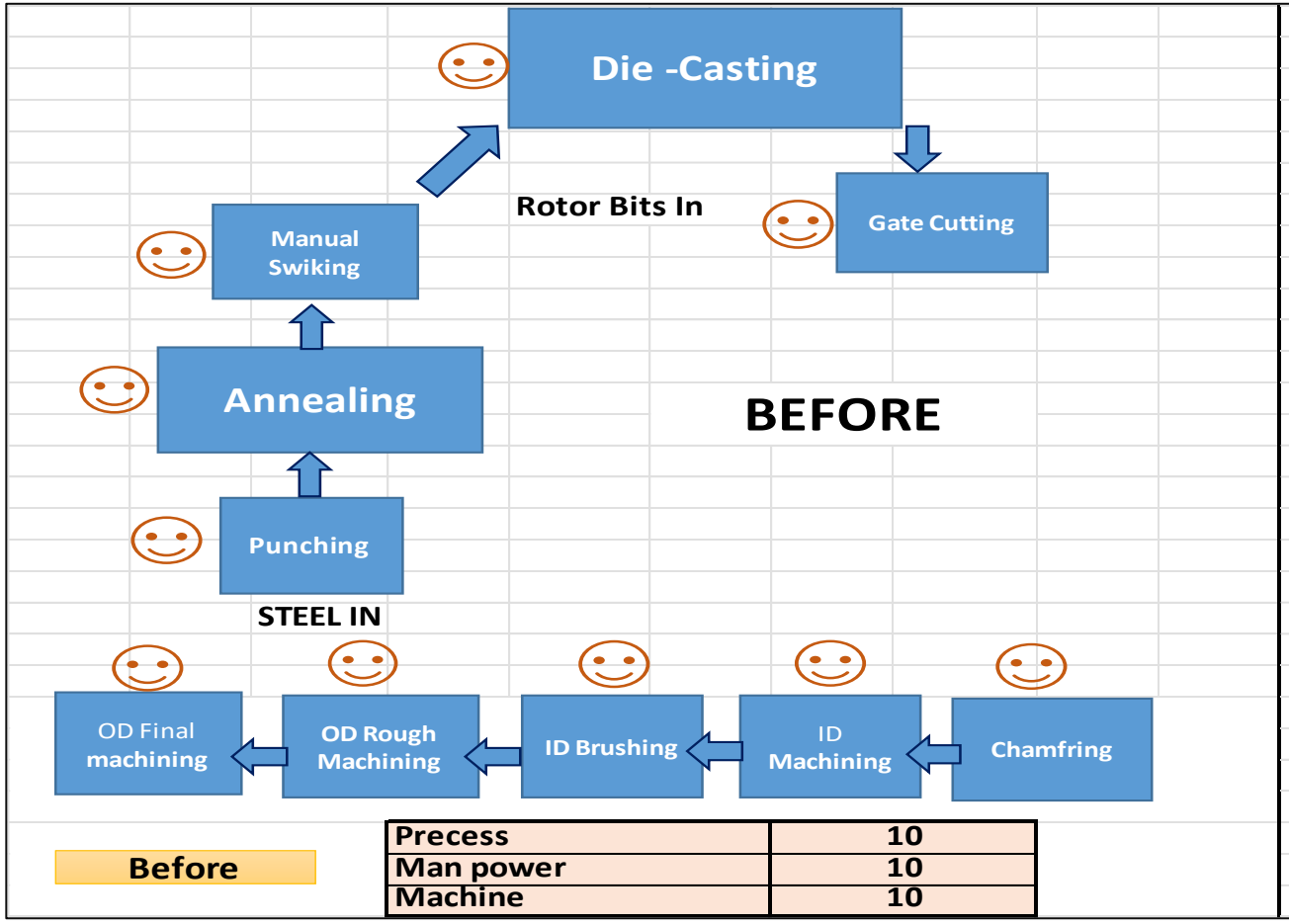
Measure the total height of cutting edge, check if any die section is chipped off, if the depth of chipped off is exceed 0.15mm, it should change the die section and put shim under it. Then grinding them together.

Example of Process Improvement – Development of Complex Tooling to Eliminate Post Processing

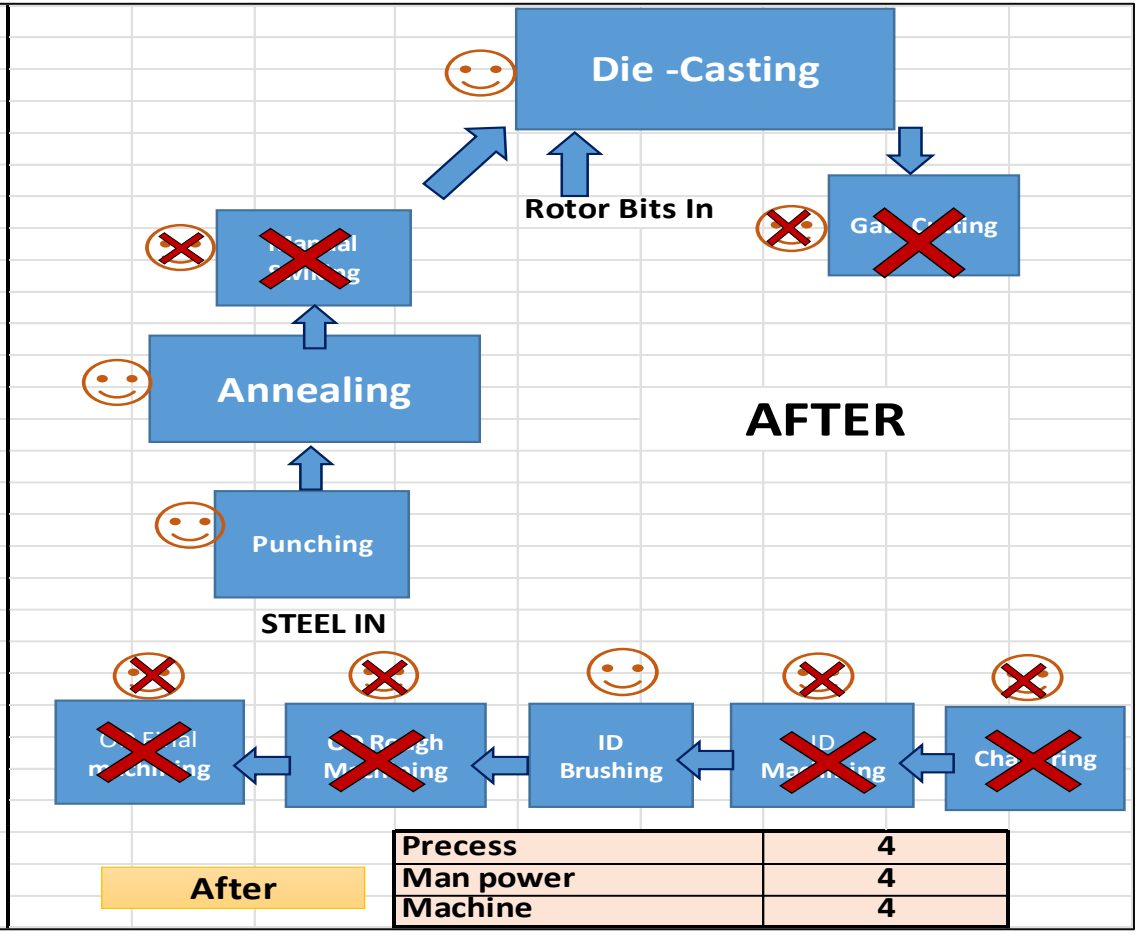
We are having best in class manufacturing flow by minimizing Production Process by Leveraging New technology with Comparison to others International Industries.

Process Benchmarking

Comparison of International SEC Benchmarking



Before	
Precess	10
Man power	10
Machine	10

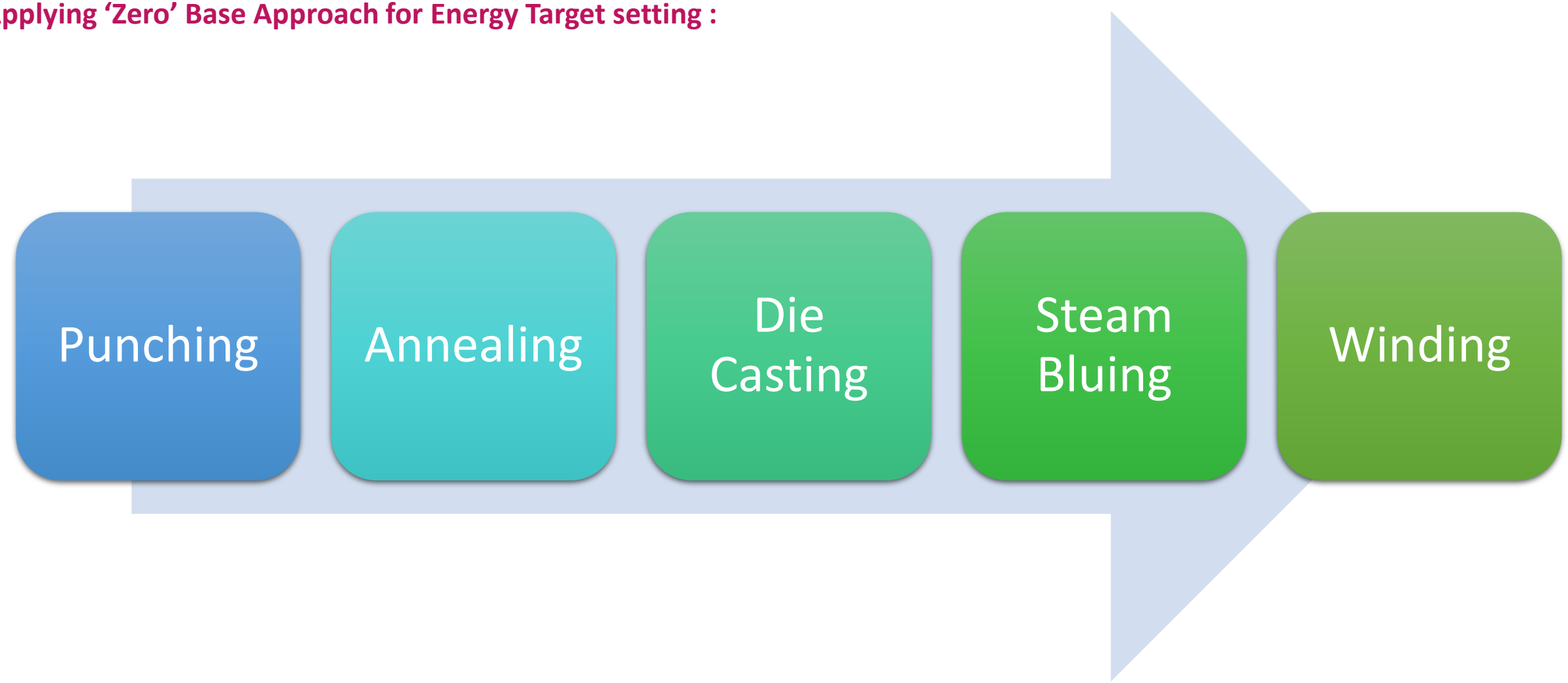


After	
Precess	4
Man power	4
Machine	4

We are having best in class manufacturing flow by minimizing Production Process by Leveraging New technology with Comparison to others International Industries.

Process Benchmarking

Applying ‘Zero’ Base Approach for Energy Target setting :



Process Mapping of the plant.

Process Benchmarking

Applying 'Zero' Base Approach for Energy Target setting :

Punching : Energy for Punching 1 Kg of Steel Press Machine Motor Rating = 40 KW Energy Required for running 1 Hr = 40 KWh Steel punched in 1 Hr = Avg 1 Tone. Electricity Used per Kg = 40 KWh / 1000 = 0.04 KWh / Kg **Energy Required for 1 Kg of punching = 34 Kcal**	**Die Casting :** Specific Heat of Aluminum = 887 J/Kg.C = 212 Cal/kg.C Heat Required for Melting 1 Kg of Aluminium = m x C x Δt = 1 x 212 x (680-25) Energy for 1 kg of Aluminum = 139 Kcal Average Ratio of Aluminum to Steel consumption= 3 % **Hence Energy of Aluminum Melting normalized to Steel Volume = 139 x 0.03 = 5 Kcal**
Annealing : Specific Heat of Steel = 490 J/Kg.C = 117 Cal/kg.C Heat Required for Annealing 1 Kg of Steel = m x C x Δ t = 1 x 117 x (780-25) **Energy for 1 Kg of Annealing = 81 Kcal**	**Steam Bluing :** Specific Heat of Steel = 490 J/Kg.C = 117 Cal/kg.C Heat Required for Steam Bluing 1 Kg of Steel = m x C x Δ t = 1 x 117 x (400-25) **Energy for 1 Kg of Steam Bluing = 44 Kcal**

Process Benchmarking

Applying 'Zero' Base Approach for Energy Target setting :

Winding :

Energy for Winding 1 Kg of Copper
Winding Line Avg Energy Consumption / Hr. = 45 KW
Copper Consumed in 1 Hr. = Avg 0.3 Ton.
Electricity Used per Kg = 45 KWh / 300
= 0.15 KWh / Kg
= 125 Kcal / Kg
Hence Energy of Winding normalized to Steel Volume = 125 x 0.08 = 10 Kcal

Utility & Other Fixed Energy Consumption :

Utility and Fixed Energy Consumption is around 10% of Total Plant Energy

Assumptions :
1. 1 KWh = 860 Kcal
2. Sp. Heat of Aluminum = 887 J/Kg. C (Source : https://theengineeringmindset.com/specific-heat-capacity-of-materials/)
3. Sp. Heat of Steel = 490 J/Kg. C (Source : https://www.engineeringtoolbox.com/specific-heat-metals-d_152.html)

First principles thinking

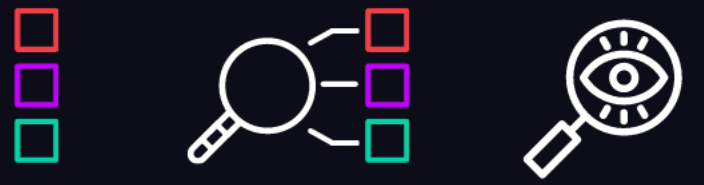
1 ASSESS THE CURRENT REALITY

- Observe
- Categorize
- Simplify

2 IDENTIFY THE FIRST PRINCIPLES

- Recognize key elements
- Understand
- Transcend

3 SHAPE A NEW REALITY



- Test new combinations
- Reintegrate
- New applications

Process Benchmarking

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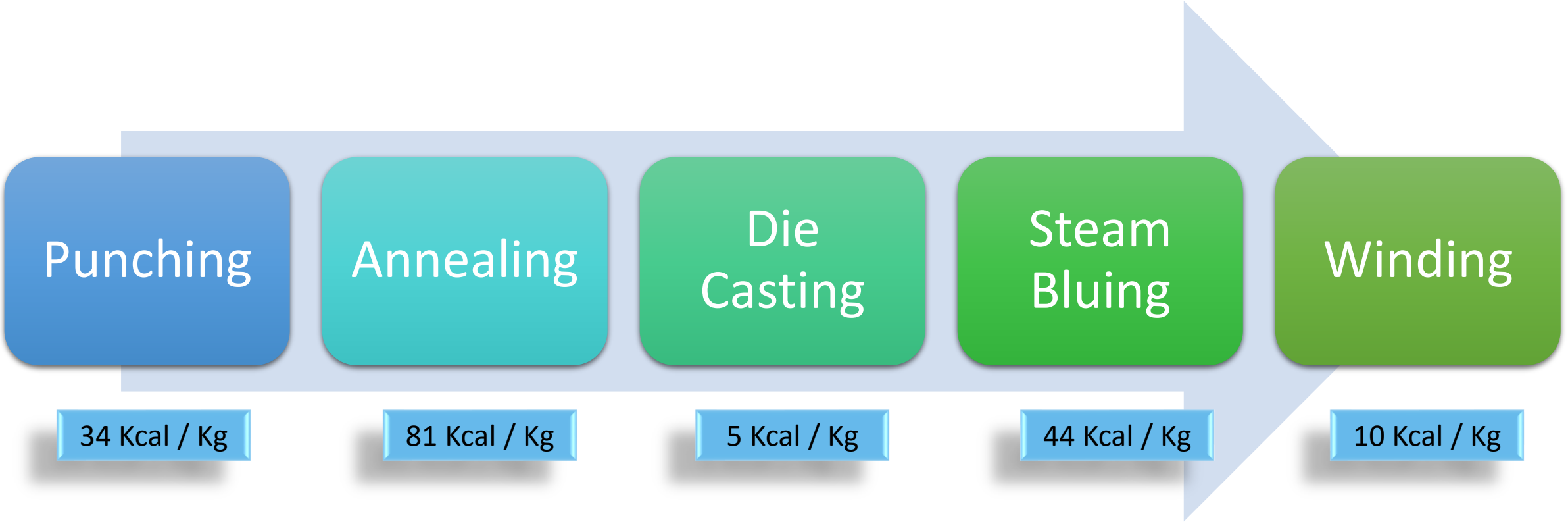
Applying 'Zero' Base Approach for Energy Target setting :



Total Energy required for processing 1 Kg of Steel Including Utility & Fixed Energy = 192 Kcal /Kg

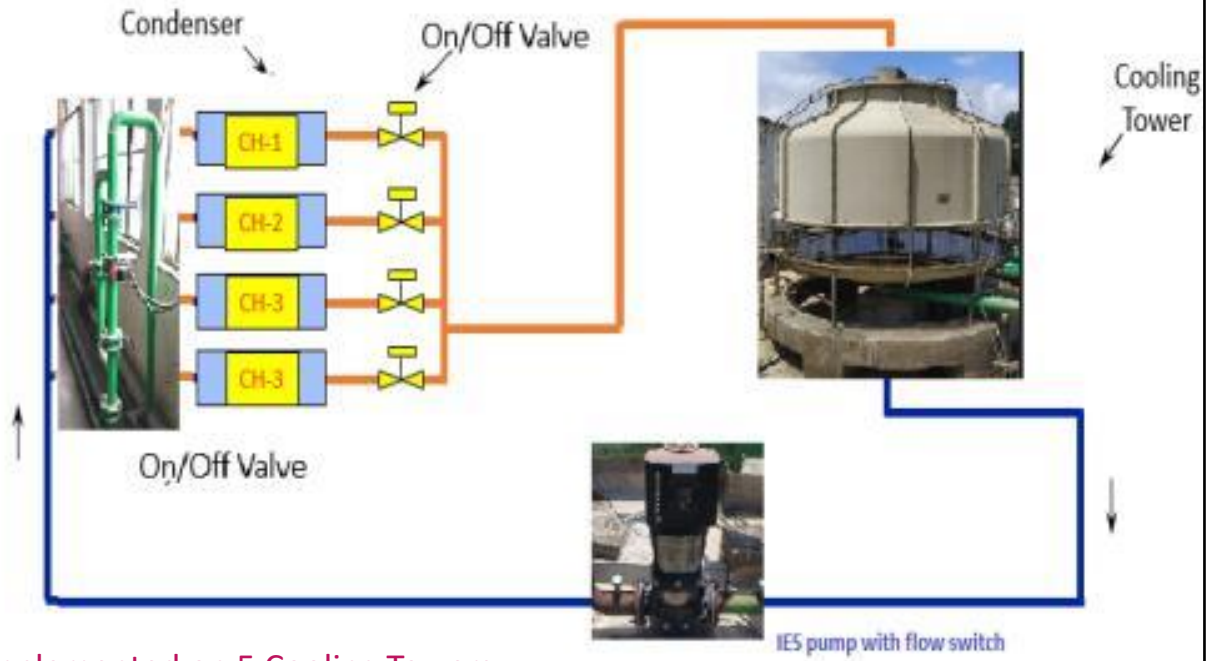
Calculating the Energy Requirement of the plant normalized to Steel Volume.

Process Benchmarking

	Levers	Can this be eliminated	Alternate process	Reduce Consumption	Increase Efficiency	New technology	Use of Renewable Energy	Reduce Variation	Use of exhaust energy	CBM	Maintenance
Mc / Process											
Press Machine											
Die casting Machine											
Air compressor											
Heating furnaces											
Alu Melting Furnace											
Welding Mc											
Air Conditioning											
Hydraulic Power Pack											
Blowers											
Lights											
Our Products											
Precision Turning Machines											
Boiler											
Coil Winding Machine											
Slot Insulation Machine											
Coil Insertion Machine											
Drift Machine											
Forming Machine											
Surge Machine											
Lacing Machine											
Varnishing Oven											
ETP and STP											

Selection of Energy Saving Projects based on Levers

IE5 Efficiency pump with auto on/of valve for cooling tower



Implemented on 5 Cooling Towers

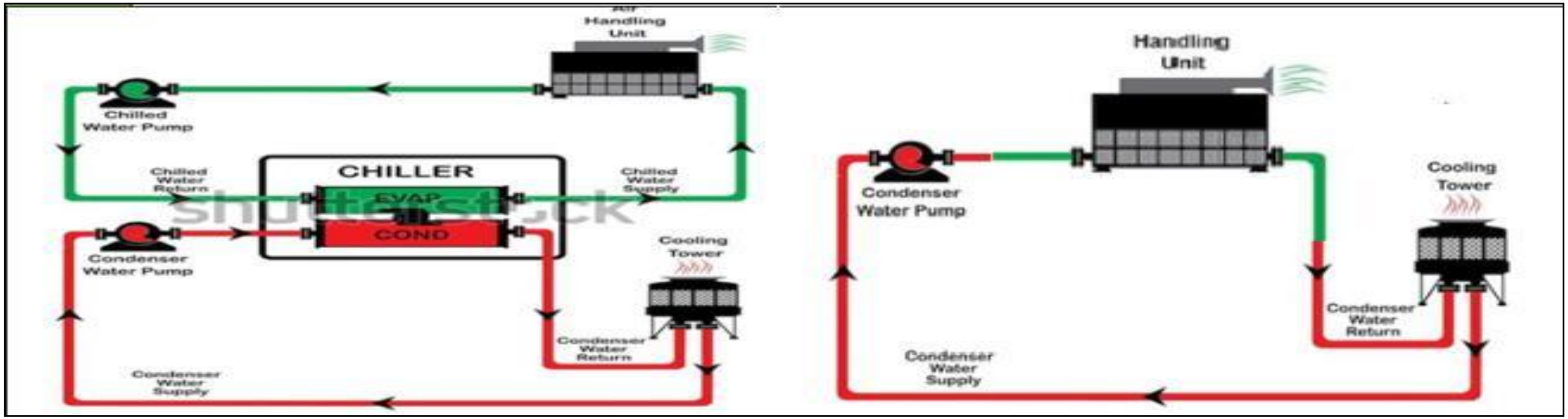
Benefits

INR 2.9 Lakhs / Year

0.29 Lakh KWh / Year

23 $MtCO_2$ / Year

Circulating Cooling Tower water through AHU



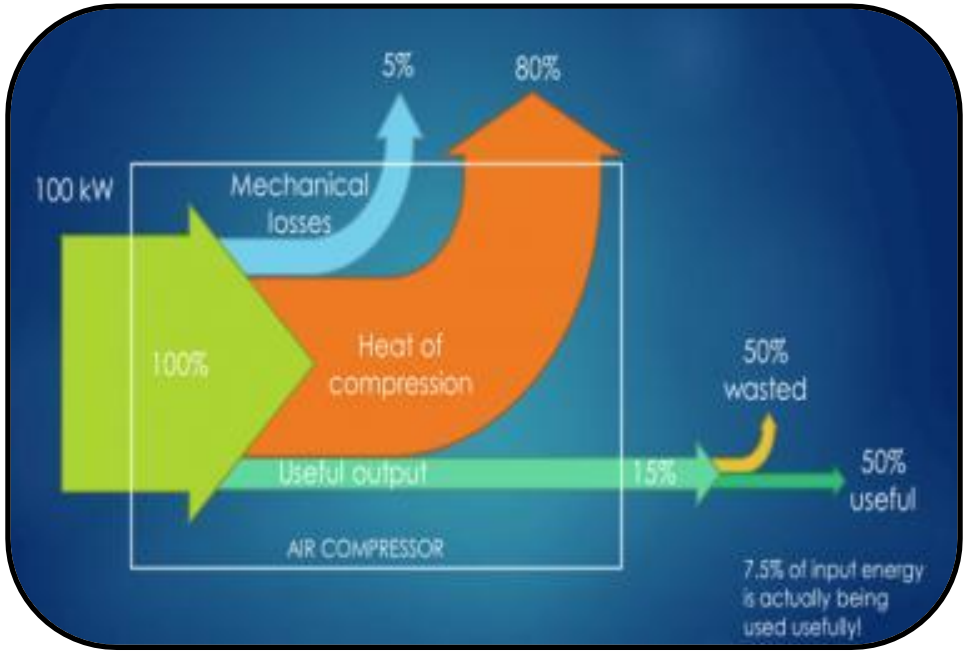
Benefits

INR 18 Lakhs / Year

1.8 Lakh KWh / Year

144 $MtCO_2$ / Year

Installation of Compressor Heat Recovery Unit



1. We have fitted Waste Heat recovery unit on one of our Air compressor.
2. Typically in an Air Compressor 80% of the energy is wasted in the form of Heat. Only 20% of the energy is utilized for generating compressed air.
3. The waste heat recovered from the compressor is used to heat water and this heated water is used for 3 applications.
   a. Ammonia Bottle Heating
   b. Boiler Feed water
   c. Canteen

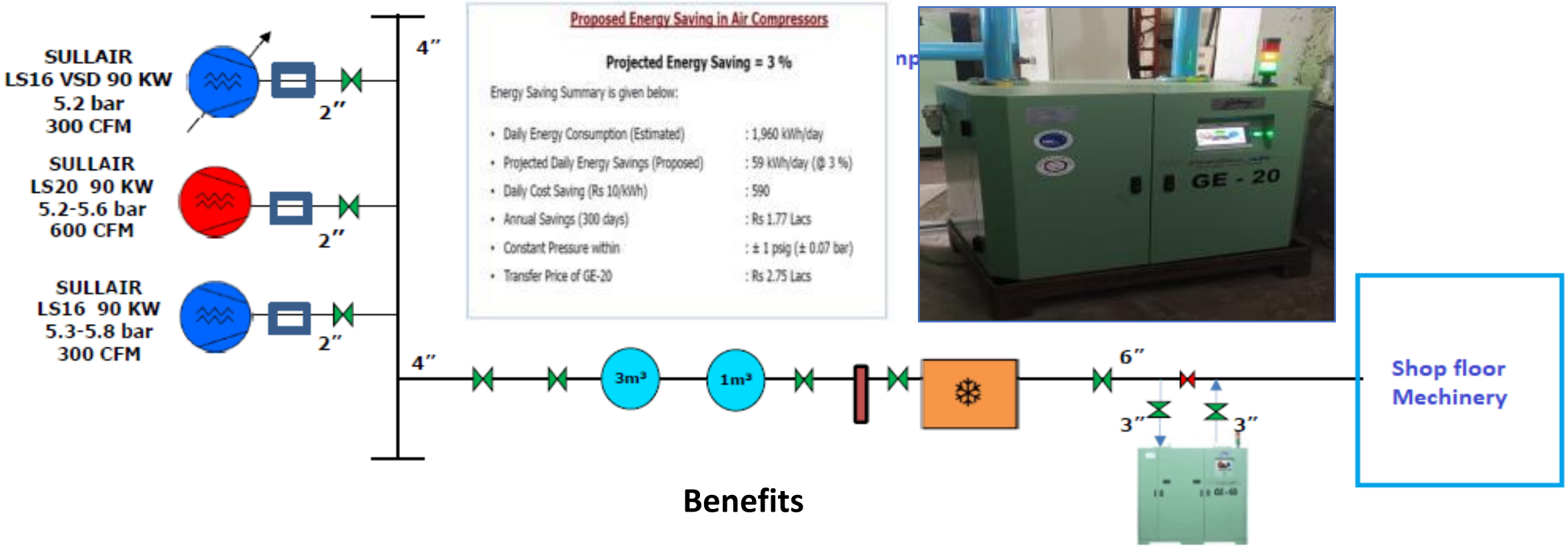
Benefits

INR 17 Lakhs / Year

1.7 Lakh KWh / Year

136 MtCO_2 / Year

IFC for Compressed Air line for Energy saving



Proposed Energy Saving in Air Compressors

Projected Energy Saving = 3 %

Energy Saving Summary is given below:

Daily Energy Consumption (Estimated)	: 1,960 kWh/day
Projected Daily Energy Savings (Proposed)	: 59 kWh/day (@ 3 %)
Daily Cost Saving (Rs 10/kWh)	: 590
Annual Savings (300 days)	: Rs 1.77 Lacs
Constant Pressure within	: ± 1 psig (± 0.07 bar)
Transfer Price of GE-20	: Rs 2.75 Lacs

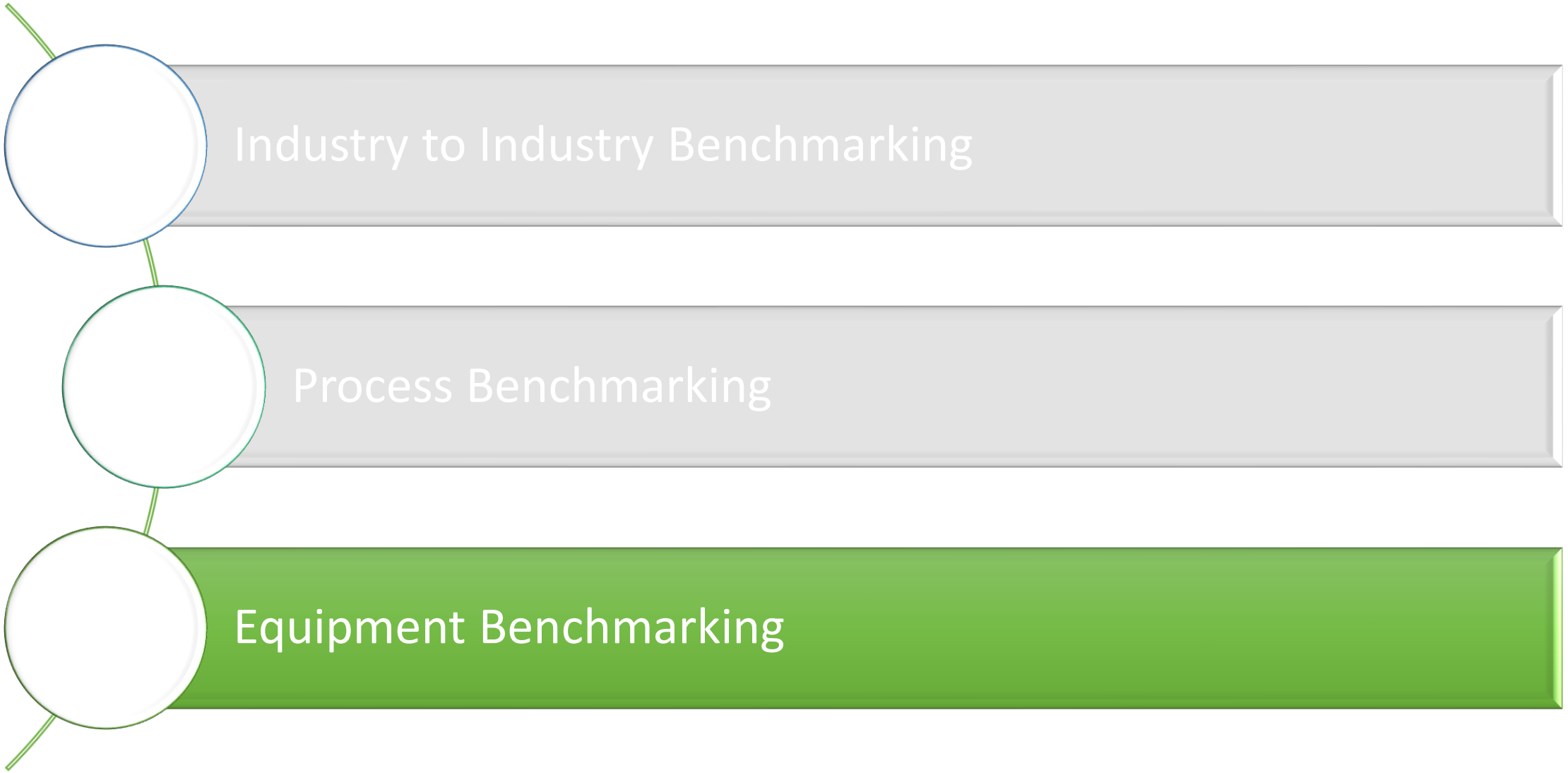
Benefits

INR 1.5 Lakhs / Year

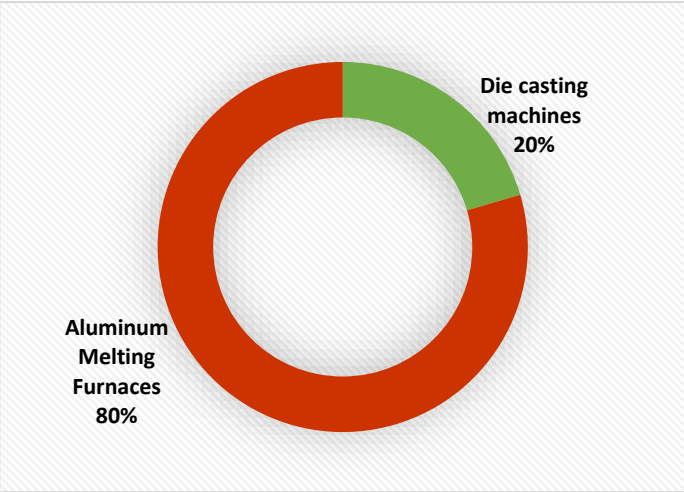
0.15 Lakh KWh / Year

12 $MtCO_2$ / Year

Approach for Benchmarking

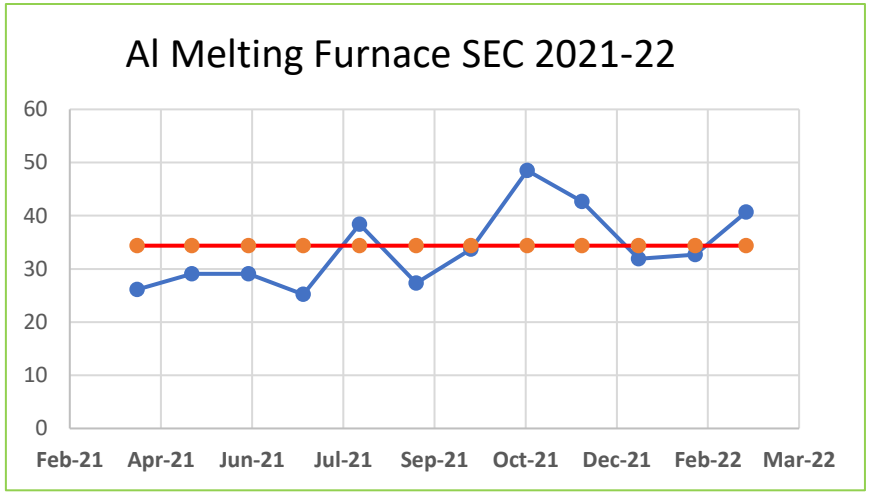


Equipment Benchmarking



Electricity consumed by Al Melting Furnace 80% of Total

63 KW Electric Furnaces
Total 10 Nos



SEC(KWh/MT) Trend of Electric Furnaces
Yearly Average SEC 44 KWh/MT against target 34.4

List Of SEU's														FR-MT-42-00			
Sr. No	SEU No	SEU	Location	EnPI	Target (Monthly) (5% Reduction)	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Avg
1	SEU-MT-2	Aluminium Melting Furnaces	Unit-1	KWh/MT	34.4	37.3	43.6	42.6	45.6	53.9	47.6	43.6	45.1	52.4	47.8	43.5	49.4	46

Variation of SEC of Aluminium Furnaces from 37 KWh / MT to 54 KWh / Mt.

Equipment Benchmarking

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D

DEFINE

- Launch Team
- Establish Charter
- Plan Project
- Gather the Voice of the Consumer
- Plan for Change

M

MEASURE

- Document the Process
- Collect Baseline data
- Narrow Project Focus

A

ANALYZE

- Analyze Data
- Identify Root Cause
- Identify and Remove Wastes

I

IMPROVE

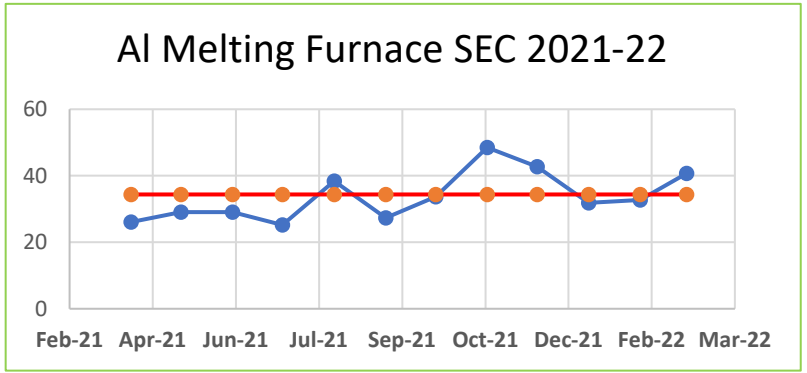
- Generate Solutions
- Evaluate Solutions
- Optimize Solutions
- Pilot
- Plan and Implement

C

CONTROL

- Control de Process
- Validate Project Benefits

Equipment Benchmarking

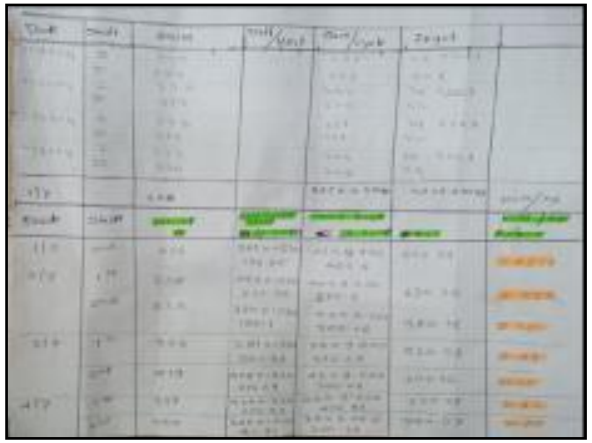


SEC(KWh/MT) Trend of Electric Furnaces
Yearly Average SEC 46 KWh/MT

Manual method Data Collection for capture the data

1) Energy data and production data captured by Manual method & calculate SEC of

Before data collection



Improvement In data Collection method

Data Collection through XL

1) Energy data and production data captured by maintenance dept. and production dept. separately in excel.

New Data Collection-

1) Energy data and production data capturing on single shared platform- MS Teams

Data Analysis-

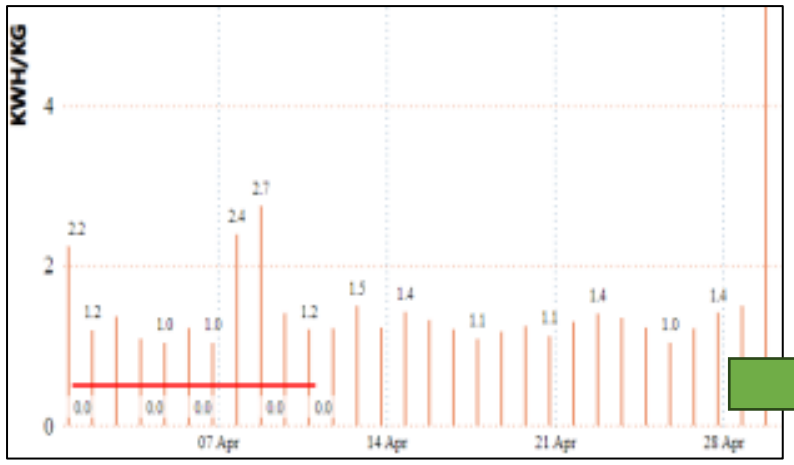
1) Started daily SEC capturing and analysis with MS Power BI Interactive dashboard.
2) Mail intimation of Daily SEC Report.

Data Analysis IOT Platform-

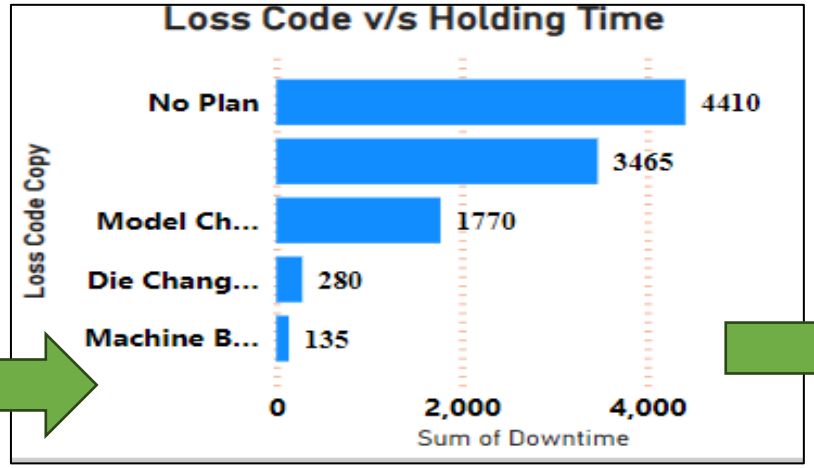
1) Started daily Consumption capturing through digital meter and automatic analysis in IOT platform

Equipment Benchmarking

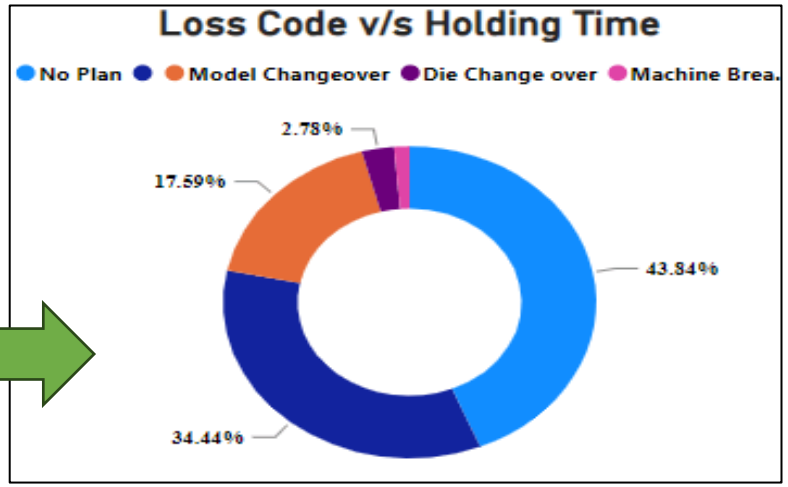
Daily Power Consumption w.r.t Production



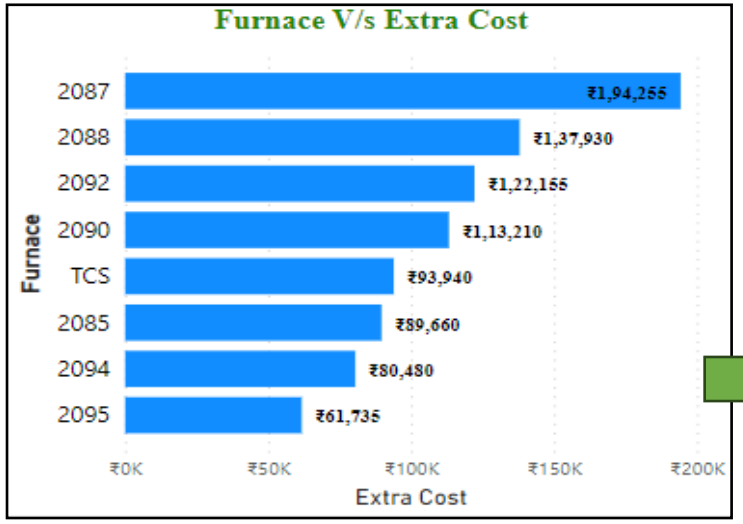
Energy Consumption w.r.t Holding



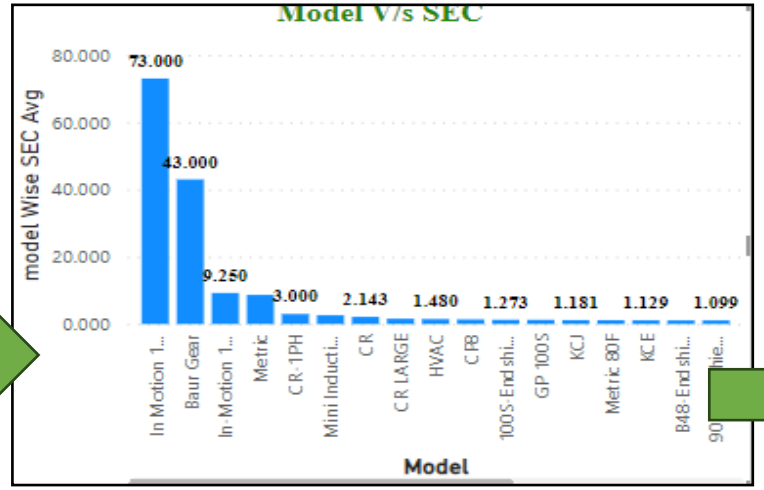
Holding w.r.t Loss code



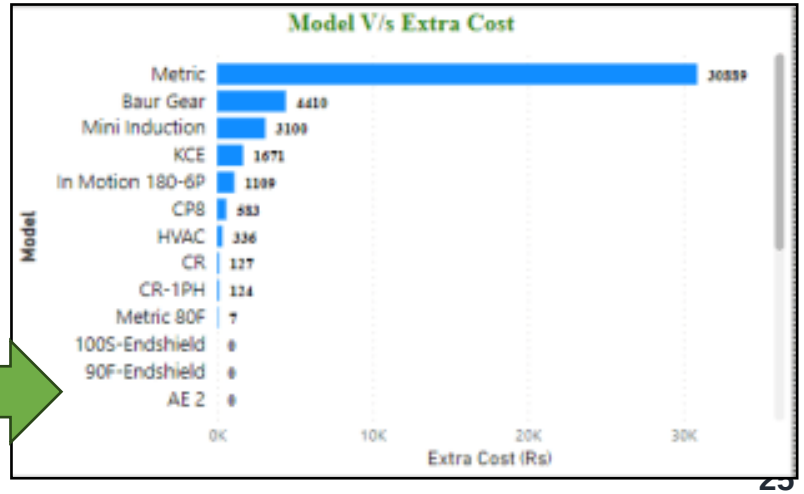
Furnace Extra Cost



Model Wise SEC



Model Wise Extra cost



Equipment Benchmarking

Identify Root Cause?

1- Cause and effects of improvement projects not clear.
2- No linkage between production and energy consumption.
3-Heat loss in Al melting furnace
4- Daily SEC Monitoring not present.

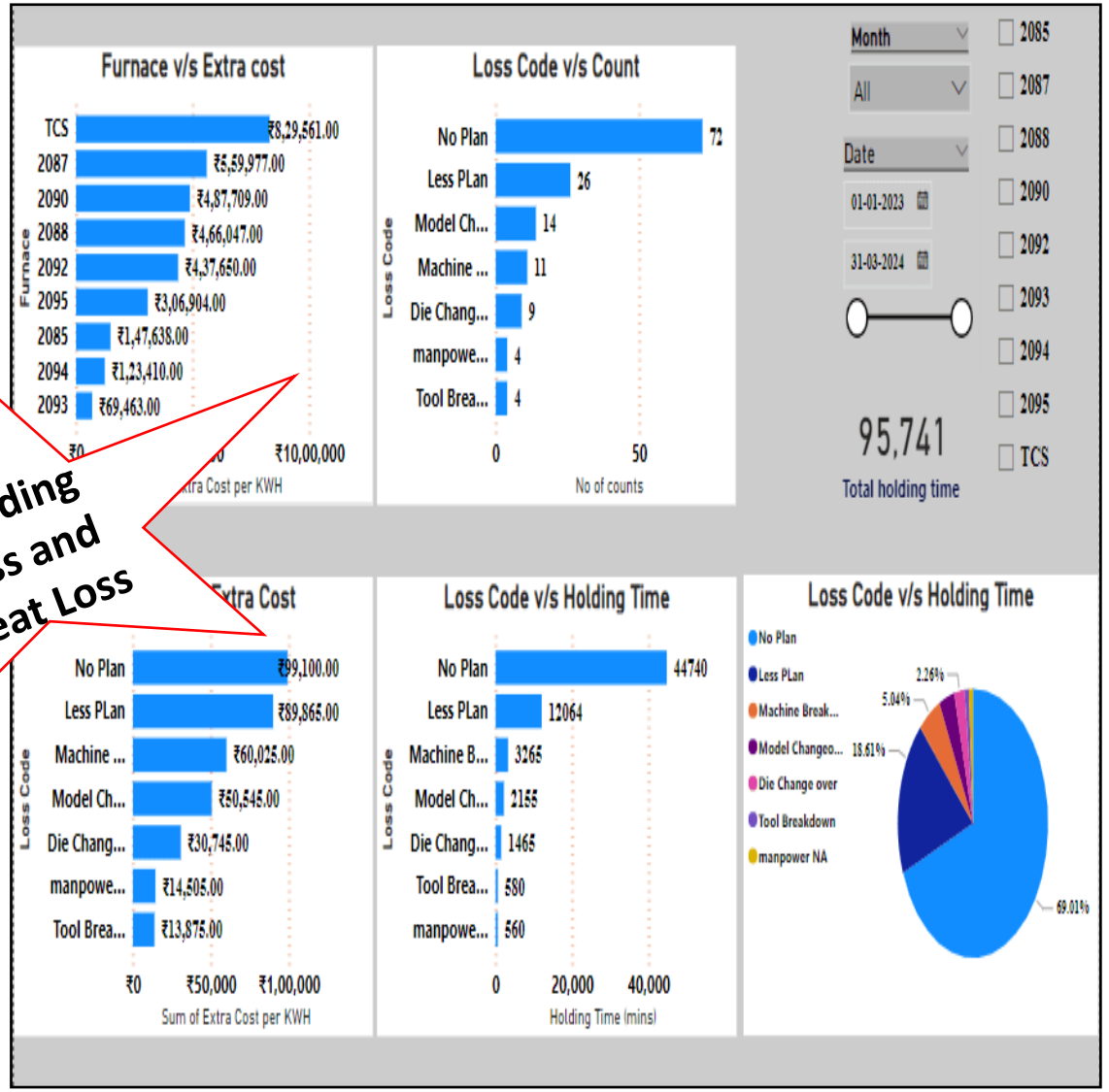
Solution

1-Centralized SEC capturing platform.
2- Project identification to minimize
3- Alerts on abnormal consumption.
4- Energy review and daily SEC report.

1) Cost wise SEC Dashboard- Help us to get the impact of poor SEC in business.

1) Loss wise SEC- Help us to focus on root cause and prioritize action plan accordingly.

Holding loss and Heat Loss



Equipment Benchmarking

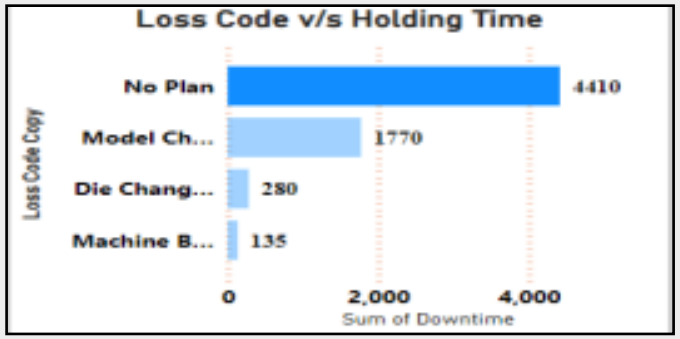
Implement Countermeasure

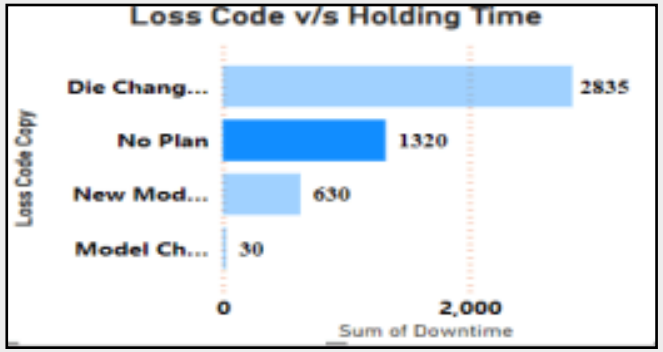
To reduce management Loss

Implementation on 05.08.2022

Reduce energy consumption by reducing management loss

Hold Loss Code	Action Plan
Less plan	In condition of less plan, we merge other plan on same machine for proper furnace utilization. On some cells like 2090 dc cell above action is not possible in such condition require full furnace capacity plan. In 2095 and 2085 we combine the production Will run machine with full capacity and cover plan and unload furnace
NO plan	If furnace need to be kept on hold due to no plan more than 2 days, we are unloading the furnace. To reduce holding time from 2 days to 1 day we are preparing data for required units to keep furnace on hold for 2 days and required units to getting required temp.after furnace fired.





Equipment Benchmarking

Implement Countermeasure

To reduce Die Change over Loss

Implementation on 5.05.2023

2. Elimination of excess die movement activity

- Problem –Die changover Losses is high.

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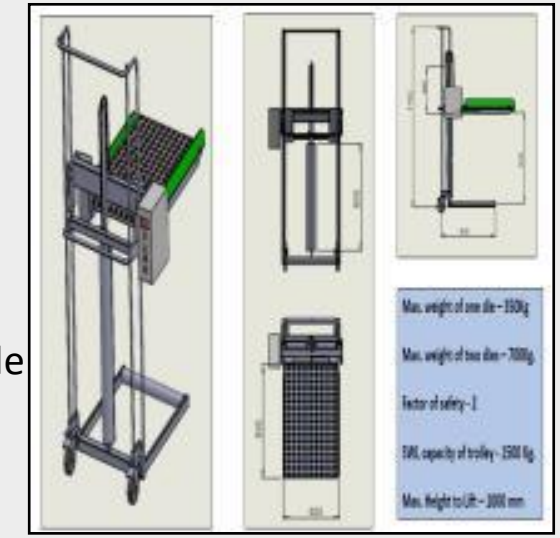
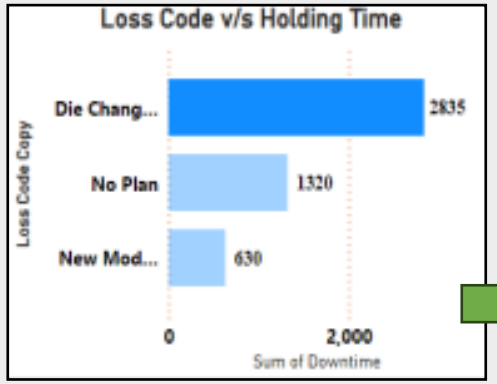
Solution –Implementation of hydraulic trolley to lift the die and load from front side of the machine



2. Result -Reduce die change over lead time **56 min to 17 min**



4. Benefits- Monthly **400 (KWh) units** saved per machine

Energy reduce by reduce Changeover process lead time

Equipment Benchmarking

Implement Countermeasure

To reduce Holding loss due to Breakdown

Implementation on 19.04.2023

Reduce Holding time of furnace- Modify Design of Heater.

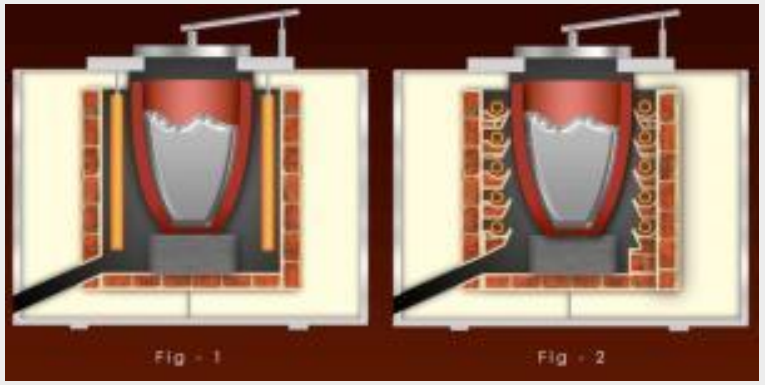
- **Problem –**
  1. During Breakdown/ PM/ TPM Furnace has to put on hold to do maintenance, As the heater design requires the ingot to be completely removed before operating.
  2. It takes 24Hr to replace heaters, including holding time, removing ingot, cool crucible (12Hr), overhaul, replace, assemble and heat furnace again.
- **Solution** – Using easy to replace heaters instead to conventional heater (installed vertical heater).
- **Results –**

1. Heater replacement time reduced to 1Hr
2. Holding time eliminated in case of breakdown/ maintenance.

- **Benefits –**

1. Heater can be replaced without removing crucible.
2. Increased in heating efficiency due to more surface area of vertical heaters.
3. Energy saving- Low power heaters installed 45KW (2.5KW*18) Before- 63KW (5.3KW *12 each), still no effect on the performance.

Machine priority –
1) 2088 Furnace- High Heater breakdown



Energy reduce by Modified furnace design

Equipment Benchmarking

Implement Countermeasure

To reduce Heat loss

Implementation on 19.03.2023

Improvement in insulation to reduce Heat loss .

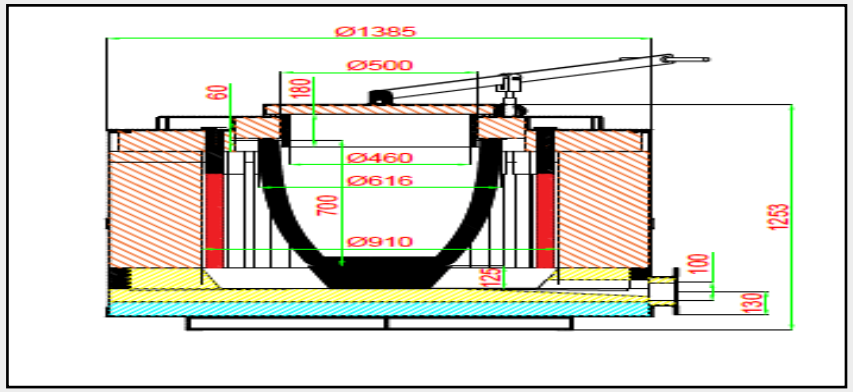
- Problem –Energy consumption increased due to
- heat loss

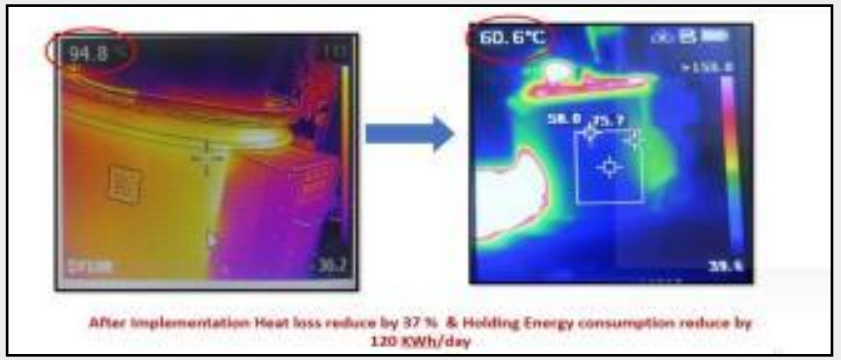
- Solution – Using Ceramic fibre blanket instead of bricks to reduce the heat loss of furnaces

- **Results –**
  1. Heat loss minimized from **90** °C to **60** °C
  2. Energy consumption decreased

- Benefits –
  1. Excess loss of energy saved.
  2. Energy saving- After implementation

Machine priority –
1) 2087 Furnace- Heat loss

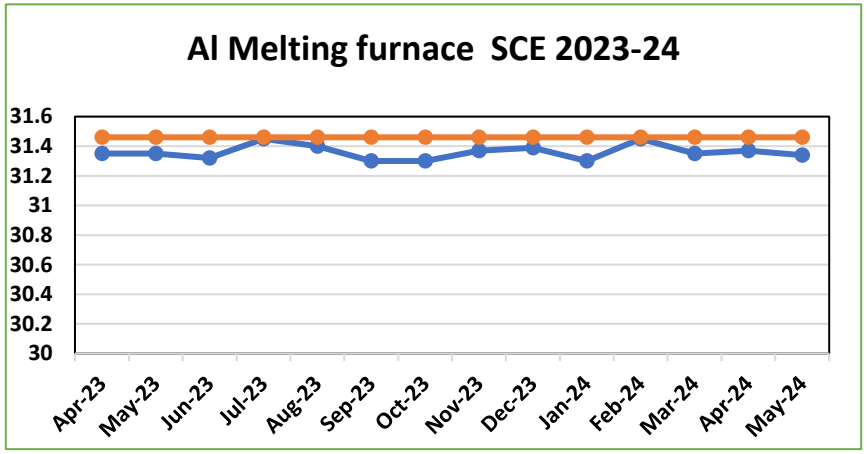


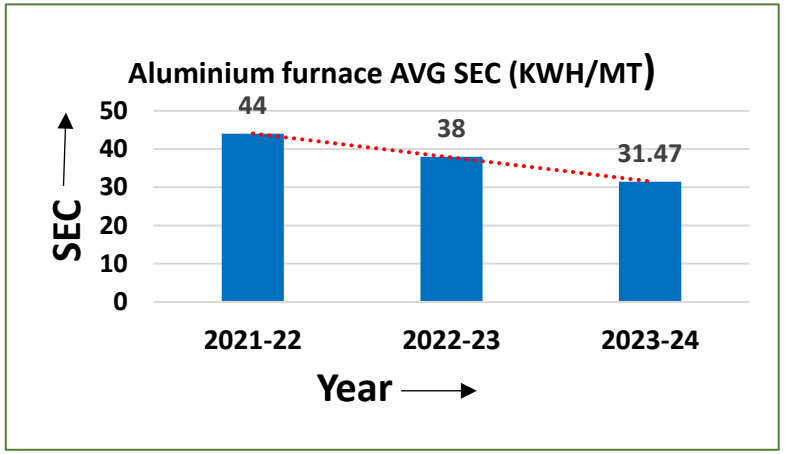


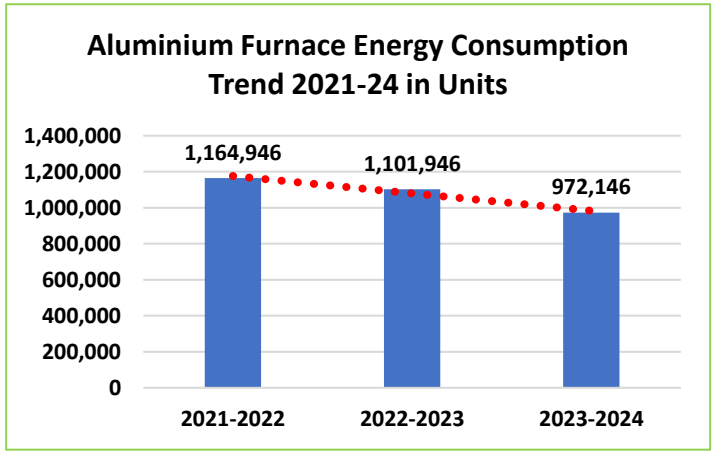
Energy reduce by Modified furnace design and materials

Equipment Benchmarking

List Of SEU's						FR-MT-42-00													
Sr. No	SEU No	SEU	Location	EnPI	Target (Monthly) (5% Reduction)	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Avg
1	SEU-MT-2	Aluminium Melting Furnaces	Unit-1	KWh/MT	31.46	31.35	31.35	31.35	31.45	31.4	31.3	31.3	31.3	31.39	31.3	31.45	31.35	31.37	31.4	31.4







Target SEC 31.46 (KWH/MT)
Yearly AVG SEC 31.47(KWH/MT

SEC reduce from 44 kwh/MT to 31.47 kwh/MT in three year

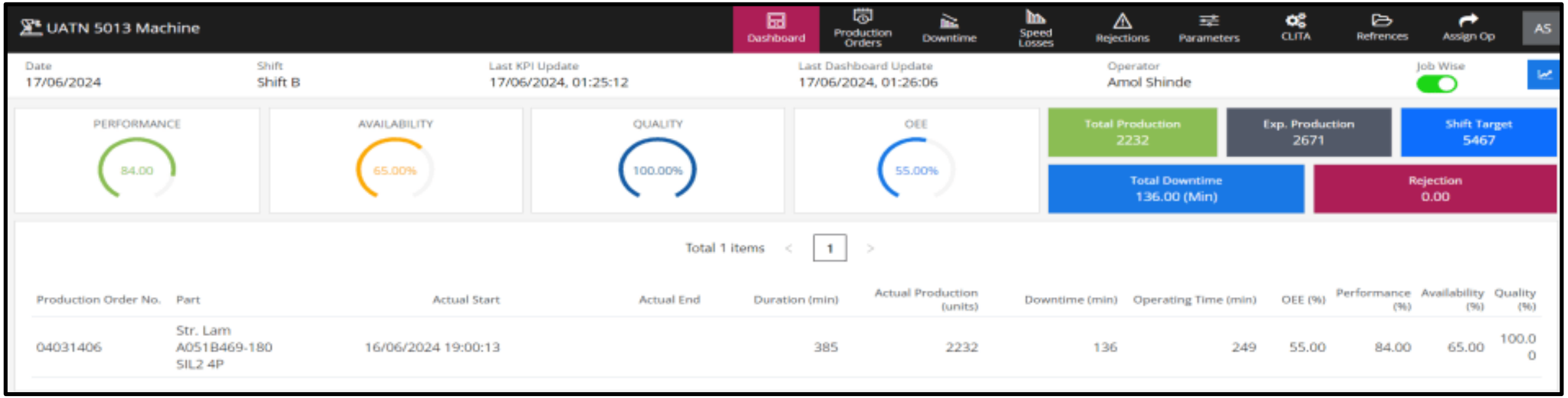
Total Electricity 1,92,800 (KWh) Units saved from 2021-2024

Total Amount saved approx. RS .19,28,000 /- from 2021-2024

Co2 Emission Reduction 39923 KgCo2 E

Workplace Temp Down 5 °C

Equipment Benchmarking – Near Future



Information on Competitors, National & Global benchmark

LAWKIM MOTORS

Projects FY 24-25: Energy Project

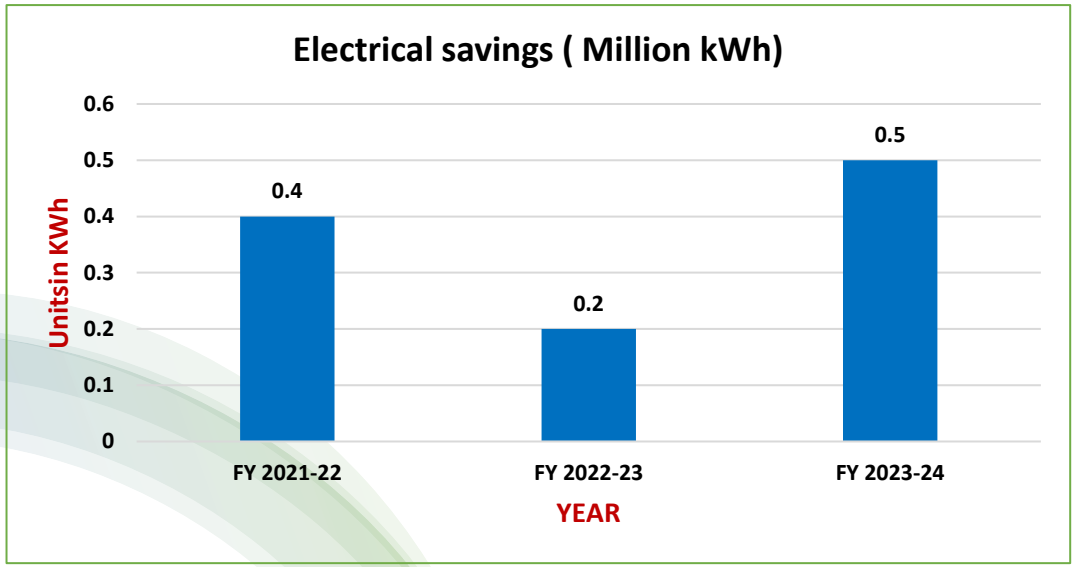
Confederation of Indian Industry

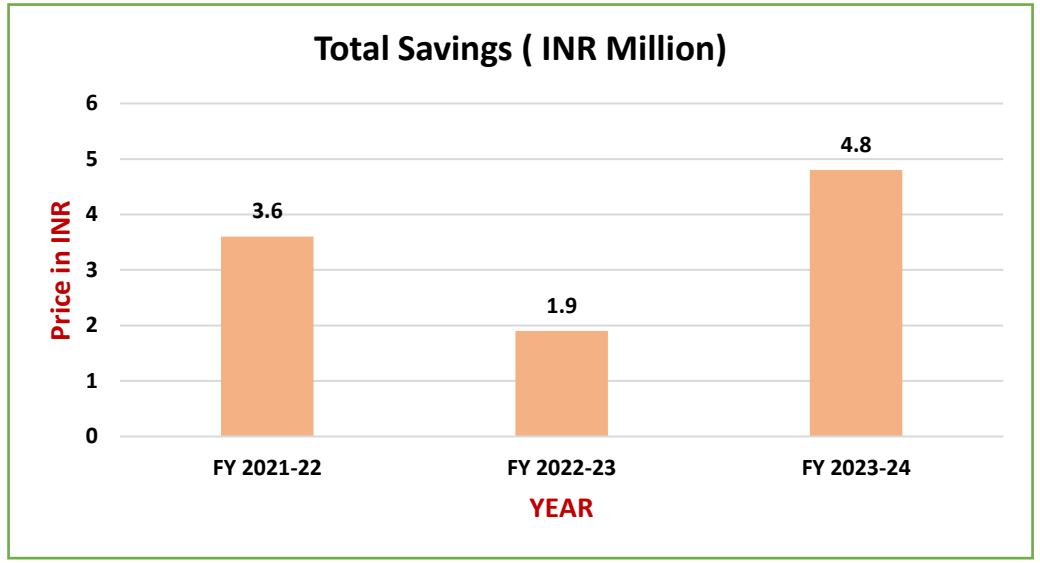
	Project	Electricity Unit Saving KWh	Investment in INR	Annual Saving In INR	Payback in Month
1	Circulating Cooling Tower water through AHU	40910.00	50000	450000	1.33
2	Energy Efficient motors IE5	19454.55	2000000	214000	112.15
3	Using Solar water for Boiler and Canteen	6045.45	50000	66500	9.02
4	Induction furnace for 2090 Die casting	120000.00	2500000	1320000	22.73
5	Energy Efficient Furnace for HPDC	65000.00	1200000	715000	20.14
6	Energy Efficvient pumps IE5 cooling tower	20000.00	1600000	220000	87.27
7	Furnace Heater circuit modification	18181.82	50000	200000	3.00
8	Portable Biogas	4745.45	200000	52200	45.98
9	ECO STP without electricity	30000.00	800000	350000	27.43
10	Electric Forklift	54272.73	1700000	597000	34.17
11	Energy edificant Ovens	10909.09	200000	120000	20.00
12	5001 straightner motor replacement with IE5	10000.00	39000	110000	4.25
13	Scarp Convy 1 & 2 motor replacement with IE5	10000.00	39000	110000	4.25
14	TCS AIR Chiller replace with Evaporative Cooler	14000.00	100000	154000	7.79
15	Annealing doors brick replacement	36363.64	500000	400000	15.00

Energy Savings Projects worth 4.59 Lakh units(KWh) saving planned in FY 2024-25

Energy Saving projects implemented in last three years

Year	No of Energy Saving Project	Investment (INR Million)	Electrical savings (Million kWh)	Thermal savings (Million Kcal)	Total Savings (INR Million)	Payback period (in months)
FY 2021-22	10	0.67	0.4	344.16	3.6	2
FY 2022-23	11	1.9	0.2	490.43	1.9	12
FY 2023-24	9	4.7	0.5	430.41	4.8	12





Energy Saving projects implemented in last three years

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Energy Saving Project Targets for FY 2021 -22

ENERGY SAVING PROJECT FOR THE YEAR 2021-22					
Sr. No-	**Description**	**Investment INR in Million**	**Savings INR in Million**	**Annualy Energy Saving In KWH**	**Pay back period in Month**
1	TCS Aluminum melting furnace door to reduce heat loss - 2 nos	0.05	0.54	0.06	0.09
2	Air saving speed controller for pneumatic cylinders to reduce air consumption during nonworking stroke	0.075	0.263	0.03	0.29
3	Use of Air amplifier for 4 number XLO od turning & 6 other machine to reduce consumption of air	0.1	0.081	0.01	1.23
4	VFD installation and pressure fine tuning with closed loop feedback system to 300 CFM air compressor at Bhavani	0.15	1.328	0.15	0.11
5	VFD installation and pressure fine tuning with closed loop feedback system to air compressor at Unit 2	0.08	0.172	0.02	0.47
6	Cooling tower fan motor temperature interlock - 5 nos.	0.026	0.237	0.03	0.11
7	Pit type furnace cage weight reduction	0.18	0.197	0.02	0.91
8	Aluminum melting furnace heat loss reduction for 10 furnaces	0	0.648	0.07	0.00
9	Vibration Analysis of bearings	0.012	0.171	0.02	0.07
10	Correction and monitoring of belt tension	0.001	0.034	0.00	0.03
		0.67	**3.6**	**0.4**	

Energy Saving projects implemented in last three years

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Energy Saving Project Targets for FY 2022 -23

ENERGY SAVING PROJECT FOR THE YEAR 2022-23					
Sr. No-	Description	Investment INRin Million	Savings INR in Million	Annualy Energy Saving In KWH	Pay back period in Month
1	Replacement Conventional fan with BLDC	0.1	0.045	0.050	2.22
2	Replacement of washroom exhaust fan with energy efficient fan	0.1	0.069	0.076	1.45
3	Replacement of streetlight with LED light / Solar Light	0.08	0.09	0.100	0.89
4	Utilization of 20 CFM Compressor at Unit-2	0	0.077	0.085	0.00
5	Booster for press shop	0.18	1.224	1.360	0.15
6	Ring type blower for Cold Plate component drying at Unit-2.	0.1	0.125	0.139	0.80
7	New Annealing furnace surface coating work to avoid energy loss	1.241	0.08	2.509	15.51
8	Air leakage arresting work which are inaudible to human by ultra sonic detection	0.001	0.096	0.106	0.01
9	Vfd based compressor pressure monitoring and setting adjusted	0.001	0.082	0.091	0.01
10	5002 straigtner motor Conversion of DC to Ac a	0.001	0.001	0.370	1.00
		1.9	**1.9**	**31.7**	

Energy Saving projects implemented in last three years

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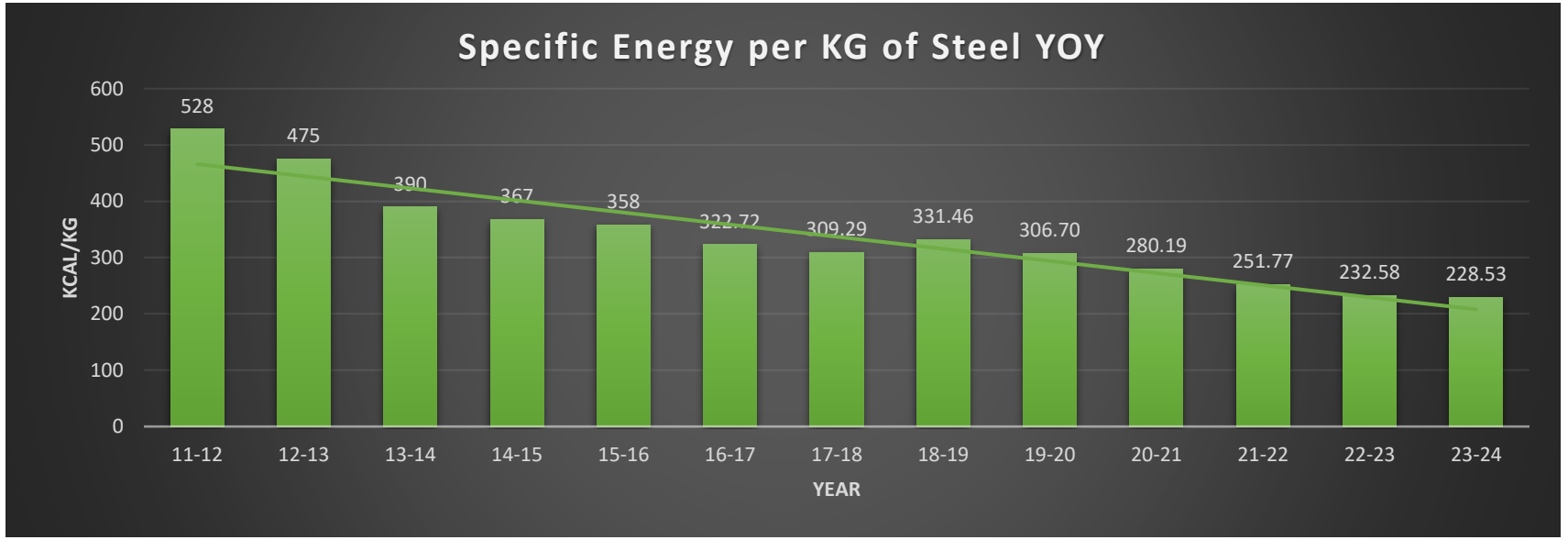
Energy Saving Project Targets for FY 2023 -24

ENERGY SAVING PROJECT FOR THE YEAR 2022-23					
Sr. No-	**Description**	**Investment INRin Million**	**Savings INR in Million**	**Annualy Energy Saving In KWH**	**Pay back period in Month**
1	Electric furnace modification to reduce power consumption	0.5	0.29	0.286	1.72
2	Replacing all annealing panel AC with SMC make Air dryer	0.7	0.29	0.290	2.41
3	Compressor Heat Recovery for Ammonia plant	2.1	1.7	1.700	1.24
4	Pneumatic job checking gauge interlock with solenoid valve and sensor	0.1	0.3	0.300	0.33
5	Replacement of existing air gun with energy efficient air gun	0.05	0.36	0.360	0.14
6	20 % reduction office and shop lighting by optimization	0.1	0.4	0.400	0.25
7	IE5 motor for Scrap Conveyer - 5 Kw	0.025	0.02	0.020	1.25
8	5001 Straightener motor change with new Panel (11 .5 Kw to 3.7 Kw)	0.25	0.58	0.580	0.43
9	5006 Straightner Motor change (7.5 Kw to 2.2 Kw)	0.2	0.37	0.370	0.54
		4.02	**4.31**	**4.3**	

Results

Specific Energy Consumption						
Year	**Annual Electrical Energy Consumption**	**Annual Cost of Electricity Consumption**	**Annual Thermal Energy Consumption**	**Annual Cost of Thermal Energy Cost in Rs**	**Specific Electrical Energy Consumption**	**Specific Thermal Energy Consumption**
Unit OF Measurement	**Million KWH**	**Million INR**	**Million Kcal**	**Million INR**	**KWh/Equivalent Product**	**Kcal/Equivalent Product**
FY 21-22	8.05	70.47	1,717.23	10.49	251.77	62417.57
FY 22-23	7.80	77.25	1,689.72	14.38	232.58	58556.57
FY 23-24	6.84	72.25	1,334.04	8.89	228.53	54174.55



Year on Year reduction in Specific Energy Consumption due to Energy Conservation Projects.

Utilisation of Renewable Energy sources (Onsite)

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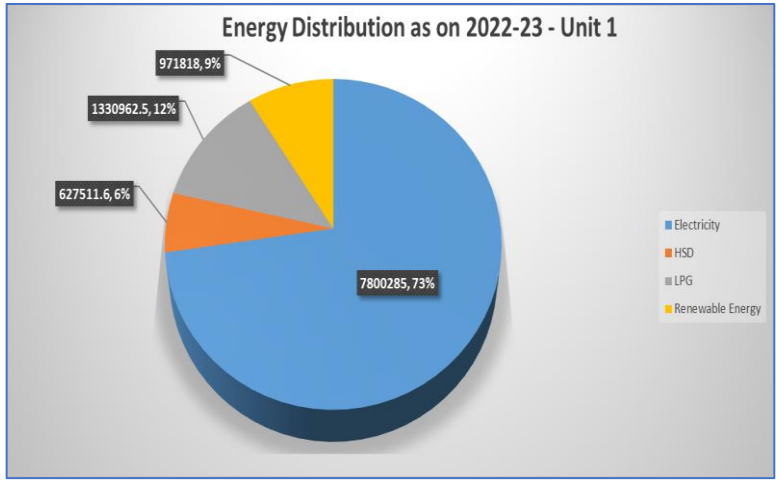
9% Contribution of solar renewable Energy in Total electrical and thermal Energy



Year	Source	Installed capacity	Capacity addition (MW) after FY 2021	Share % w.r.t to overall energy consumption	Solar generation % share in total	On- Site Renewable Energy Usage- Cumulative Target
2021-22	Solar	750 KW	0	0.96	12.20%	10%
2022-23	Solar	750 KW	0	0.97	12.46%	10%
2023-24	Solar	750 KW	0	0.96	12.50%	10%

Solar Roof Top System – 756 KWP Capacity.

Solar Street light Annual Potential units substitute- 3600 units

Solar Water heater for Dish washer

Utilisation of Renewable Energy sources (Onsite)

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Msg Long Term Guidelines

Renewable Energy Share in Total Energy

2020-21 Target	30%. Achieved 12%
2031-32 Target	**40 %**
Rationale for 2031-32 target	1. G&B has deployed rooftop solar units (7.15 MWp) at various mfg locations and is also in a third party Power Purchase Agreement (4 MVA). In certain locations G&B has also deployed Producer gas plants replacing the use of fossil fuel. However, due to process changes & outsourcing, challenges and non-uniformity in the RE sector policies, G&B has achieved 12% transition to Renewable by 2020-21. 2. The proposed trajectory is aligned to the Greener India targets & Science based decarbonisation pathway. 3. G&B plans its transition through Green Power purchase from DISCOMs mode beginning with its footprint in States like Maharashtra, Uttarakhand and later to other operational States. The impact of incremental tariff to source Green Energy shall vary with respect to the State DISCOMs which has been envisaged. Over the decade, a strategy change can be adopted based on various market factors and suitability to G&B

Classification:

After PPA Percentage of RE increase to 50 % of total energy consumption

Actions planned against target

Target Setting			
Sr.No	**Year**	**Target**	**Actions Planned**
Short- Term Target			
1	2024-25	16 %	1. Installation of Solar Water Heater for dish washer.-Project complete 2. Installation of 350 KWp Roof top solar Project on Process
Long- Term Target			
2	2026-27	50%	1. Plan to purchase 3 MW of Green power from Offsite location

Parameter	Unit	Green Mark	INTIGRIUM	ENRICH
Solar Project Capacity	MWP (DC)	2 (3 MW DC)	3	3
Price of the Project/mw	Rs. Lacs	13.5	15.3	132
Price/MWp	Rs. Cr	4.5	5	4.4
Estimated Power Generation per MWp	Lacs unit KWH	17,00,000	1710000	15,50,000
Estimated Power Generation from Project	Lacs unit	42,50,000	5130000	46.5
Cumulative Generation Deration over 25 years	%			
Open Access Losses	%	0.2	0.1068	3.18%
Operation & Maintenance Charges / MWp	Rs. Lacs	12	4	6
Total Operation & Maintenance Charges for the Project	Rs. Lacs	36	12	18
Anuual Escalation -O & M	%	3	0.05	5.00%
Free Period -O & M, if any	Year	NA	0	0
Tariff Realization -OA Sale	RS /unit	5.5	5.16	7.63
PPA Period	Year	25	25	25
Tariff Escalation Assumed	RS /unit		0	2.00%
Project Equity	%	4,05,00,000	30%	30%
Project Debt	%	9,45,00,000	70%	70%
Interest Rate -Annual	%	10	9%	8%
Loan Term	Year	10	8	7
Moratorium	Quarter		4	2

GHG Inventorisation

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Guideline from Director

Being cognizant of the need of sustainable growth and dwindling stock of natural capital, we commit ourselves to the attainment of the following Ten - Natural Capital Commandments.

1. **Reduce specific consumption of water and energy by 2 - 6% every year over next ten years.**
2. **Reduce specific generation of waste and reduce the quantum of waste going to land fills by 2- 6% every year over next ten years**
3. **Increase use of renewable including renewable energy by 2- 10 % every year in place of non-renewable over next ten years**
4. **Reduce emission of green house gas emissions and other process emissions by 2 - 6% every year over next ten years and explore opportunities through Clean Development Mechanism (CDM) and other Carbon Exchange Programs**
5. **Increase use of recyclables and enhance recyclability of resources embedded in the product by 2 – 10 % every year over next ten years**
6. **Increase the share of harvested rainwater in overall annual use of water by 2 – 10 % every year over next ten years**
7. **Incorporate life cycle assessment criteria for evaluating new and alternative technologies & products**
8. **Strive to adopt green purchase policy and incorporate latest clean technologies**
9. **Take lead in promoting and managing product stewardship program, by forging partnerships with businesses and communities**
10. **Reduce depletion of natural capital which is directly attributable to company's activities, products and services by 2 – 10 % every year over next ten years.**

We also commit to demonstrate attainment of these commandments in our pursuit to certifications such as ISO 9001, ISO 14001, ISO 45001, Eco Labels and the like.

Date : **Signature : Mr. J. N. Godrej**

CII Confederation of Indian Industry

Greener India Targets (wrt Base Year FY21-22)

INDICATOR	Proposed TARGETS (2031-32)
Energy Productivity (EP100 aligned)	+60 % (MVA/kwh)(In line with Carbon Intensity Reduction Plan)
Specific Water (all sources)	-25 % (kl/MVA)
Water Positivity	2 x
Specific Mfg. waste generation (for each Hazardous & Non-hazardous)	-25 % (mt/MVA)
Zero Waste to Landfill (Hazardous & Non-Hazardous)	ZERO
Carbon Intensity	+60 % (MVA/tco2e)
Renewable Energy Share in Total Energy	40 %
Net Zero Buildings (Non-Manufacturing - New or Retro fitting)	100 %
Green Supply Chain – GreenCo / SBTi (by Buy Value)	80% Value (Domestic)

GHG Emission Management System :-

In Lawkim we are in contract with M/s Sphera for carbon footprint measurement, in this we are using a online software SOFI tool.

We have assigned data point wise responsibility to cover scope 1, scope 2 & scope 3 emission. In this system for each points there are two persons.

Person		Responsibility
1. User	-	Data entry of assigned points
2. Approver	-	Validation and approval of data
3. Super Admin	-	Monitor Data & generate Emission reports from tool.

We enter data in SOFI tool and get carbon footprint report for our emission.

Based on the output report the action plans are prioritized.

GHG Inventorisation

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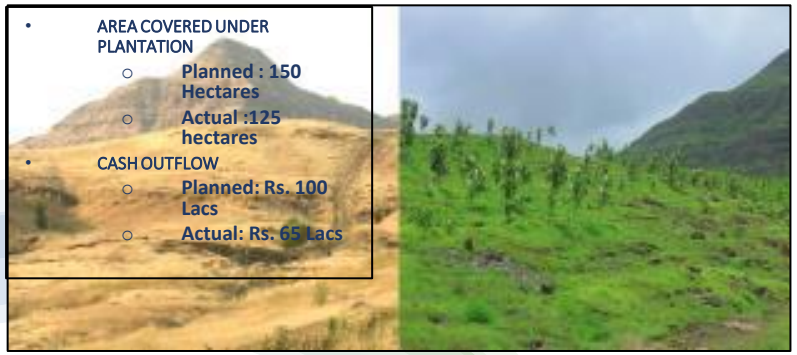
GHG Emission Intensity(FY 2021-24)

Scope	Data Parameters	2021-22	2022-23	2023-24
Scope 1Emmission	Kg CO2/Equivalent Product	18.84	14.45	13.07
Scope 2Emmission	Kg CO2/Equivalent Product	278.55	225.53	211.45
Scope 3Emmission	Kg CO2/Equivalent Product	716.756	439.31	494.82



Actions planned against target

Target Setting			
Sr.No	Year	Target	Actions Planned
Short- Term Target			
1	2024-25	18425 Mtco2e	1. Implementation of IE5 Energy efficient motor. 2. Installation of 1 Energy Efficient Furnace for Al Melting 3. Use of BLDC Fans & Exhaust fans in the plant. 4. Replacement of Old AC with 5 Star Inverter AC in Office Area. 5. Installation of Solar Tubes in Office Area
Long- Term Target			
2	2026-27	16214 Mtco2e	1. Diesel Generator convert from Diesel to LPG 2. 02 nos Diesel forklift replacement with Electric one 3. Use of Ceramic Insulation for Annealing Furnace 4. Horizontal Deployment of Energy Efficient Al Melting furnace 5. Installation of Induction Heating Furnace for 2090 Die Casting Machine 6. Replacement of Old Compressor motor with IE5 Motor. 7. Refurbishment of Press machine & Punching Tool for use at Higher SPM.

Capacity Building Approach

1. The criteria owners, e.g. – LPG gas Usage , are given appropriate functional training.
2. Industrial visits are organized for benchmarking .
3. Experts in the field contracted to work together .
4. Worked with educational institutes.
5. Horizontal dissemination of knowledge done by the trained person.
6. Projects are taken to implement the learning.
7. Periodic reviews are done to evaluate the effectiveness of training.

Waste utilization and management

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Waste Management System

WM 3.1 Waste collection, segregation, internal transport & handling, storage and disposal mechanism

WASTE INVENTORIZATION APPROCH

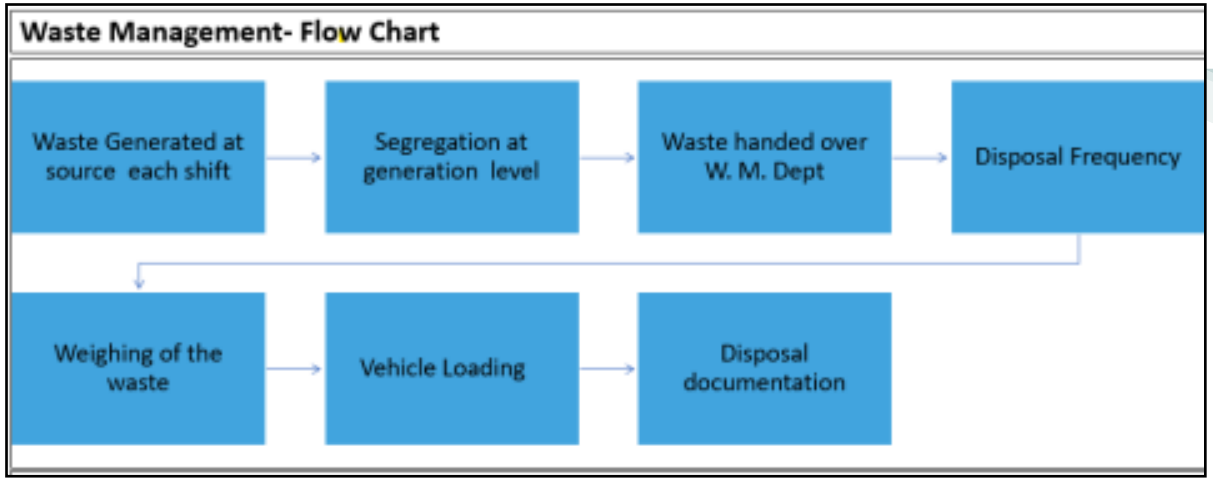
Non-Hazardous Waste – Steel, Copper wire & Aluminum

Shift-wise and Cell-wise Collection is done and handed over to waste management department. Per motor waste generated is displayed in the Cell to track the abnormality.

Hazardous Waste

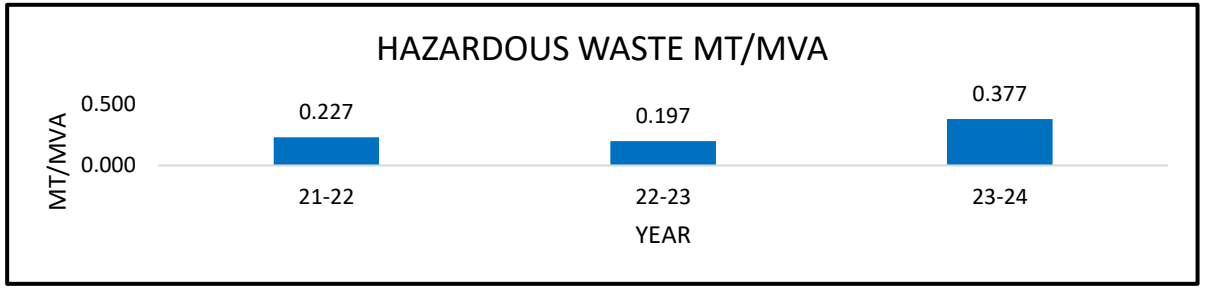
Daily / Weekly collection of the waste is done cell-wise and handed over to waste disposal department along with memo called "waste Handling Slip", and it is monitored cell-wise as "Gram per motors" for improving.

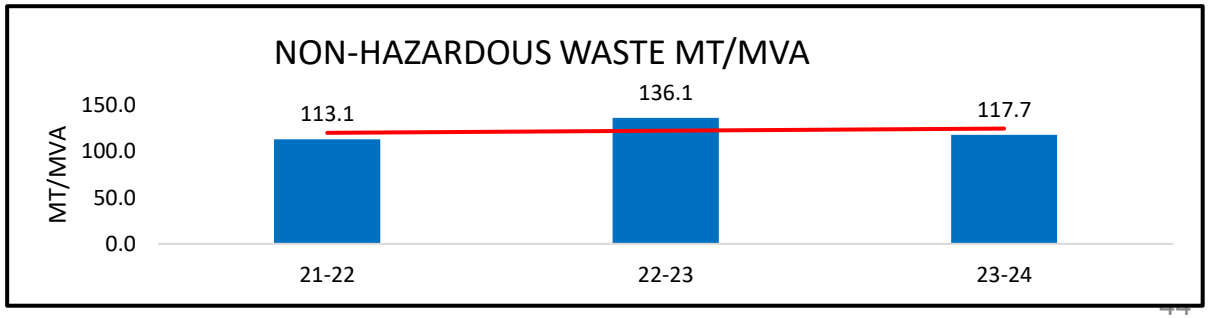
Waste management department compiles all the data and reports out, Monthly, Yearly Trends.



Waste utilization in last three years

Type of waste generated	Quantity of waste generated (MT/Year)			Disposal method
	2021-2022	2022-2023	2023-202	
Used or spent oil	1.64	2.35	2.3	Recycler or sent Actual user
Empty barrels /containers /liners contaminated with hazardous chemicals /wastes	9.9	9.9	1.1	Recycler or sent Actual user
Process wastes, residues and sludges	10.21	2.54	0.88	Disposal Facility
Steel Scrap	12701	11806	0.18	Recycler
MS Scrap	108	130	9604	Recycler





Waste utilization and management

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Waste Management System

Non-Hazardous Waste Handling bin and Trolley

Empty Spool Trolley

Different waste handling and collection bins and trolleys.

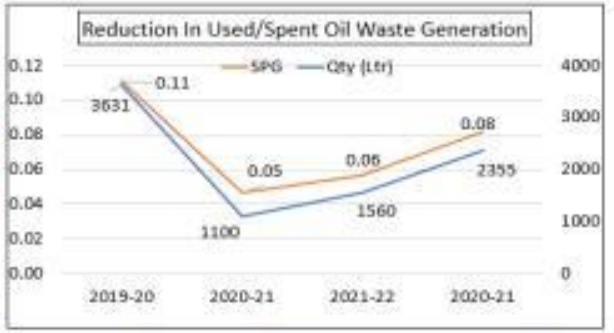
Steel Waste Management System

Scrap Conveyor & Baling Machine

Improved handling of punching waste by installation of scrap conveyor and bailing machine.

Project 2 – Filtration of Used Oil

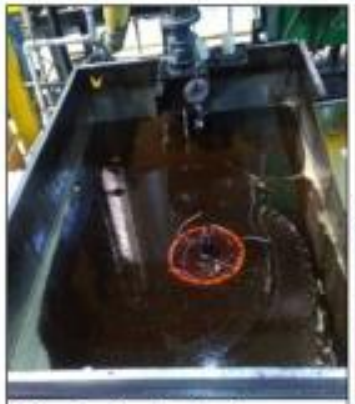
Used Oil Filtration Machine



Reduction in Specific Waste Generated of Used/Spent Oil

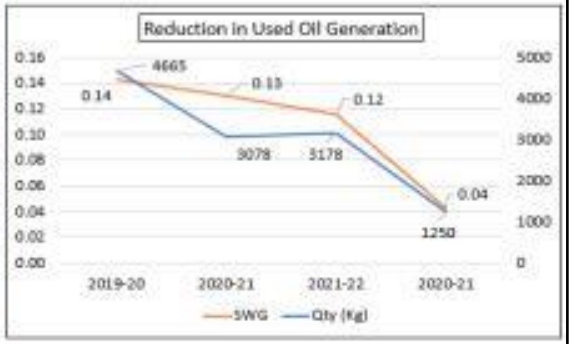
* Increase in Specific Waste Generation in 2021-22 and 2022-23 is due to refurbishing of two press machines

Project 1 - Replacing Dip Varnishing with Vacuumed Impregnation Varnish



Dipping Varnishing Process

Vacuumed Varnish



Filtration of Used Oil Reduce Used Oil Waste

Green Supply Chain Management

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MANUAL ON GREEN PURCHASE POLICY

CHAPTER-II

GREEN PURCHASE POLICY FOCUS AREAS

Godrej & Boyce Mfg Co Ltd, Vikhroli is one of the largest engineering and consumer products manufacturers in the country. Godrej & Boyce Mfg Co Ltd offers entire spectrum of industrial solutions from storage to material handling, process equipment etc. Godrej & Boyce Mfg Co Ltd is also one of the leading players in the consumer products like Appliances, Locks, Furnitures etc.

Adopting Green Purchase Policy (GPP) is one of the commandments under MSG.

The methodology adopted for the development of Green Purchase Policy (GPP) are the initial awareness presentation on GPP to the plant team, followed by circulation of preliminary questionnaire & data collection, discussion with the plant team for listing out major purchase groups to be included in the Green Purchase Policy & development of green purchase guidelines for identified products/services.

GPP FOCUS AREAS:

The development of Green Purchase Policy (GPP) aims at:

1. Reducing the usage of hazardous (toxic) products/chemicals in their manufacturing facilities & phasing out toxic chemicals use over a period of time.
2. Purchasing energy efficient equipments/products to reduce the energy use & conserve energy, which in turn minimize the Greenhouse Gas emissions.
3. Purchasing water efficient fixtures to reduce the usage of water & conserve water.
4. Minimizing the generation of waste by increasing the utilization of products with higher recycled content & also using products that can be recycled.
5. Adopting environment friendly Green Building practices for new construction.
6. Encouraging suppliers to adopt green initiatives & ensuring they are environmentally cautious.
7. Practicing various eco friendly concepts like green office / building.

The plant personnel should implement the suggestions made in the report after verifying safety aspects. It is the responsibility of the plant personnel to observe statutory regulations, if any, as applicable to the factory.

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2.1 Awareness Creation for the Suppliers : Cluster Approach

- As a part of Advanced Cluster activity, Vendor Cluster is formed, Where-in Lawkim Team supports improvement activity by sharing Knowledge gained.

Shree Kedareshwar Engineering , Shirwal (10 Km)

2.1 Awareness Creation for the Suppliers : Targeted Trainings

Supplier Training Checklist

CATEGORY	Topics
INBOUND	Logistic
	Packing
	Inventory
IN PROCESS	Electrical consumption
	Water consumption
	Air Consumption
	Consumables
	Standard time
	Transhipment
	WIP
	Power Factor improvement
	Natural Lighting
	Ventilation
FINISHED GOODS	Handling
	Trucks/Tempo
	Road/Train/Air
WASTE MANAGEMENT	Rework
	Hazardous Substances used

- Based on Regular Supplier Audit and standard checklist, the topic of training for each supplier is decided.
- Based on identified Opportunity areas, Specific Targeted training programs will be conducted for that supplier.

2.1 Awareness Creation for the Suppliers : Annual Vendor Meet

Divisional Head And Plant Head Addressing Vendors In Vendor Meet.

2.1 Awareness Creation for the Suppliers : WBPS System

WBPS Portal is used to share newsletters, training materials and updates to suppliers.

Green Supply Chain Management

Packaging Improvements

Plastic Bag Savings Through Recycle

- **Problem Statement**-The Stator of GPM (B56 and 100S) models goes to unit 2 and Bhavani industries for threading and Winding purpose. We also dispatched plastic bags that are NEW along with the kit. Expect recycle activity here which is not happening.
- **Action Taken**-Stopped giving new bags for production, notified all concerned and now started 100% recycle activity (VCI Bags 13*22 and 12*14)
- **Benefits-**
- Reduces Pollution Across Ecosystems
- Requires Less Energy and Helps Conserve Natural Resources
- There is no need to bring new bags which reduces the cost by approximately lakhs of rupees per month.

Packaging Improvements

Converting Wooden Pallet to Metal Pallet

Before

Wooden Pallets were sent by supplier for Steel Coils

After

Instead of Wooden Pallets, metal pallets are used

- **Benefits**

1. Better Load Carrying Capacity
2. Environment Friendly
3. Safer and Cost Effective.

5.1 Packaging Improvements

Reuse of Wooden Pallet

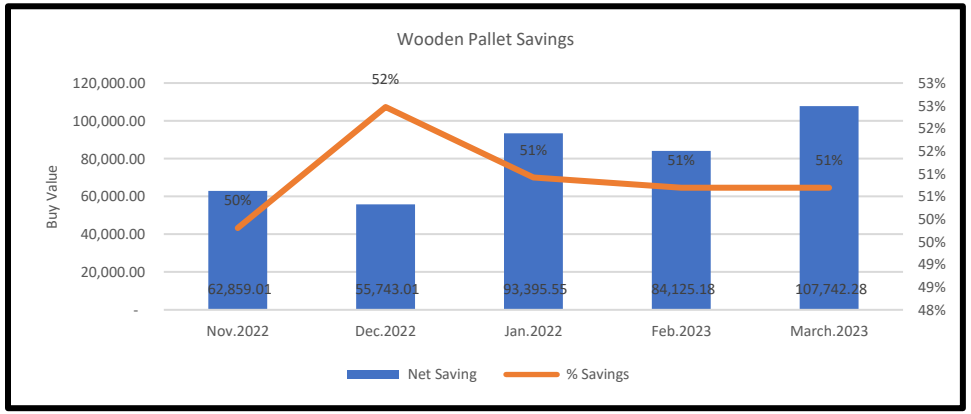
Before

Wooden Pallets were scraped

After

Special Carpenter is allocated to convert these pallets to usable ones

We used to scrap the wooden pallets that come with the incoming material, if those pallets are modified then we can use those pallets to store other materials in the company and as well as to dispatch the material to the customer by changing it as per requirement so that we No need to buy new pallets.



An Average Savings Of 51% Can Be Observed In The Buy Value Of Wooden Pallets

Green Supply Chain Management

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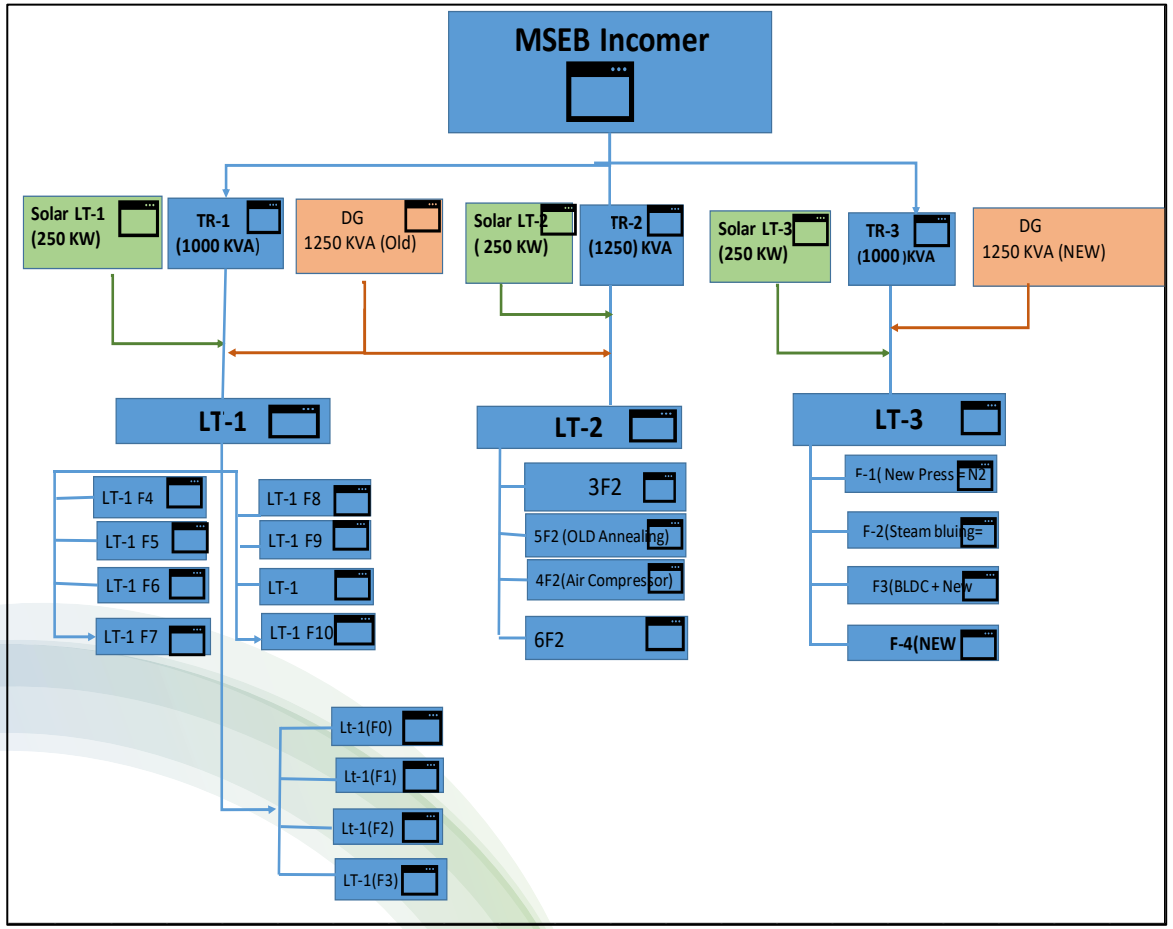
CII Confederation of Indian Industry

Targets, Action Plan and Resource Allocation

Sr. No	Area	Long Term Targets - 2025-2026	Action Plan
1	Import Substitution	Reduce Import by 20% Against FY22-23	• Find alternative Domestic suppliers with better quality
2	Sourcing Material from Nearby Sources	Aggregate Lead wire Sourcing at Trimurti Industries	• Analyze feasibility and capacity at Trimurti • Enter Into an Agreement for Assurance to both Parties
3	To Procure Energy Efficient Equipment	Promoting 50% of Critical Suppliers for Procuring energy efficient equipment and utilities.	• Prepare detailed data of existing tools available with vendors. • Provide specific guidelines for procurement of new tools as per EER norms
4	Awareness Creation	Promote 10 more Vendors to go for environmental Certifications like GreenCo	• Identify critical suppliers • Conduct audits to identify opportunity areas • Provide targeted training for those suppliers for certification
5	Supplier Evaluation System with focus on Green Supply Chain	90% Critical vendors to be audited based on environmental performance	• Prepare standard audit plan • Monitor Environmental performance of vendors

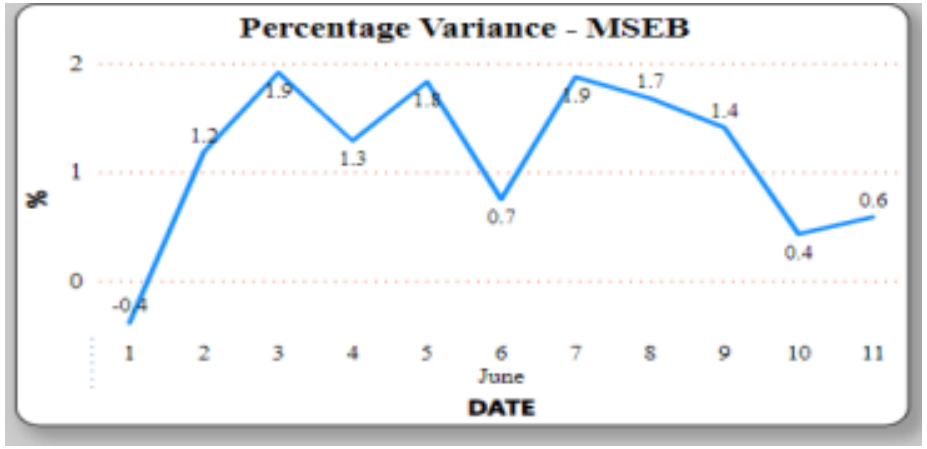
EMS System and other requirements



ENERGY FLOW MONITORING DIAGRAM

ENERGY MONITORING DASHBOARD

EMS System and other requirements



Energy Variance is tracked on daily basis.

Daily Energy monitoring System

Energy Variance Observation					
Year	No of Energy Meter Installed	MSEB+Solar +DG	Total Variance (%)	Total Units (Feeder Panel)	Variance Units
FY19-20	EnMS Project Under Process	11790231	22.0	9199232	2590999
FY20-21	102	8528053	15.9	7169232	1358821
FY21-22	32	9035456	3.3	8737060	298396
FY22-23	20	8839628	0.5	8882850	43222

Energy Balance is tracked on daily basis and currently up to (+/-) 2% energy is unaccounted for.

Processes To Monitor the Energy Losses	
	To Reduce Energy Variation Track the Energy flow & Energy meter added at required points (Variation reduce 10% to 3% in One year)
 	To Measure Accurate Consumption of Energy , Used High Accuracy Measuring Device to measure Energy(KWh) (Class 0.5)
	To check the accuracy level of Measurement Calibrate all Energy meter through NABL certified Organization At a specific Schedule.

Action Taken to Reduce the Energy Measurement Variation

NET ZERO Commitment

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Greener India Targets (wrt Base Year FY21-22)

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INDICATOR	TARGETS (2031-32)
Energy Productivity (EP100 aligned)	+60 % (MVA/kwh) (In line with Carbon Intensity Reduction Plan)
Specific Water (all sources)	-25 % (KL/MVA)
Water Positivity	2 x
Specific Mnfg waste generation (for each Hazardous & Non-hazardous)	-25 % (MT/MVA)
Zero Waste to Landfill (Hazardous & Non-Hazardous)	ZERO
Carbon Intensity	+60 % (MVA/tCO2e)
Renewable Energy Share in Total Energy	40 %
Net Zero Buildings (Non-Manufacturing - New or Retro fitting)	100 %
Green Supply Chain – GreenCo / SBTi (by Buy Value)	80% Value (Domestic)

(1) All Targets aligned to Global Initiatives signed into (EP100, SBTi, Net Zero etc…)

(2) All G&B Mfg. Locations to be 'GreenCo' certified and Key Suppliers either GreenCo or SBTi signatories

(3) Internal Carbon Price at $5/tCO2

Journey Towards Environment Stewardship

Confederation of Indian Industry

Godrej | LAWKIM MOTORS

CII GreenCo Gold Award-2014

Best Practices on Water Award- 2015

CII GreenCo Platinum Award- 2016

CII IGBC Platinum Award- 2018

ISO 50001 2022

CII GreenCo Platinum Plus-2023

CII GreenCo Star performance - 2024

LAWKIM MOTORS

Thank You

Save Energy Save Earth

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