CII – 24th National Award for " Excellence In Energy Management - 2023"

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Team:
Satish Uttarwar – CMS
Arjun S Panwar - Energy Cell
Ananda kale –Utility Services

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Our Purpose

We Innovate Mobility Solutions With Passion To Enhance Quality of Life

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Our Products

ILCV

407

1109

709

Ultra trucks

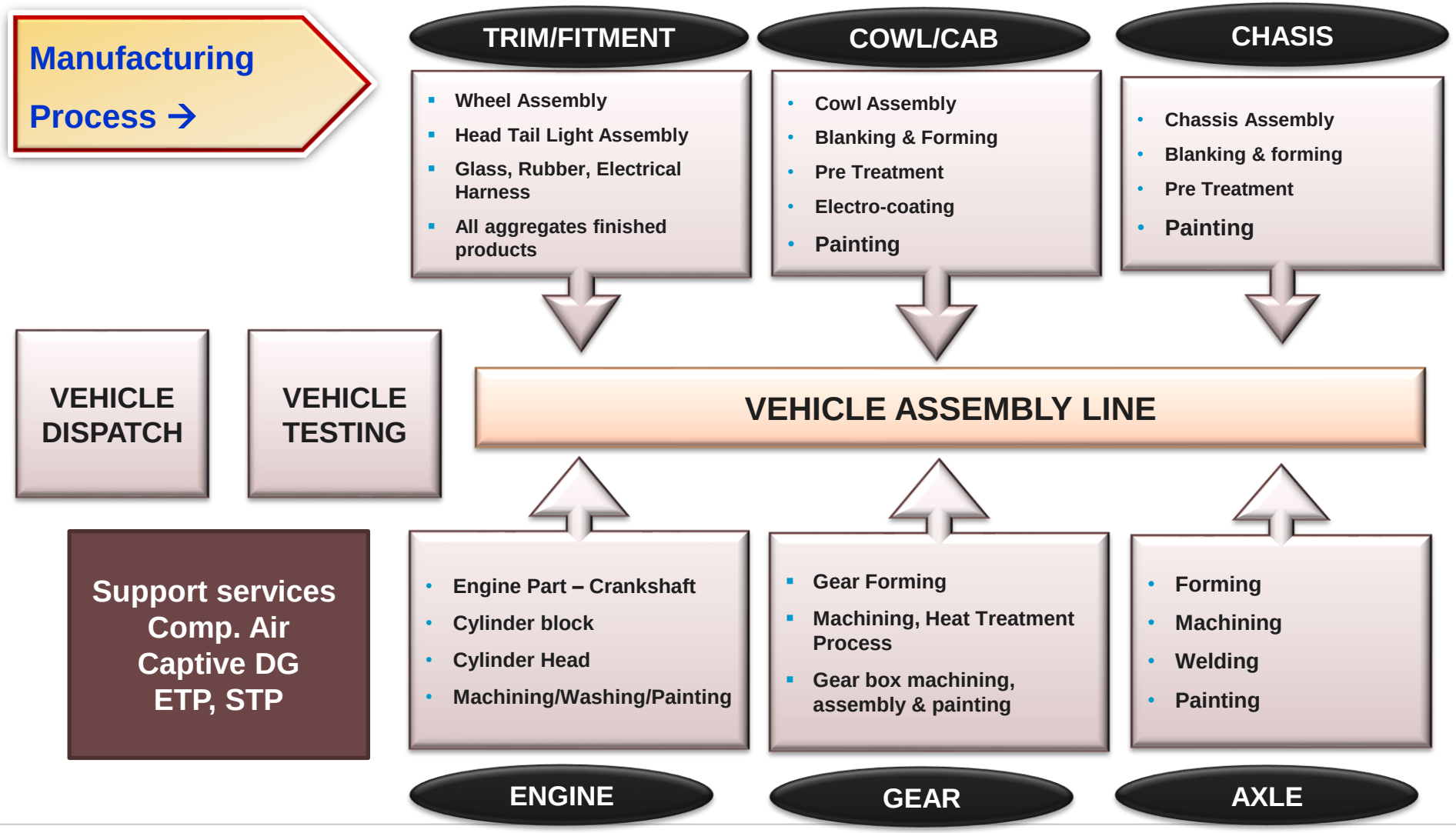
SCV & PICK UP

Xenon Pickup

Winger

MHCV

2. Brief Manufacturing Process



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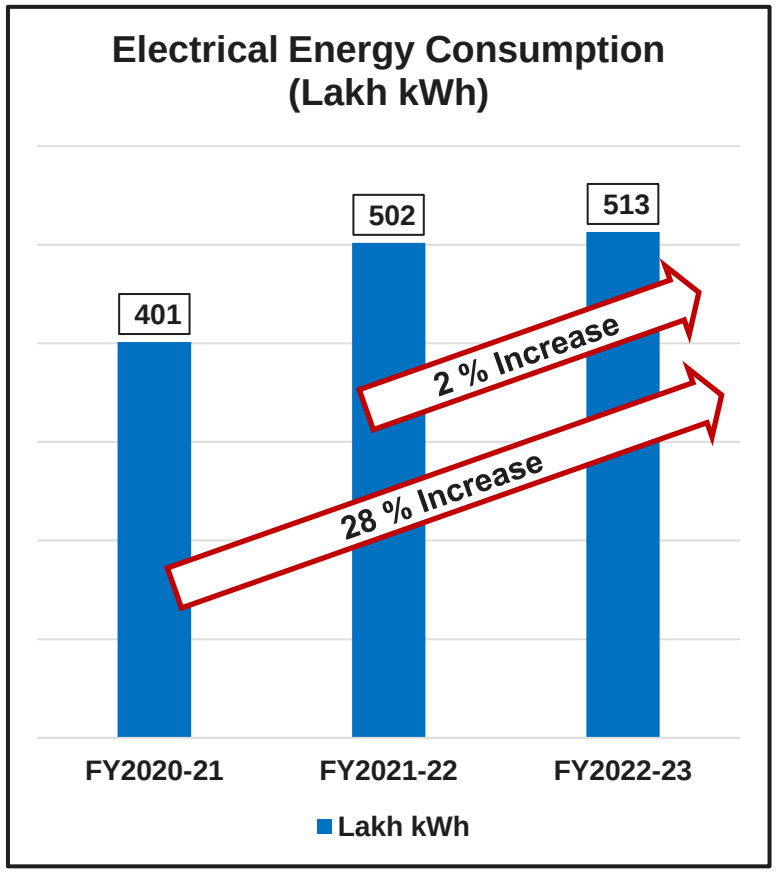
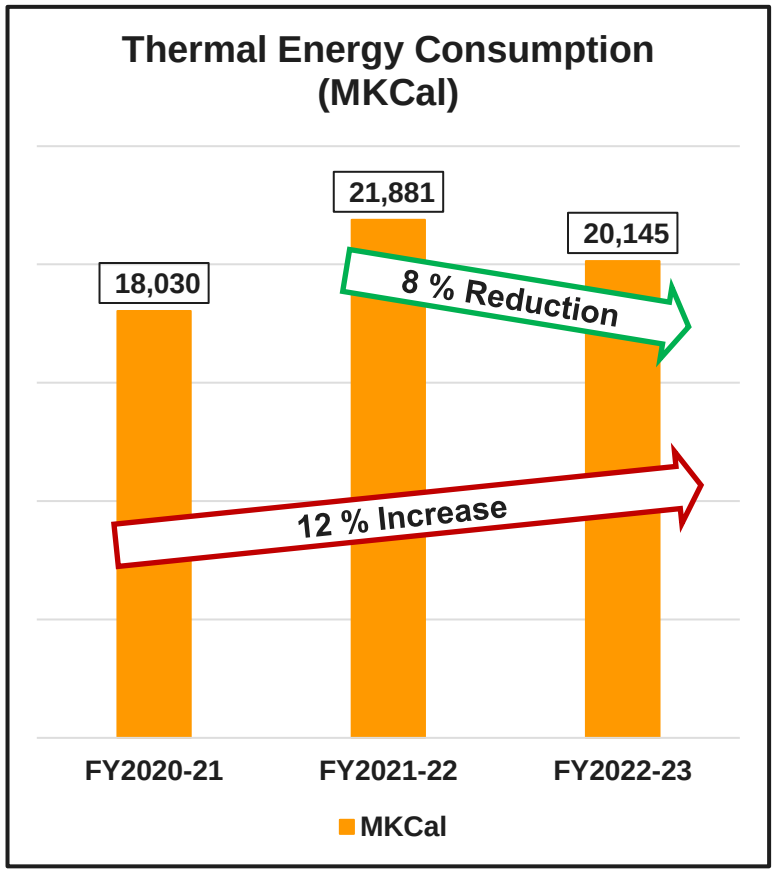
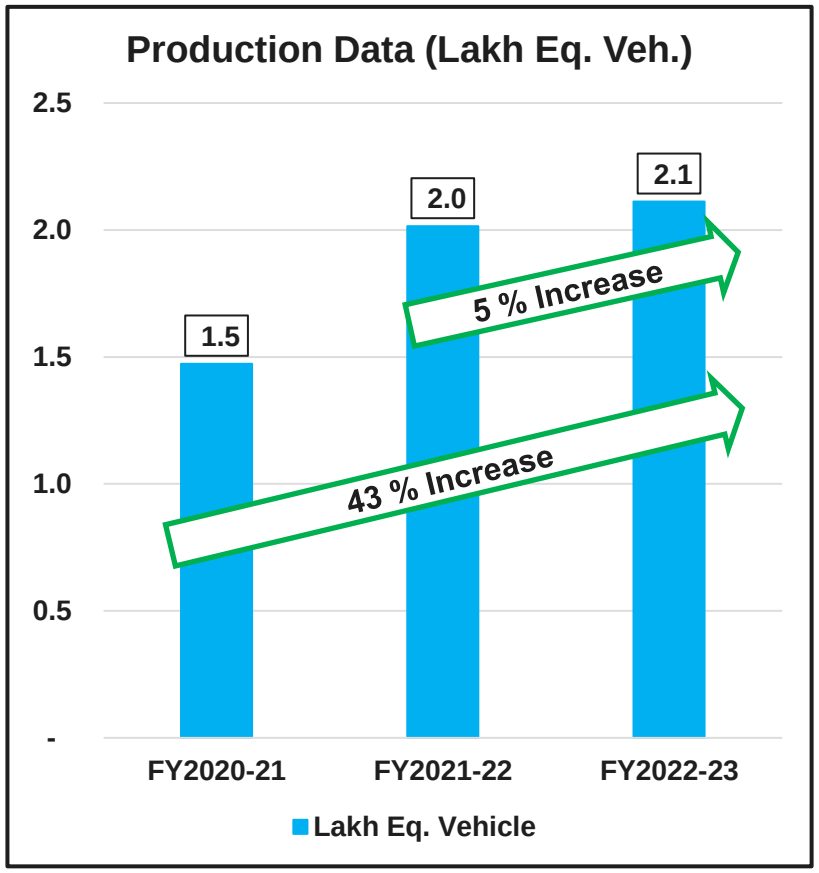
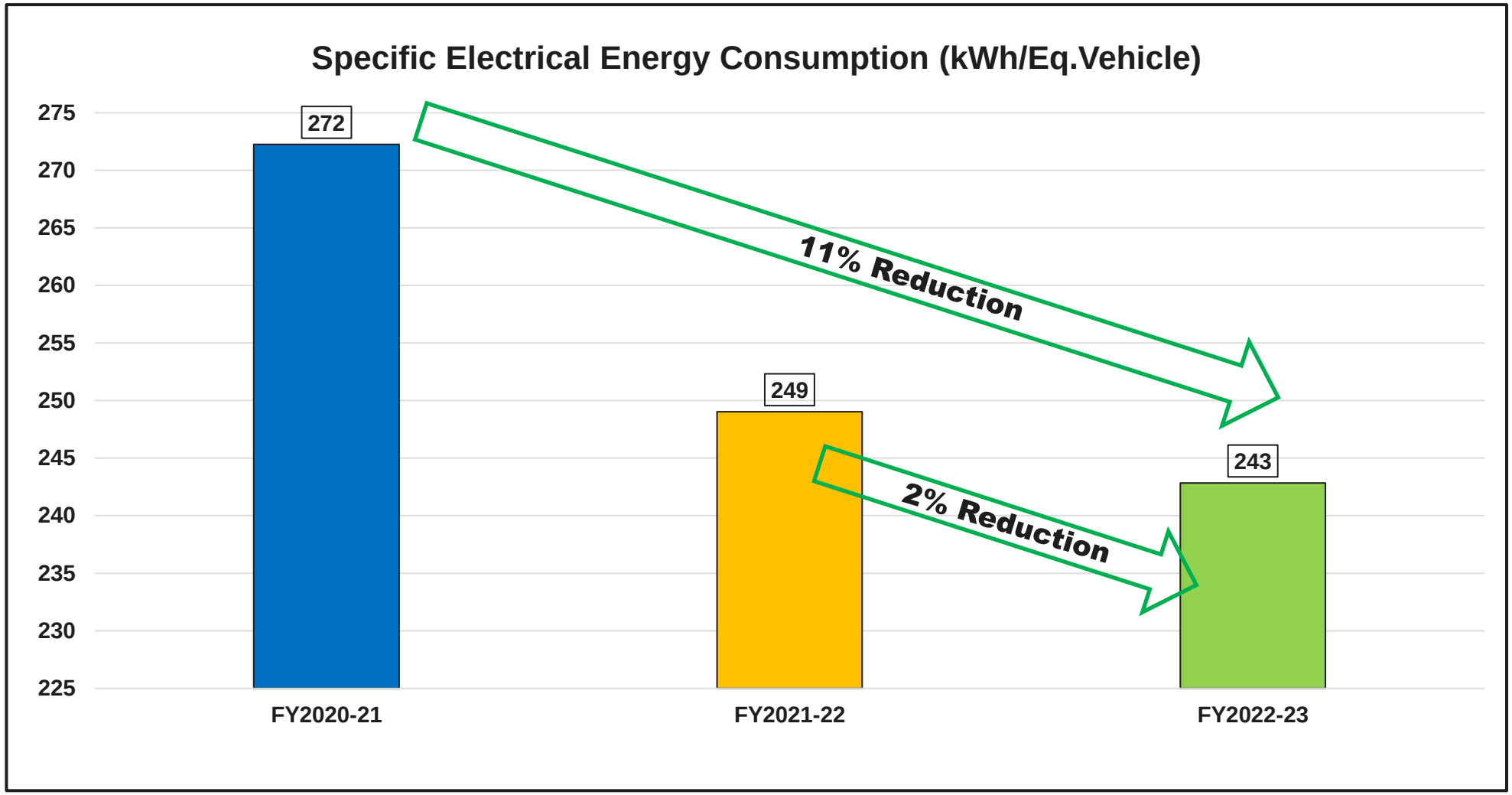
Overall Energy Consumption and Production Data FY2022-2023



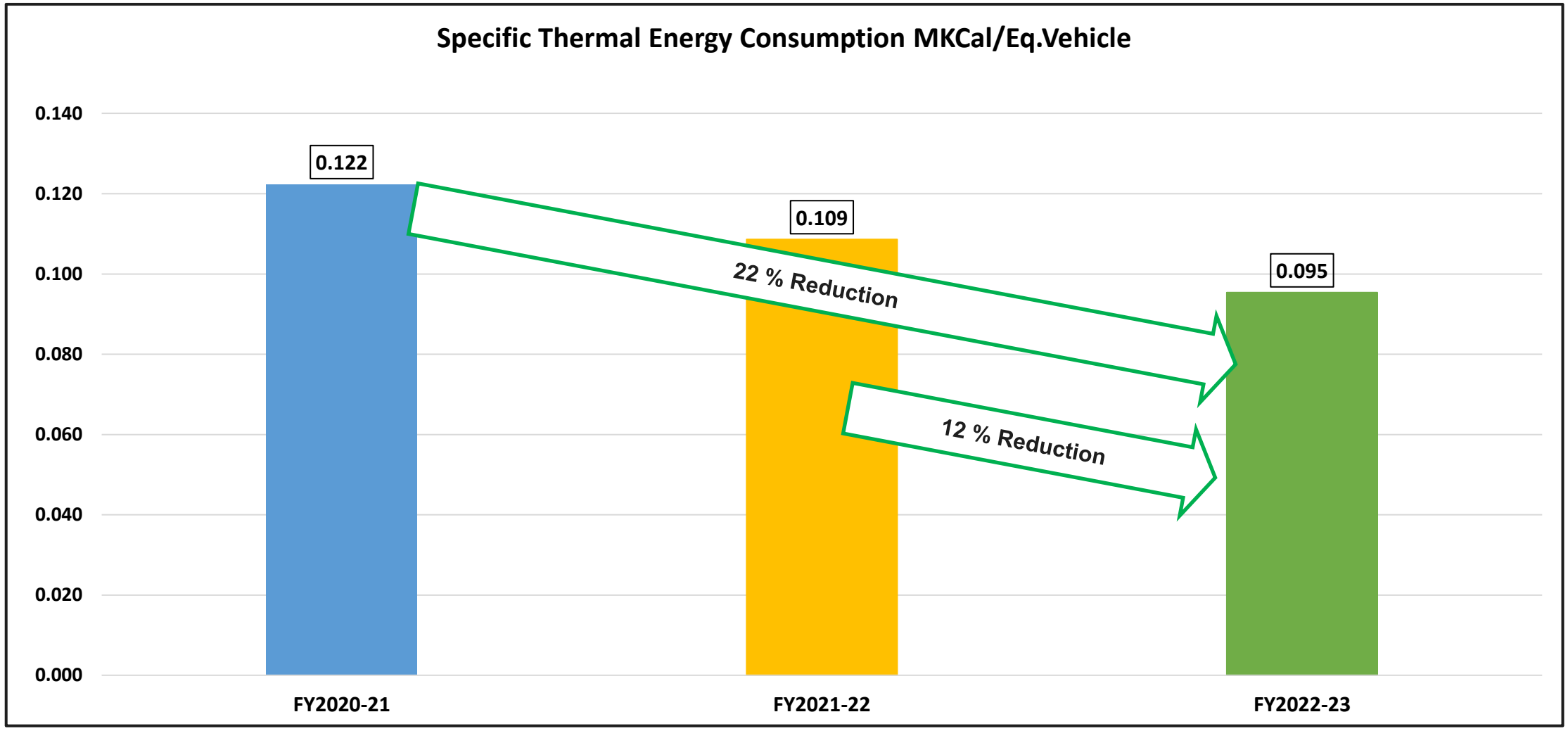




3. Specific Energy Consumption in Last 3 Years - Electrical



3. Specific Energy Consumption in Last 3 Years - Thermal



3. Energy Consumption Overview

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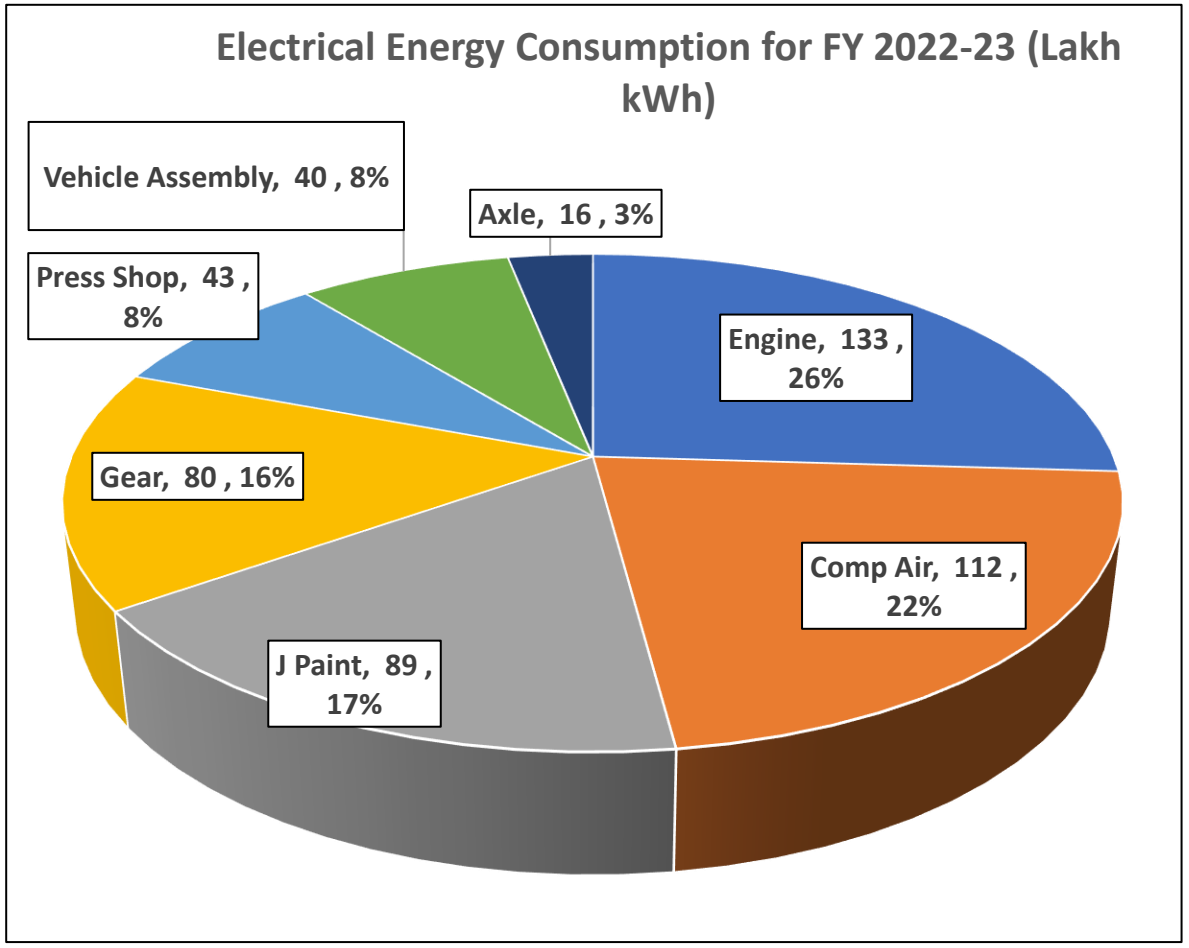
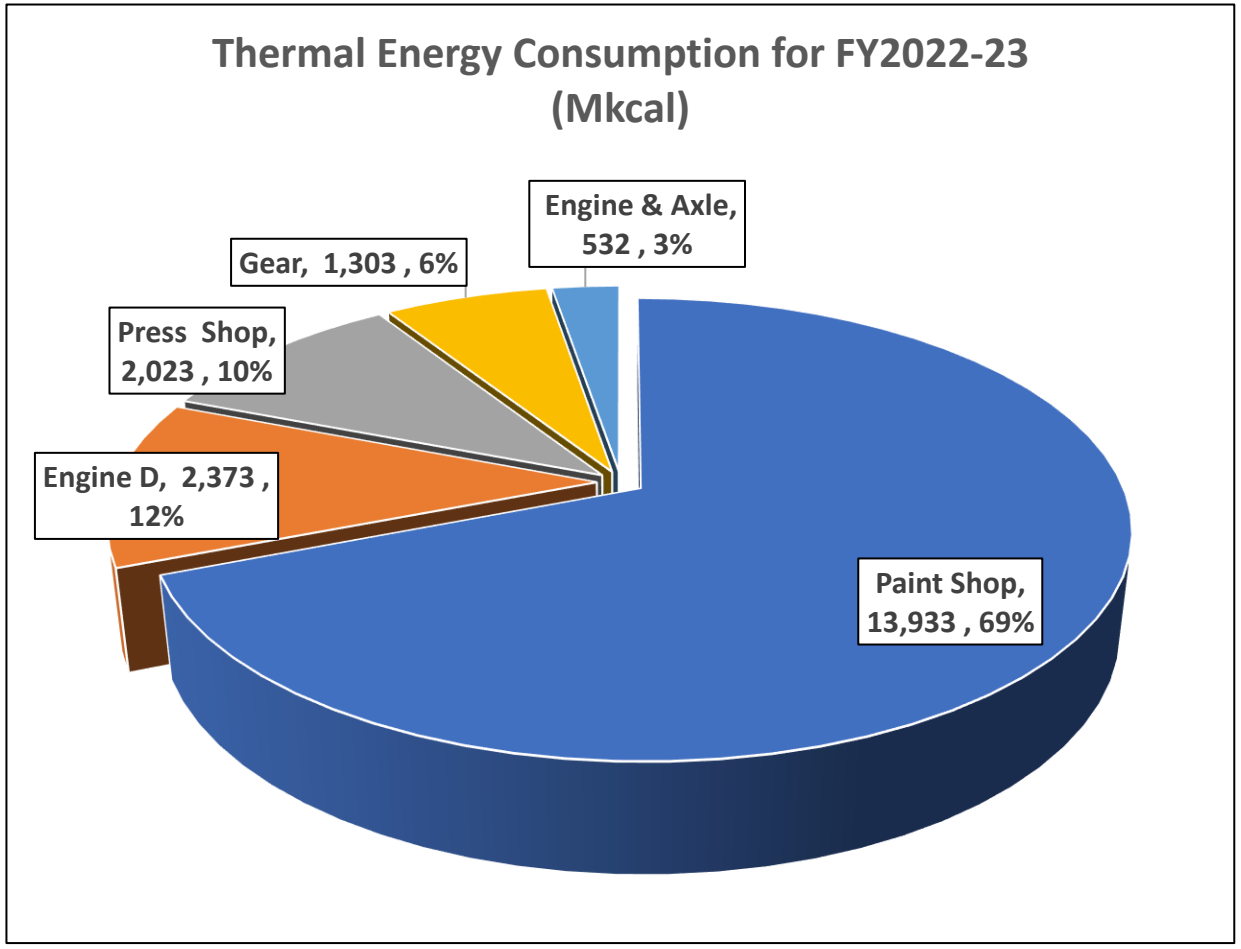
Process wise Electrical Energy Consumption FY2022 - 23

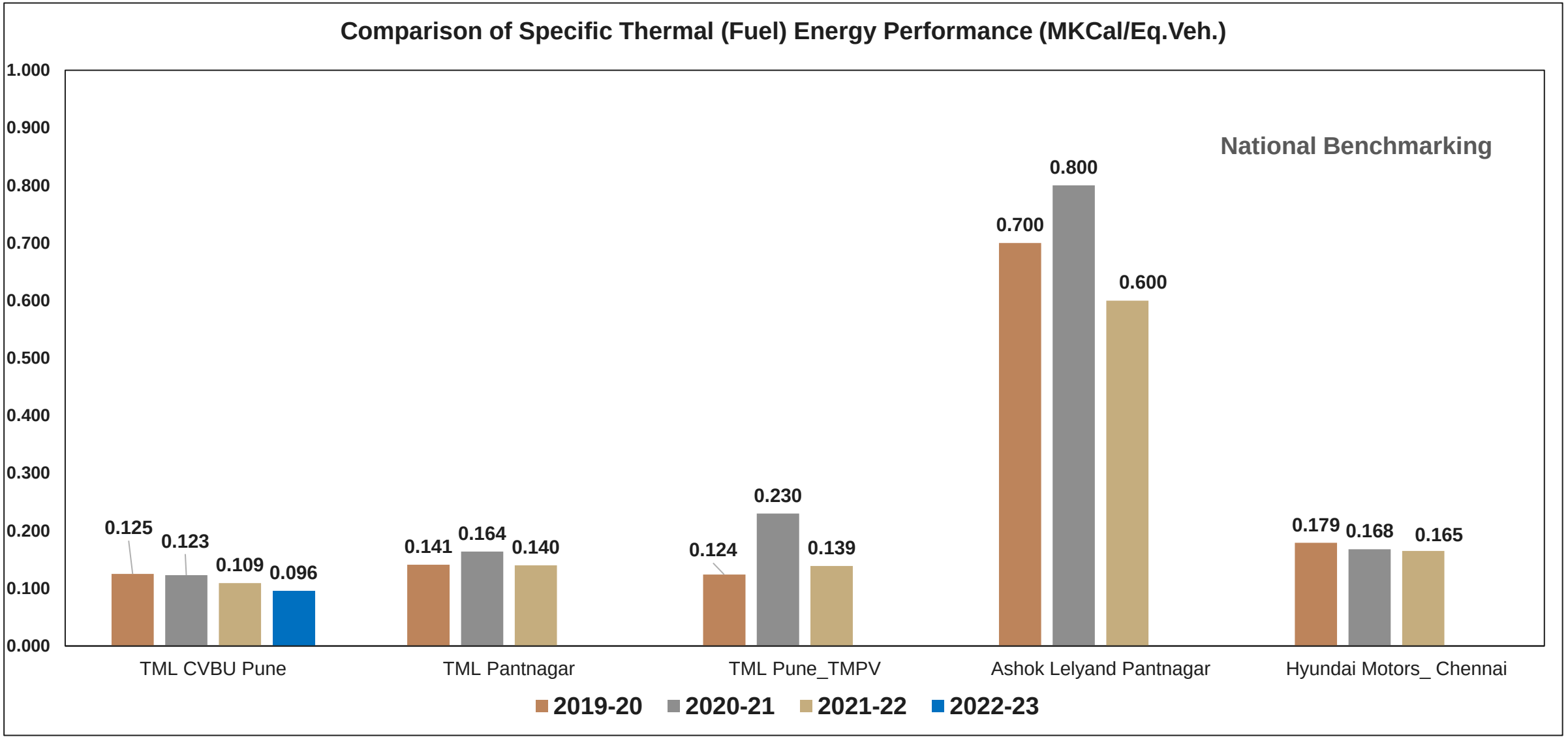


Process wise Thermal Energy Consumption FY2022 - 23



4.0 BENCHMARKING

4. Information on Competitors, National & Global Benchmark



4. Information on Competitors, National & Global Benchmark

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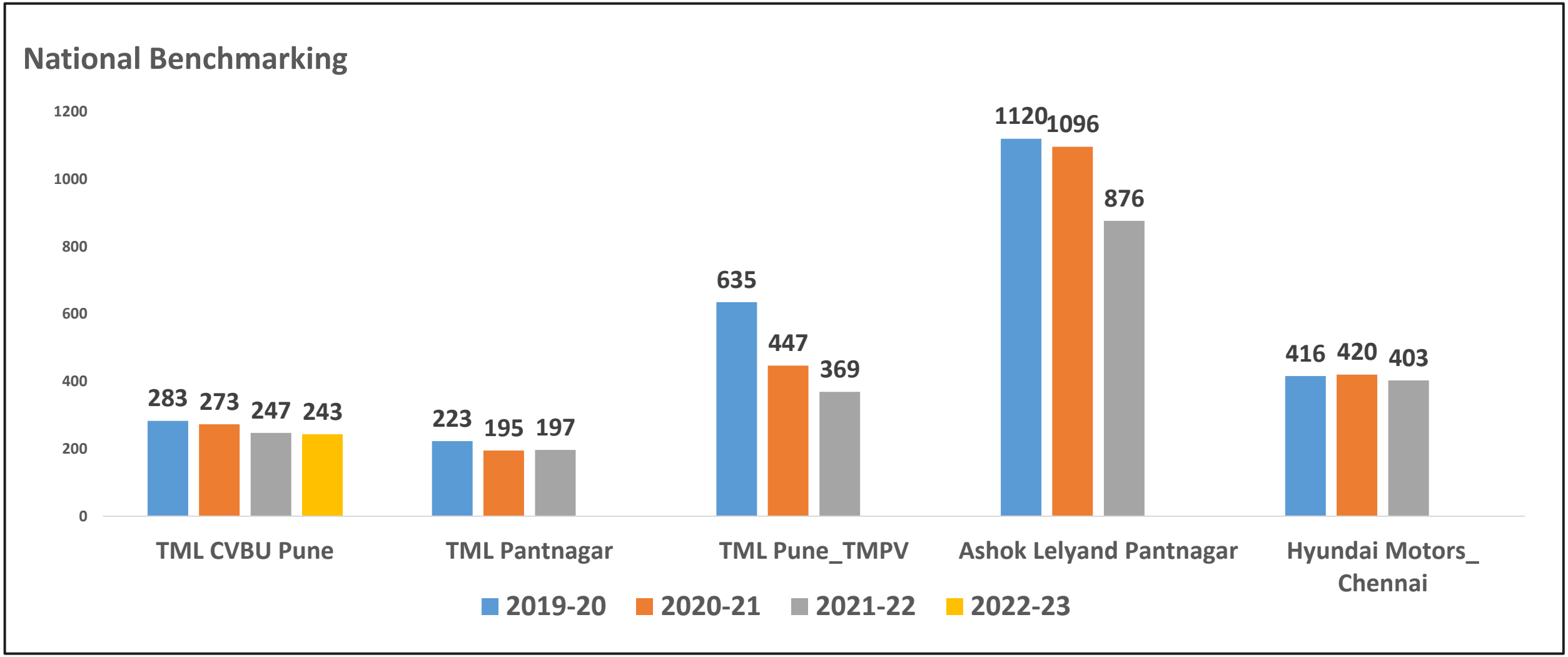

Global Benchmark

TATA Motors CVBU Pune Energy performance is better than its Global competitors, but we would like to highlight following aspects

- Apple to apple comparison is very difficult to compare
- Manufacturing models are different, eg. In CVBU Pune, we are having all manufacturing processes.
- Climatic conditions varies

Roadmap to achieve Benchmark / Global Best :-

TATA Motors CVBU Pune Plant will continue to refine all process to achieve Benchmark Level.

To Sustain the Best Achieved Level :-

We are following robust process of assessment of performance vis-à-vis comparative information / benchmark from different organisation and standards.

Roadmap :-

- Intelligent management- **Optimise and effective use of Resources**
- **IOT** / Machine management through **Digitization** – KT2 / Adapt Latest Technology
- Lean manufacturing and Processes Management - **Innovations**
- Clean resources - **Maximise Renewable Energy**
- GHG Management - **Reduce Carbon Footprint**
- **Real-time Monitoring and analysis** at shop floor

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❑ **Summary of Project Implemented in Last Three Years**

Year	No of Key Proposals	Investments (Rs. Million)	Savings (Rs. Million)	Payback Months
2020-21	20	12.4	32.5	5
2021-22	12	10.1	24	4
2022-23	22	6.8	19.4	4
Total	**54**	**29.3**	**75.9**	**5**

5. Energy Saving Projects Implemented in Last Three Years

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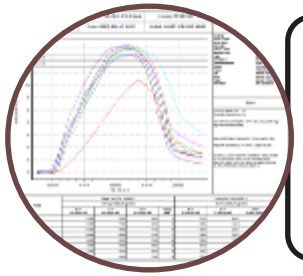
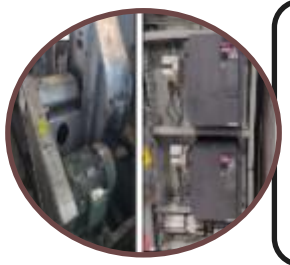
❑ List of Major Implemented Energy Conservation Projects_**FY2022-23**



Energy Saving by Development and Implementation of low bake pre-gel seam sealant

- Energy Cost Saving → **Rs. 38.24 Lakh**
- Investment → **Nil**
- Total Fuel saving → **61,000 SCM/Year**



Energy Saving by Efficiently Managing Air Supply & Exhaust System of Base coat paint booth

- Energy Cost Saving → **Rs. 27.27 Lakh**
- Investment → **Nil**
- Total kWh saving → **3,20,880 kWh/Year**

Installation of VFD at Paint shop, Xenon, H Block Engine, Press Shop, Axle (Qty: 111 Nos.)

- Energy Cost Saving → **Rs. 80.72 Lakh**
- Investment → **Rs. 31.52 Lakh**
- Total kWh saving → **9,49,735 kWh/Year**

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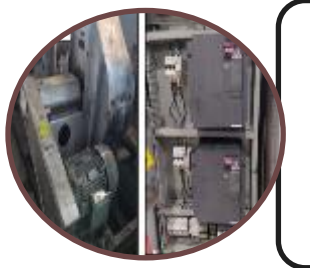
❑ List of Major Implemented Energy Conservation Projects_**FY2021-22**

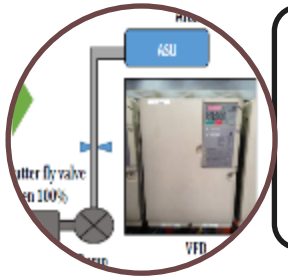
Electrical heating to CNG conversion (Total 5 Machines converted to NG)

- Energy Cost Saving → **Rs. 26.33 Lakh**
- Investment → **Nil**
- Total kwh saving → **2,82,000 kwh/Year**



REDUCING ENERGY CONSUMPTION OF PERFORMANCE TEST BED BY LOWERING SPEED OF BLOWER SPEED (16 no's VFD installed).

- Energy Cost Saving → **Rs. 27.56 Lakh**
- Investment → **Rs. 8 Lakh**
- Total kwh saving → **3,32,448 kwh/Year**



ELIMINATION OF PUMP THROTTLING AT J11/J12 PAINT SHOP(Modulation of pump flow with VFD)

- Energy Cost Saving → **Rs. 19.73 Lakh**
- Investment → **NIL**
- Total kwh saving → **2,12,585 kwh/Year**

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❑ List of Major Implemented Energy Conservation Projects_**FY2020-21**

New Technology - Replaced CL666 & installed new Cylinder Block Honing (Servo-controlled system without Hydraulics).

Energy Cost Saving → **Rs. 5.5 Lakh**

Investment → **Rs. 5 Lakh**

Waste Heat Recovery System Reutilization of Waste heat of flue gas of Engine Test Beds for heating water in Washing Machine.

Energy Cost Saving → **Rs. 13.97 Lakh**

Investment → **Rs. 25 Lakh**

Converting Nos. of Sodium Vapour Lamps to Highbay LEDs - High bay lamps to convert to LED Qty 1579 Nos.

Energy Cost Saving → **Rs. 106.93 Lakh**

Investment → **Rs. 105.78 Lakh**

6.Innovations

6. Innovation Project 1 -

Development & Implementation of Low Bake Temp. Seam Sealant.

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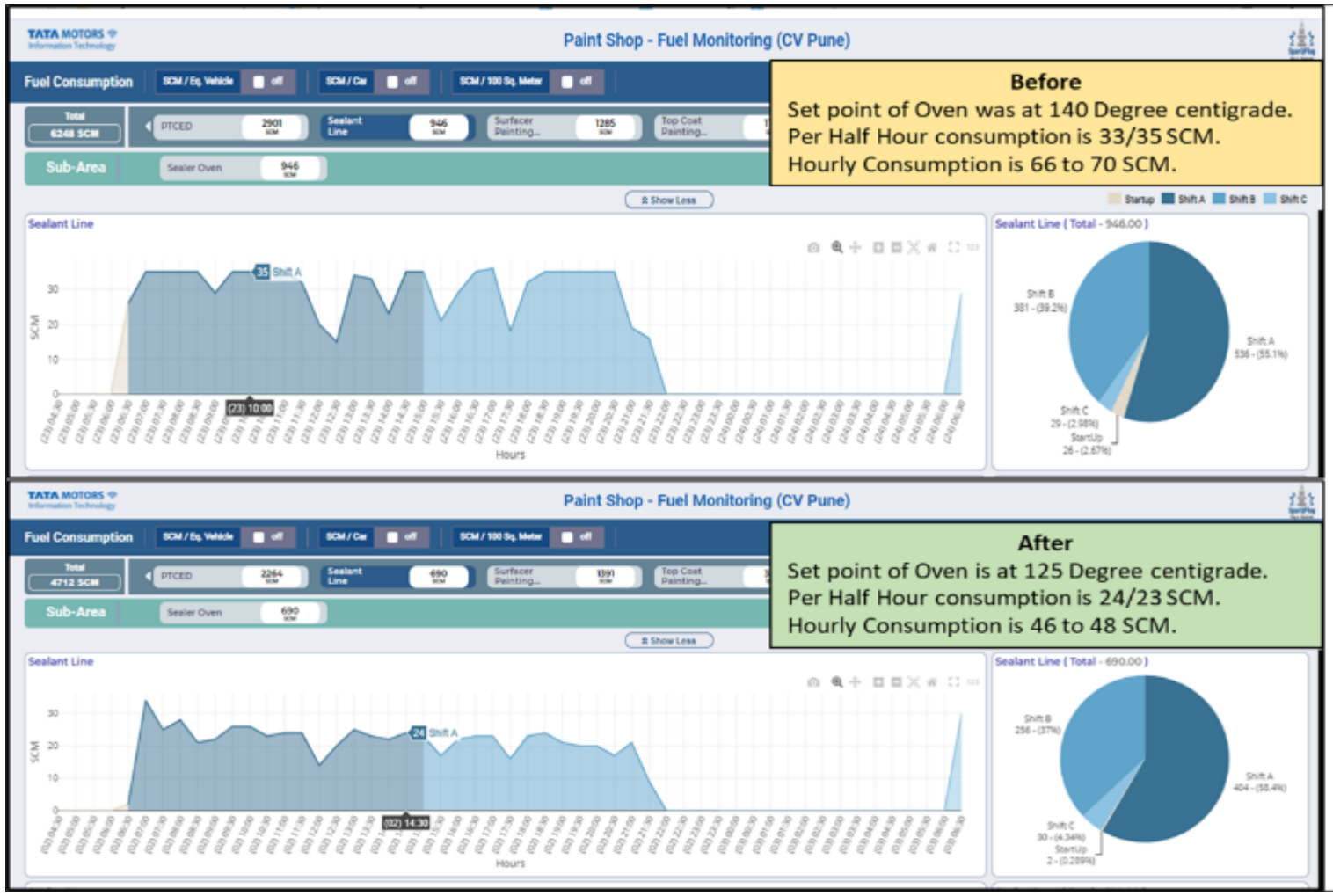
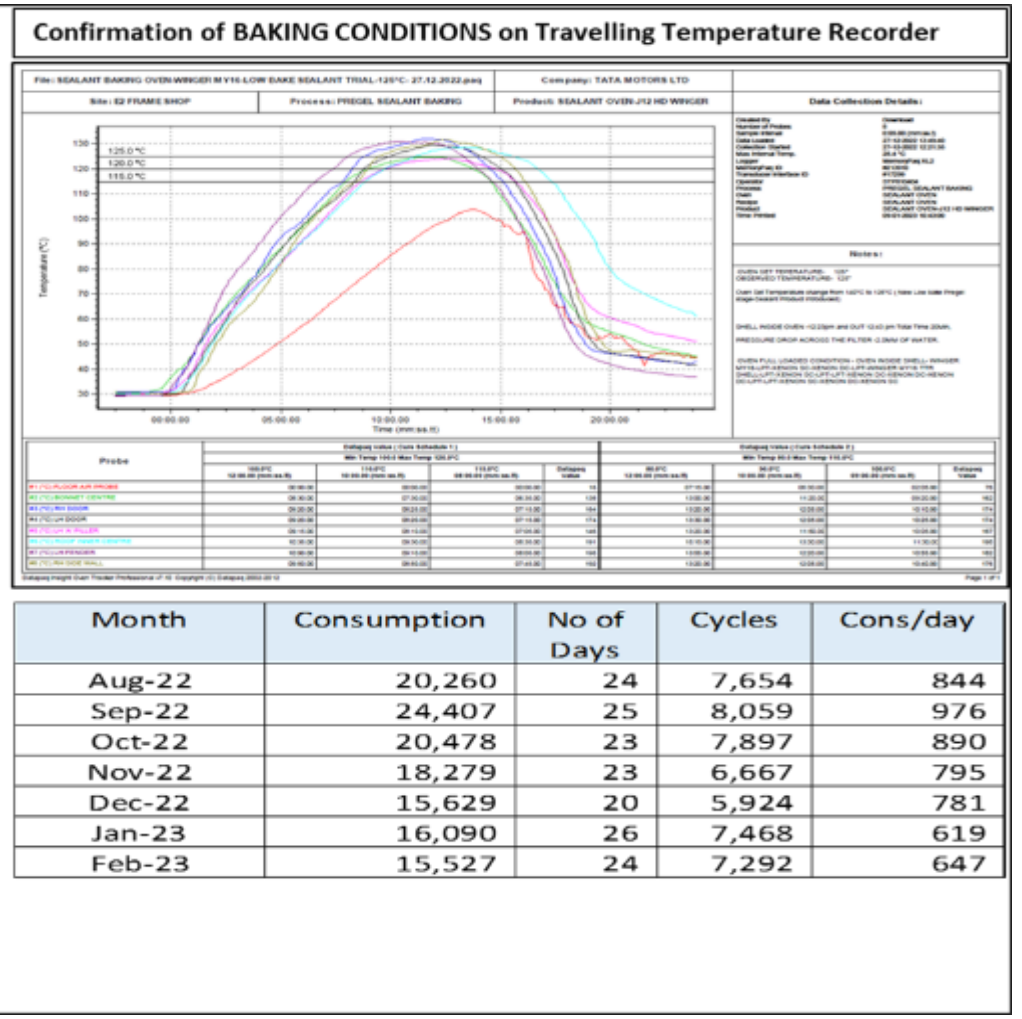


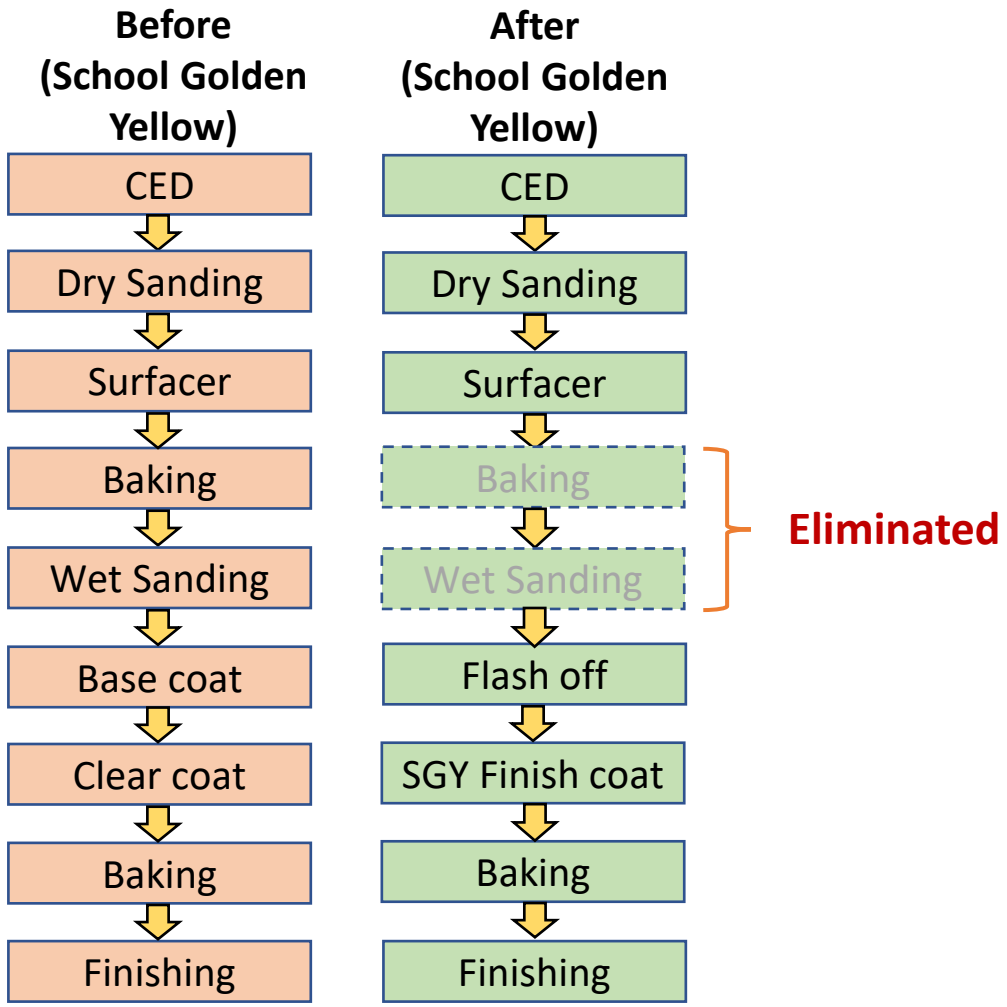


Month	Consumption	No of Days	Cycles	Cons/day
Aug-22	20,260	24	7,654	844
Sep-22	24,407	25	8,059	976
Oct-22	20,478	23	7,897	890
Nov-22	18,279	23	6,667	795
Dec-22	15,629	20	5,924	781
Jan-23	16,090	26	7,468	619
Feb-23	15,527	24	7,292	647

Annual fuel saving : 67100 SCM **Emission Reduction : 138 MTCO2e**

6. Innovation Project 2-

Elimination of Surfacer oven baking cycle (School Golden Yellow) –J12 Paint Shop



- School Golden Yellow colour shade converted from **3C2B (3 Coat 2 Bake) to 2C1B (2 Coat 1 Bake)**
- **Elimination of One baking cycle @140°C/20min** resulting in **fuel saving (~ 0.83 m^3/body). 15% Energy Saving**
- Inline reduction in VOC emission.

6. Innovation Project 3 –

Reduction of HCV Frame baking oven cycle by elimination of Epoxy Black Top coat

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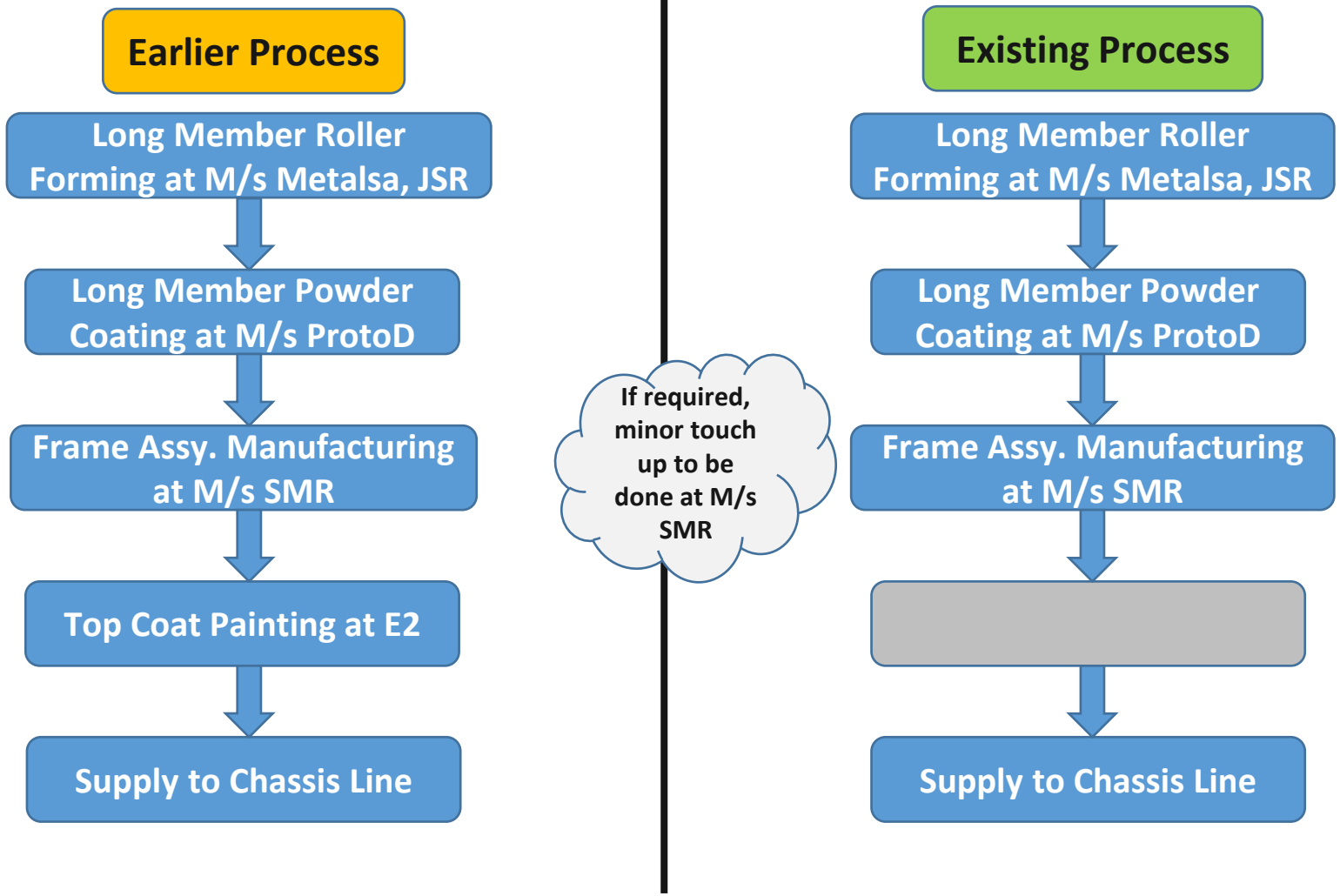

- Elimination of Topcoat. Paint saving of @ 3.5 liters/cycle.
- **Elimination of One baking cycle @140°C/22min** resulting in reduction in oven exhaust. **Electrical saving of 3.8 KWH/Frame & Fuel saving ~2.2 SCM / frame. 20% energy saving.**
- Inline reduction in VOC emission.

6. Innovation Project 4 – Efficiently Managing Air Supply & Exhaust System of Base coat -Process Flow

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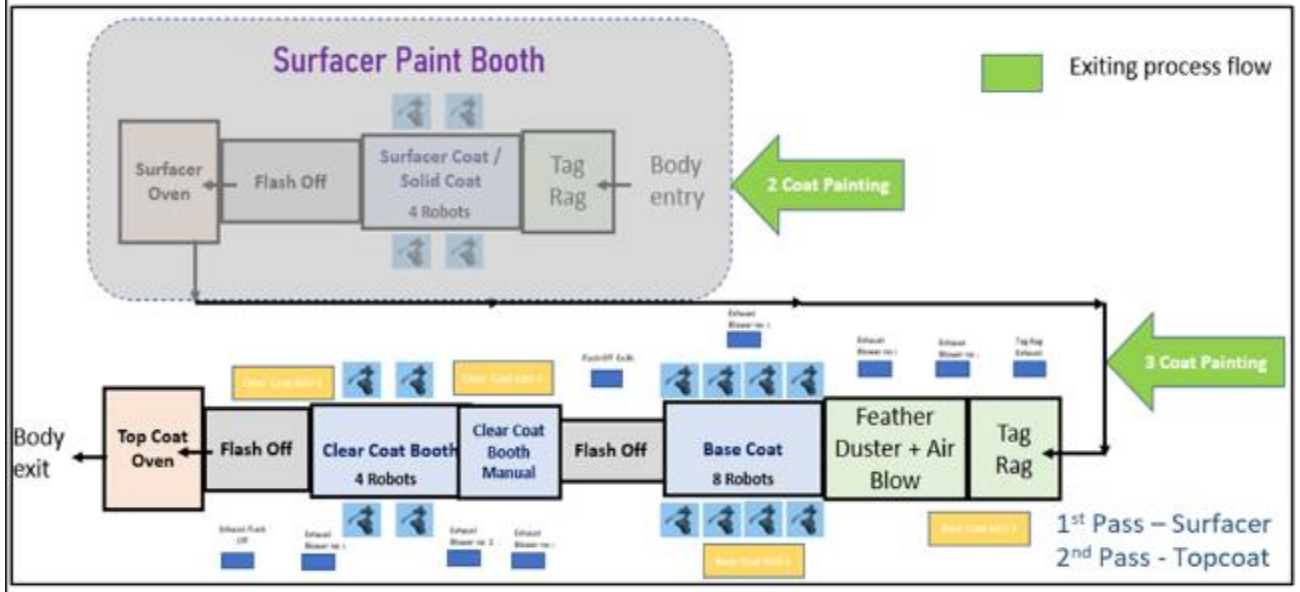
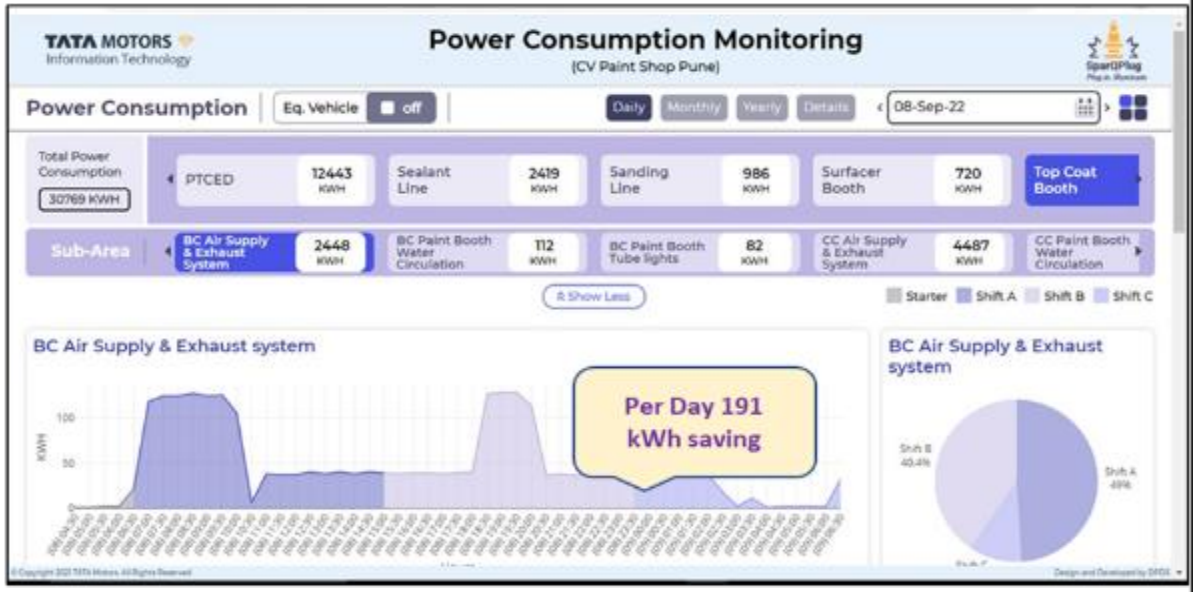
Before	After
➢ During the production of clear coat along with the Air supply system of clear coat , base coat Air supply system was also required to be kept ON in though there is no production in base coat. ➢ Base coat Air supply system was required to be kept on in recess mode for Tag Rag operation (cleaning of vehicle) which is required for painting at clear coat. ➢ So unnecessary consumption of Energy was there at base coat.	➢ To achieve the energy saving during production of clear coat , the base coat air supply system is modified such that only air at Tag Rag operation zone is kept ON instead of full base coat booth. ➢ At base booth to achieve this only one air supply fan and one exhaust fan is kept ON at recess mode frequency and all other VFD's i.e. ASU2 , EXHAUST 1 , 2, 3 and flash off are kept at zero frequency. ➢ This is achieved by modifying the PLC program and VFD parameters.





Total Energy Saving by Efficiently Managing Air Supply & Exhaust System of Base coat = 3,20,880 kWh/Annum

Total Emission Reduction by Efficiently Managing Air Supply & Exhaust System of Base coat = 228 tCO2e/Annum

6. Innovation Project 5 –
Pump circulation Optimization during non-Production Hours

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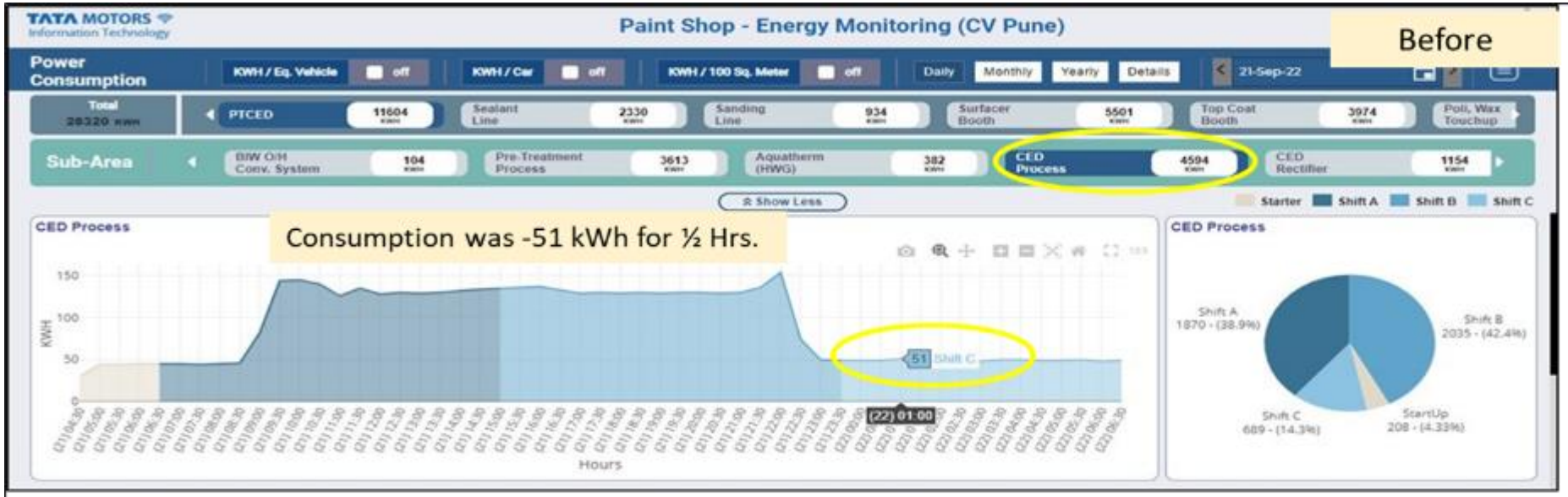

Before:

- Energy Consumption = 102 kWh/Hr.
- Annual Energy Consumption =3,30,480 kWh

After:

- Energy Consumption = 90 kWh/Hr.
- Annual Energy Consumption =2,91,600 kWh
- **Energy Saving 38,880 KWH/Annum**
- **Emission Reduction = 27.6 tCO2e /Annum**

6. Innovation Project 6:
VFD installation on selected load (Press Machine, Blowers, Cooling Tower, Pumps)

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Before Power Cons. with Load Manager

After Power Cons. with Load Manager

VFD Installation and Energy Saving Analysis

- Total 111 VFD installed on selected load (Press Machine, Blowers, Cooling Tower, Pumps, etc.) across plant to reduce carbon emission and energy consumption.
- To reduce power quality issues, Choke installed with all VFD.
- Optimized the set frequency as per process requirement for all VFDs to further reduce power consumption at minimum level.
- Measured the before and after power consumption to validate the energy saving by VFD installation.

➢ **Energy Saving Per Year : 9,49,735 kWh**
➢ **Emission Reduction per year : 674 Ton CO2e**
➢ **% Energy Saving : 42%**

Sr. no.	Factory Wise VFD Installed	Nos. of VFD Installed	Before Energy Consumption (kWh)	After Energy Consumption (kWh)	Annual Energy Saving (kWh)	Annual Cost Saving (INR)	Investment (INR)	Payback (months)	Carbon Emission Reduction (tCO2e)
1	Paintshop	31	3,65,414	2,87,088	78,326	6,65,772	5,48,230	10	56
2	Paintshop by AME	19	3,48,627	2,87,260	61,367	5,21,622	4,06,707	9	44
3	E Block Press Cution	18	3,82,104	1,16,388	2,65,716	22,58,586	10,20,628	5	189
4	E Block Press Ejector & Blower	4	1,88,856	79,905	1,08,951	9,26,082	2,45,492	3	77
5	H 8 Engine	15	4,79,021	2,35,362	2,43,659	20,71,100	4,23,527	2	173
6	H 7 Engine	2	58,560	29,983	28,577	2,42,907	58,332	3	20
7	Xenon	19	2,62,739	1,34,514	1,28,226	10,89,917	3,47,998	4	91
8	RATP (Chinchwad)	3	1,28,832	93,919	34,913	2,96,765	1,01,589	4	25
	Total	111	22,14,154	12,64,418	9,49,735	80,72,750	31,52,503	5	674

Total 111 VFD installed in the FY at different loads considering the application & requirements

6. Innovation Project 7 – Washer Pump circulation Optimization during non-Production

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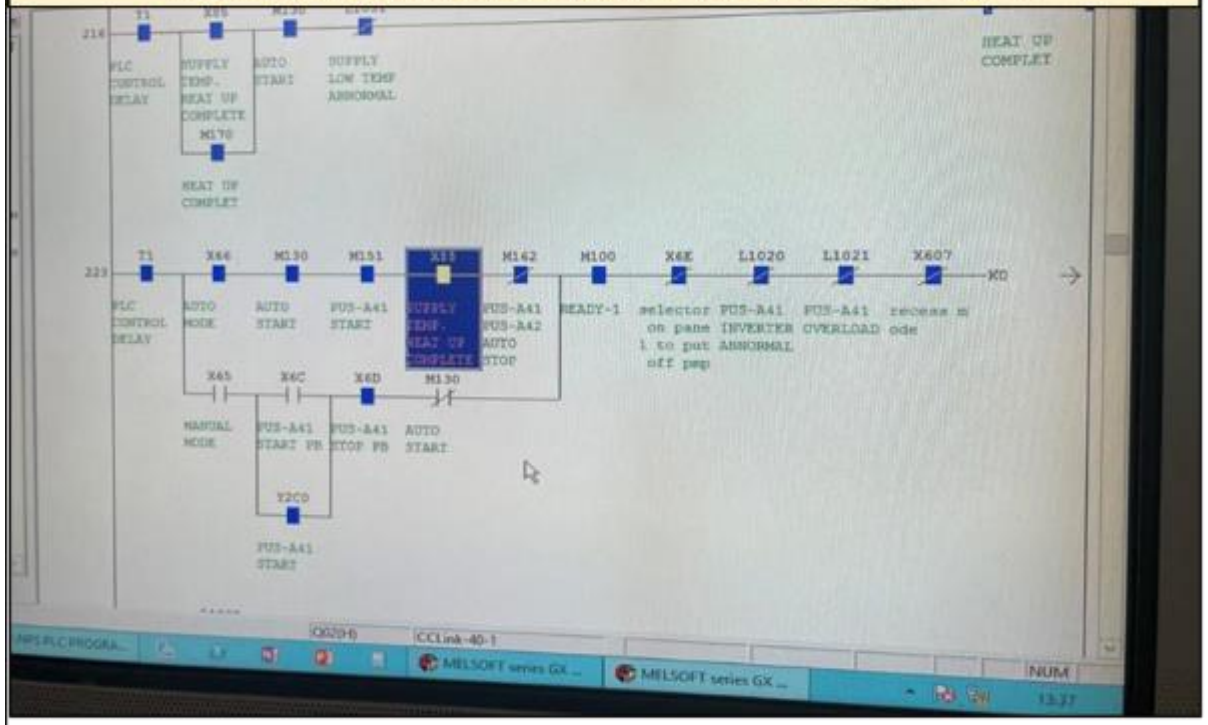
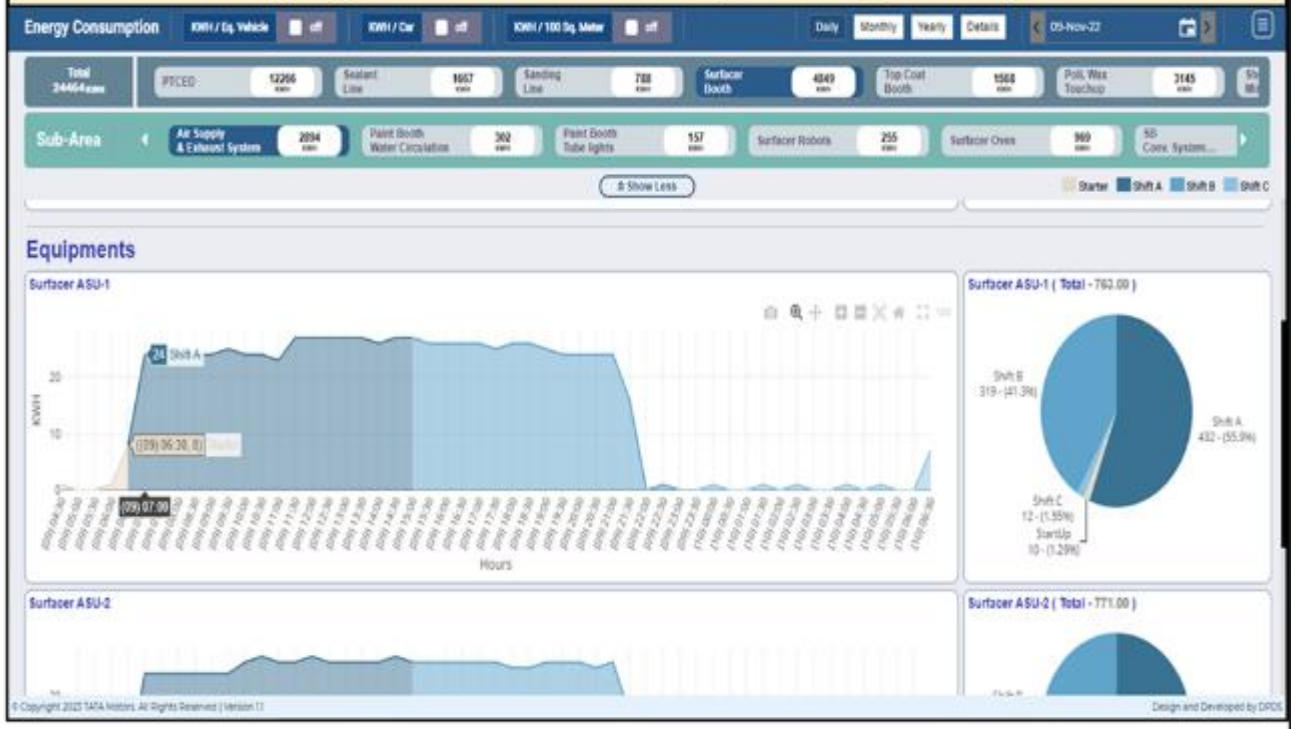
Modified PLC ladder for washer pump ON/OFF operation



Mapping Before & After consumption using Industry 4.0



- Energy Saving achieved by Automation ON/OFF of Washer pumps per day 1 hour
- Manual pump On/Off delay by operator is eliminated
- Rework on cab at Touch up booth eliminated which were of Rundown on cabs generated due to low temperature in booth.
- **Energy Saving = 34,500 kWh/Annum**
- **Emission Reduction = 24.5 tCO2e/Annum**

6. Innovation Project 8 - In-house Empty skid conveyor Capacity improvement.

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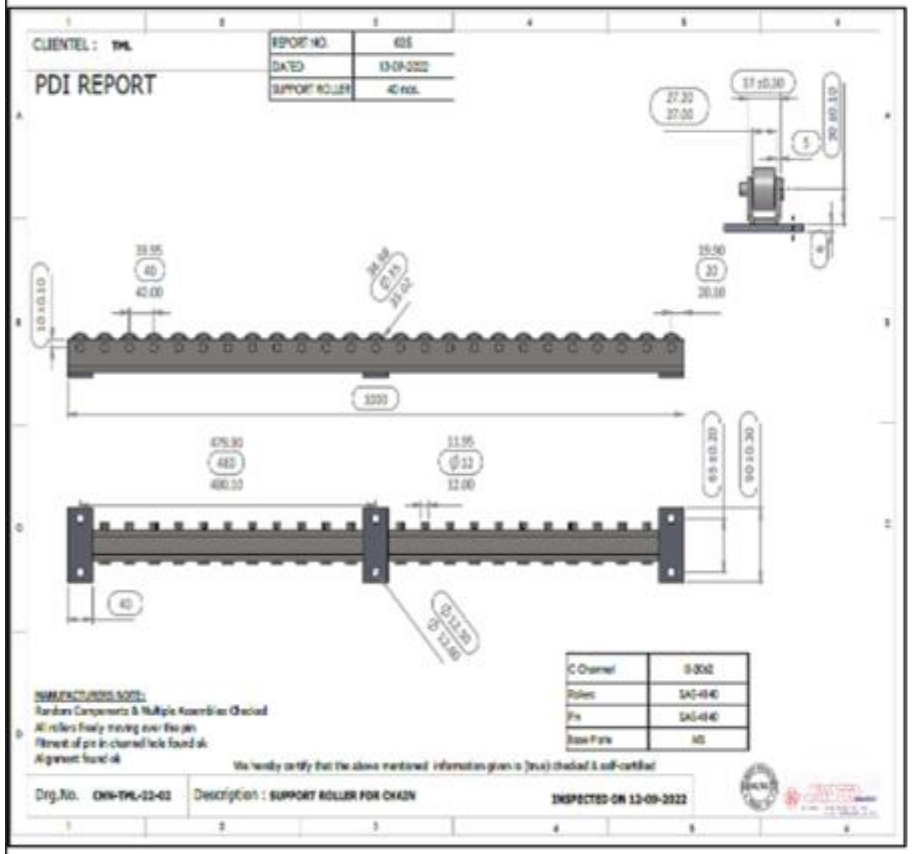
Idler Roller Drwg.



MODIFIED CONVEYOR

Fuel Saving due to Empty skid conveyor Capacity improvement = 9,456 SCM/Annum
Power Saving due to Empty skid conveyor Capacity improvement = 26,880 kWh/Annum
Emission Reduction by Empty skid conveyor Capacity improvement = 40 tCO2e

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Renewable energy generation, utilization and % of Overall Energy consumption

Onsite Generation

Year	Technology (solar/wind/biomass etc)	Installed Capacity (MW)	Generation (million kWh)	% of overall electrical energy consumption
2020-21	Solar	3.8	3.88	3.36%
2021-22	Solar	4.8	4.42	4.33%
2022-23	Solar	4.8	5.78	6.2%

Offsite Generation

Year	Technology (solar/wind/biomass etc)	Installed Capacity (MW)	Consumption (million kWh)	% of overall electrical energy consumption
2020-21	Wind	21.95 + 18	29.95	25.9%
2021-22	Wind & Solar	21.95 + 18 +17	35.55	34.84%
2022-23	Wind & Solar	21.95 + 42.25 + 25.36	50.5	54%

7. Utilization of Renewable Energy Sources

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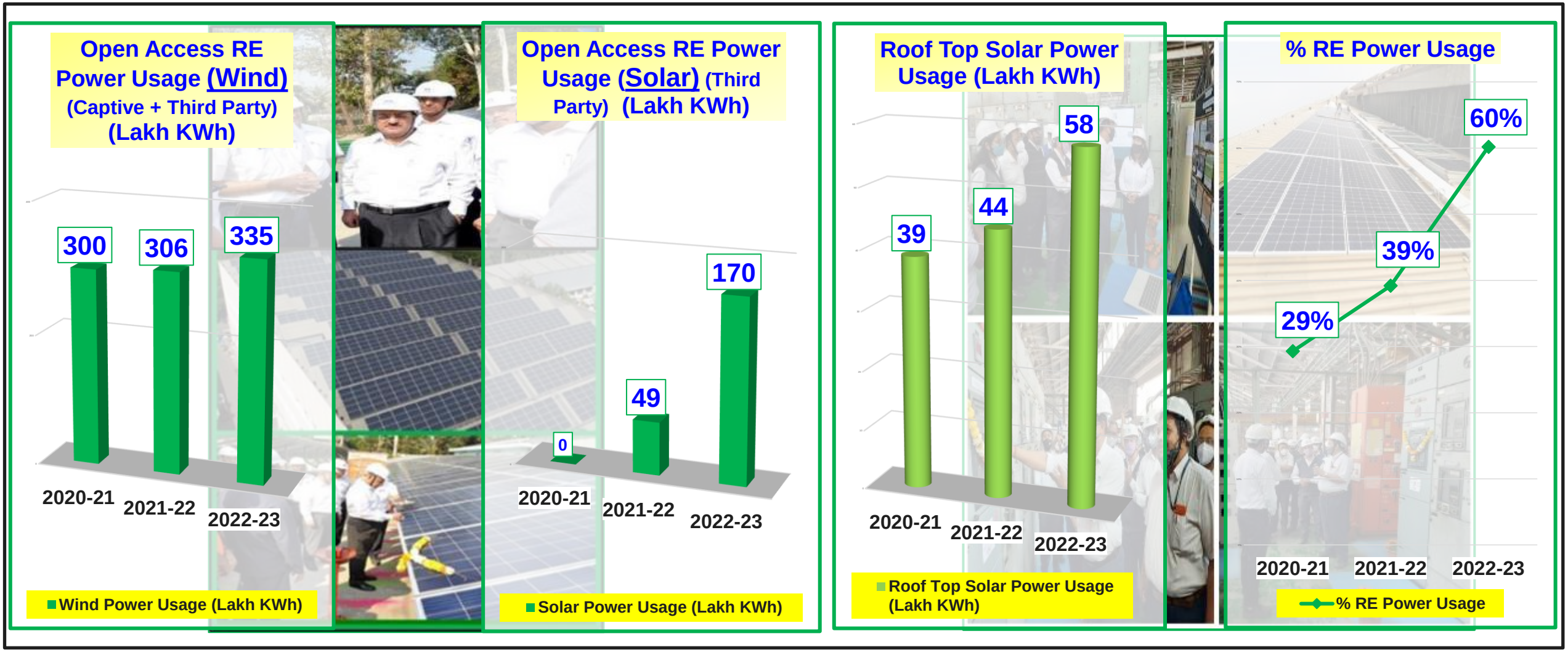

8. Waste Utilization and Management

Waste Utilization and Management

8. Waste utilization and management

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No	Type of waste generated	2020-2021	2021-2022	2022-2023	Disposal method
		Quantity of waste generated (MT/year)	Quantity of waste generated (MT/year)	Quantity of waste generated (MT/year)	
1	Grinding sludge	87.83	109.10	81.36	Landfill after treatment
2	Phosphating sludge	13.14	24.83	41.45	Landfill after treatment
3	Paint sludge hazardous kachara	234.55	265.35	381.62	Incineration
4	Waste oily Scum	15.14	32.08	14.86	Incineration
5	Spent Resin	0.86	0.35	2.04	Incineration
6	Asbestos	5.75	5.52	0.4	Landfill
7	Glass wool	0.75	1.96	2.22	Landfill
8	Chimney soot	0.33	0.00	0.06	Incineration
9	FRP Waste	0.72	1.26	1.62	Landfill
10	Shot blasting dust	7.94	6.90	12.26	Landfill after treatment

8. Waste utilization and management

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No	Type of waste generated	2020-2021	2021-2022	2022-2023	Disposal method
		Quantity of waste generated (MT/year)	Quantity of waste generated (MT/year)	Quantity of waste generated (MT/year)	
11	ETP-Industrial sludge	355.95	862.84	348.7	Landfill after treatment Through Authorised MPCB
12	ETP-Domestic sludge	10.02	13.70	0.1	Landfill after treatment
13	Nickel + Al catalyst	0.38	0.9	0.1	Landfill
14	ERC pattern waste	14.82	10.16	20.48	Incineration
15	HFO sludge	0	0	0	Incineration
16	Door, Roof liner	4.8	3.58	5.4	Landfill
17	Broken Tube lights	0.99	1.12	1.0	Landfill after treatment
18	Paint sludge - MPCB Regd. Re-cycler	61.91	50.06	65.98	Recycle
19	Paint sludge - MPCB Regd. Re-cycler	84.76	119.54	36.74	Recycle
20	Paint sludge - MPCB Regd. Re-cycler	0	0	62.04	Recycle

8.Water Consumption Status

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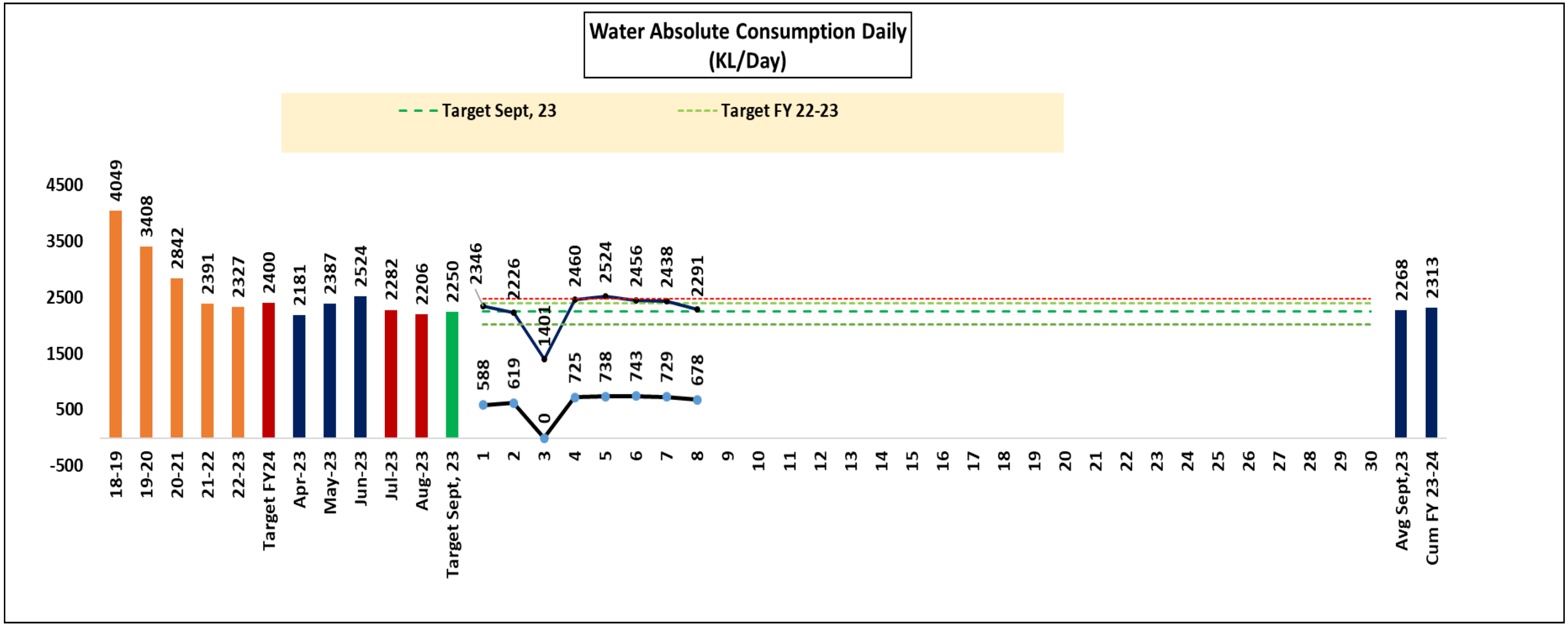
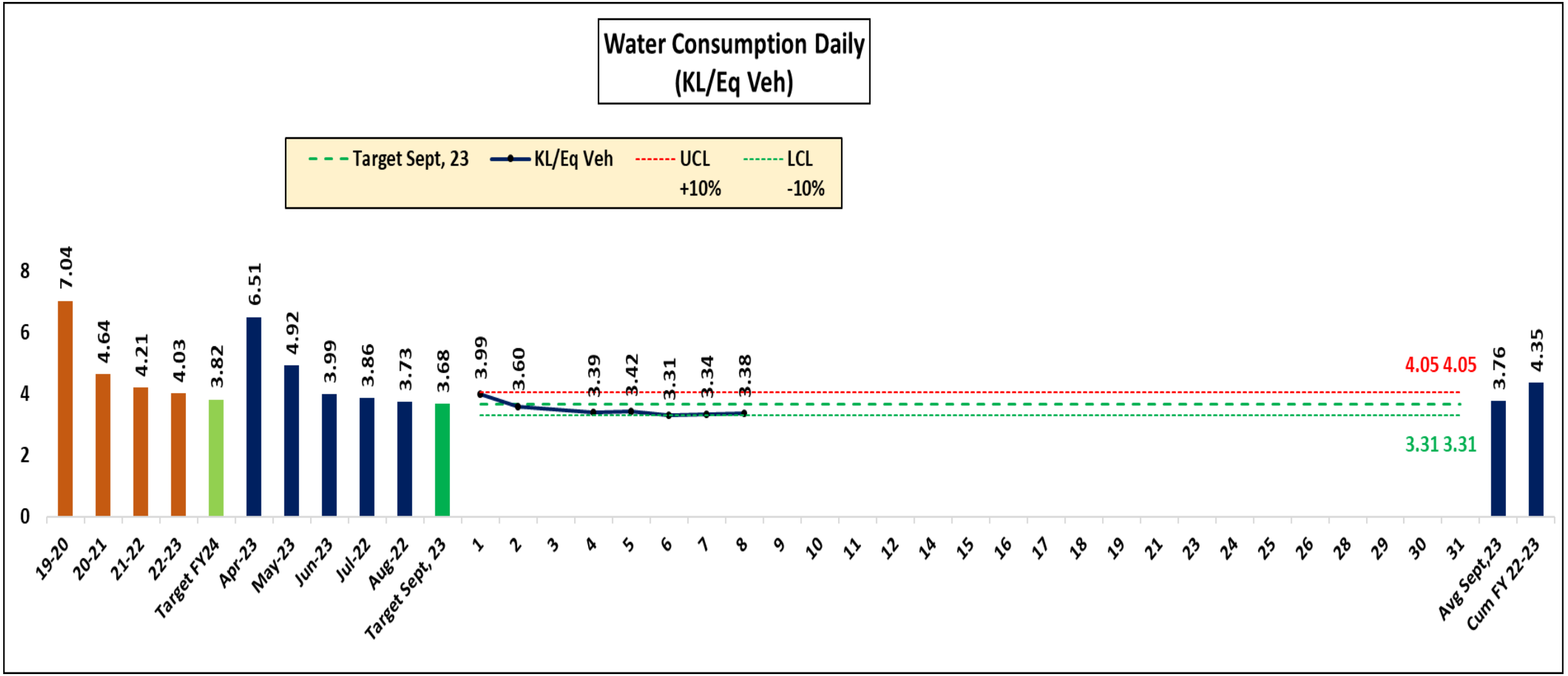
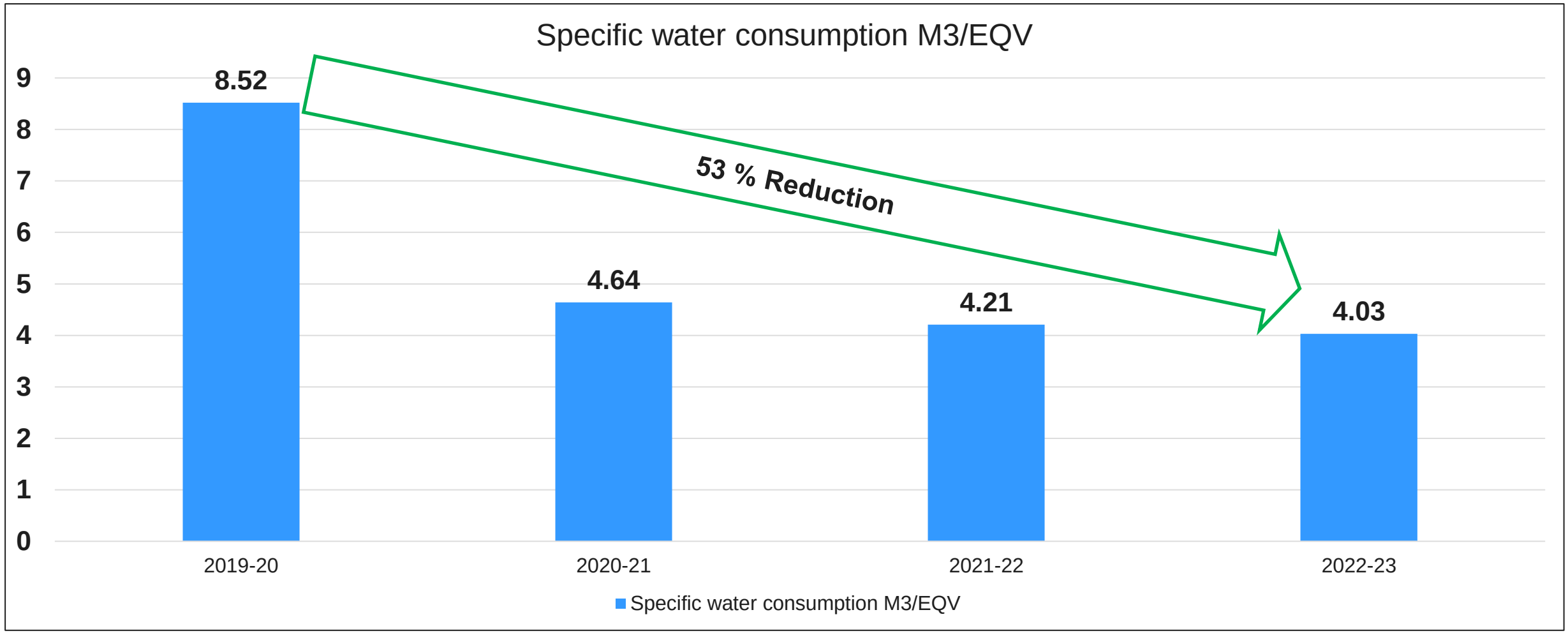


CFT formed for Water consumption reduction at plant Level.
2.5 KM Old underground headers line replaced with above ground.
IoT base Consumption monitoring is planned for individual block.

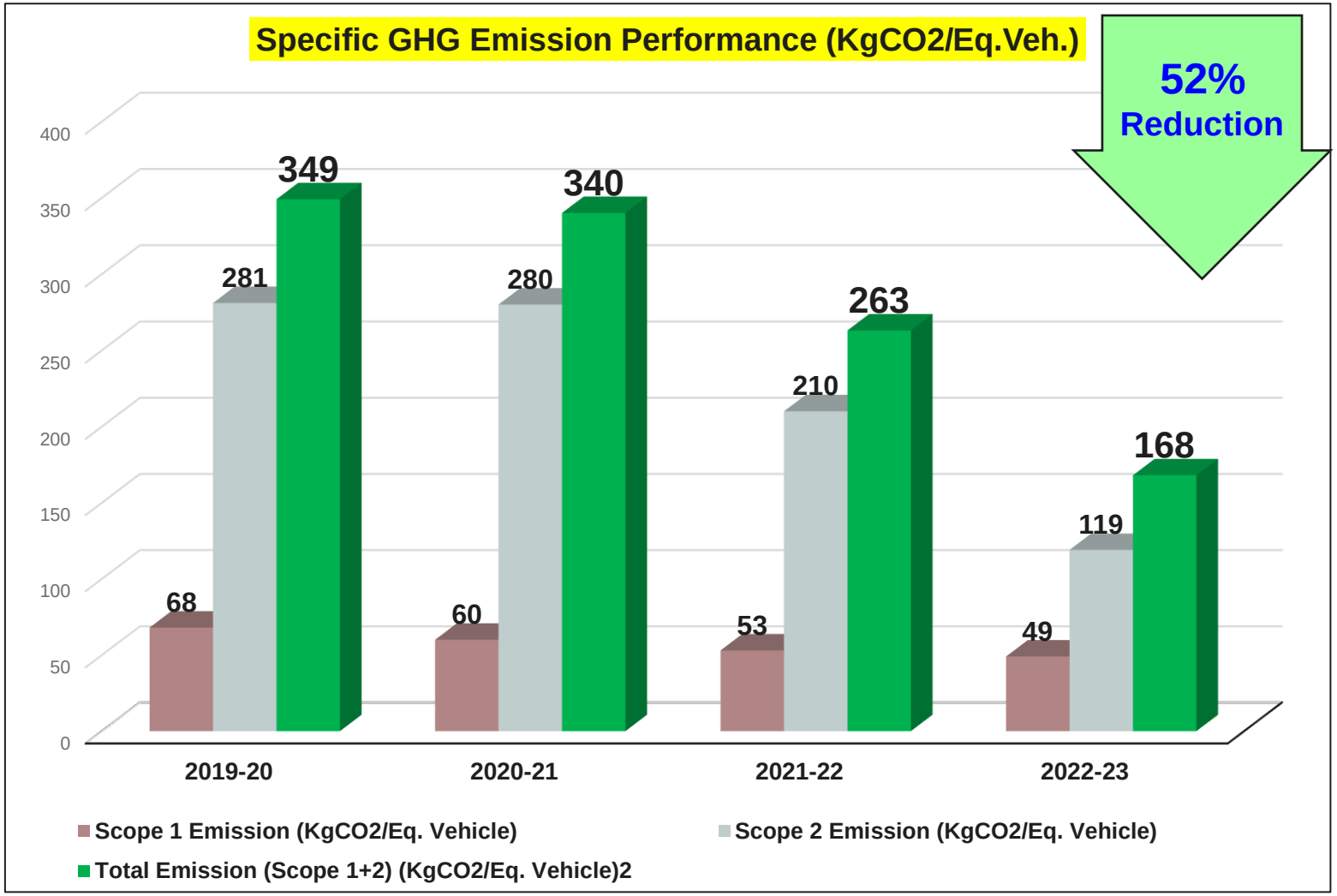
8.Water Consumption Status



8.Water Consumption Status



9. GHG Inventorization



Scope	Emission Sources Considered
Scope 1 Emissions	Fuel consumed for - Process Heat Generation - Process Use - Canteen - Engine Testing - Power Generation - Internal Vehicle movement
Scope 2 Emissions	Purchased Electricity excluding renewable energy
Scope 3 Emissions	It is being reported at Company Level.

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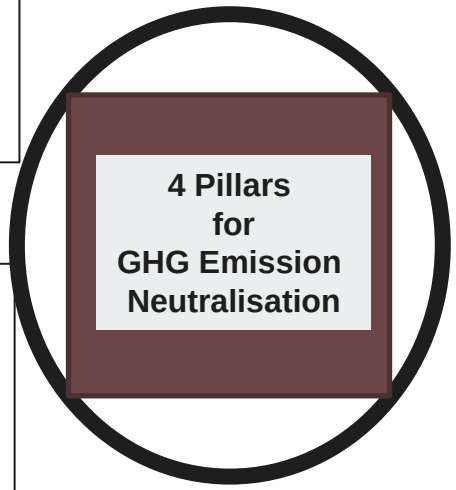
Action Plan for CO_2 Emission Reduction:-

4 Pillars of Neutralising GHG emission

- **Green Power Purchase**
  - \+ Quick gain
  - \+ Manage Business variability
  - \- Recurring add-on Power Purchase expenses

- **EnCOn Projects for Power consumption reduction**
  - \+ Mid & Long term gain
  - \+ Continuous process
  - \+ Reduces Power consumption permanently
  - \+ Improves Operation Efficiency & reduces cost impact
  - \- Controlled by Idea generation & Technology availability /Maturity
  - \- Capex requirement



- **Captive RE / RE100** (Wind, Solar)
  - \+ Mid & Long term gain
  - \+ Reduces Power Purchase cost
  - \- Controlled by Regulation
  - \- Capex requirement

- **EnCOn Projects for Fuel consumption reduction**
  - \+ Mid & Long term gain
  - \+ Continuous process
  - \+ Reduces Fuel consumption permanently
  - \+ Improves Operation Efficiency & reduces cost impact
  - \- Controlled by Idea generation & Technology availability /Maturity
  - \- Capex requirement

Action Plan for CO_2 Emission Reduction:-

Maximise use of Renewable Energy (Wind Power & Solar Power) with in regulatory framework

1) Captive Wind Power through Open Access

2) Third Party Wind Power through Open Access

3) On-site Rooftop Solar Power Plant.

4) Science Base Target for CO_2 Emission Reduction

Short Term Target : As per MERC order and MSEDCL Circular, we are process to procure RE power to achieve the GHG emission target set at Plant Level , Company & Group Level.

Long Term Target : To install Offsite 25MWp Group Captive Solar Power Plant.

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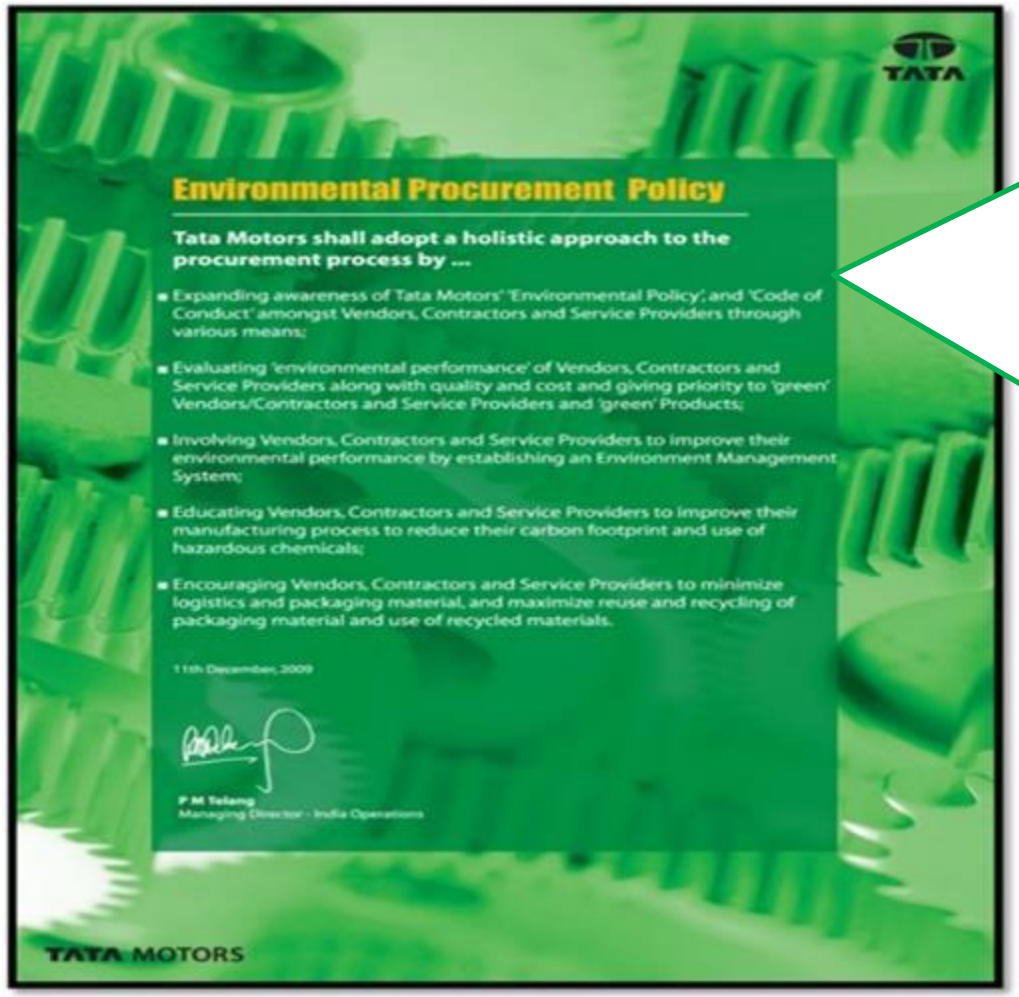
Green Purchase Policy :-



Our **Environmental Procurement Policy** aims at;

- Awareness of **TML Environmental Policy & TATA Code of Conduct** amongst suppliers;
- Environmental performance evaluation and priority to “Green Suppliers”;
- **Encouraging suppliers to improve environmental performance** and implement **EMS;**
- **Reduce carbon footprint** and use of hazardous substances;
- Minimize logistics and packaging material, Maximize reuse and recycling.

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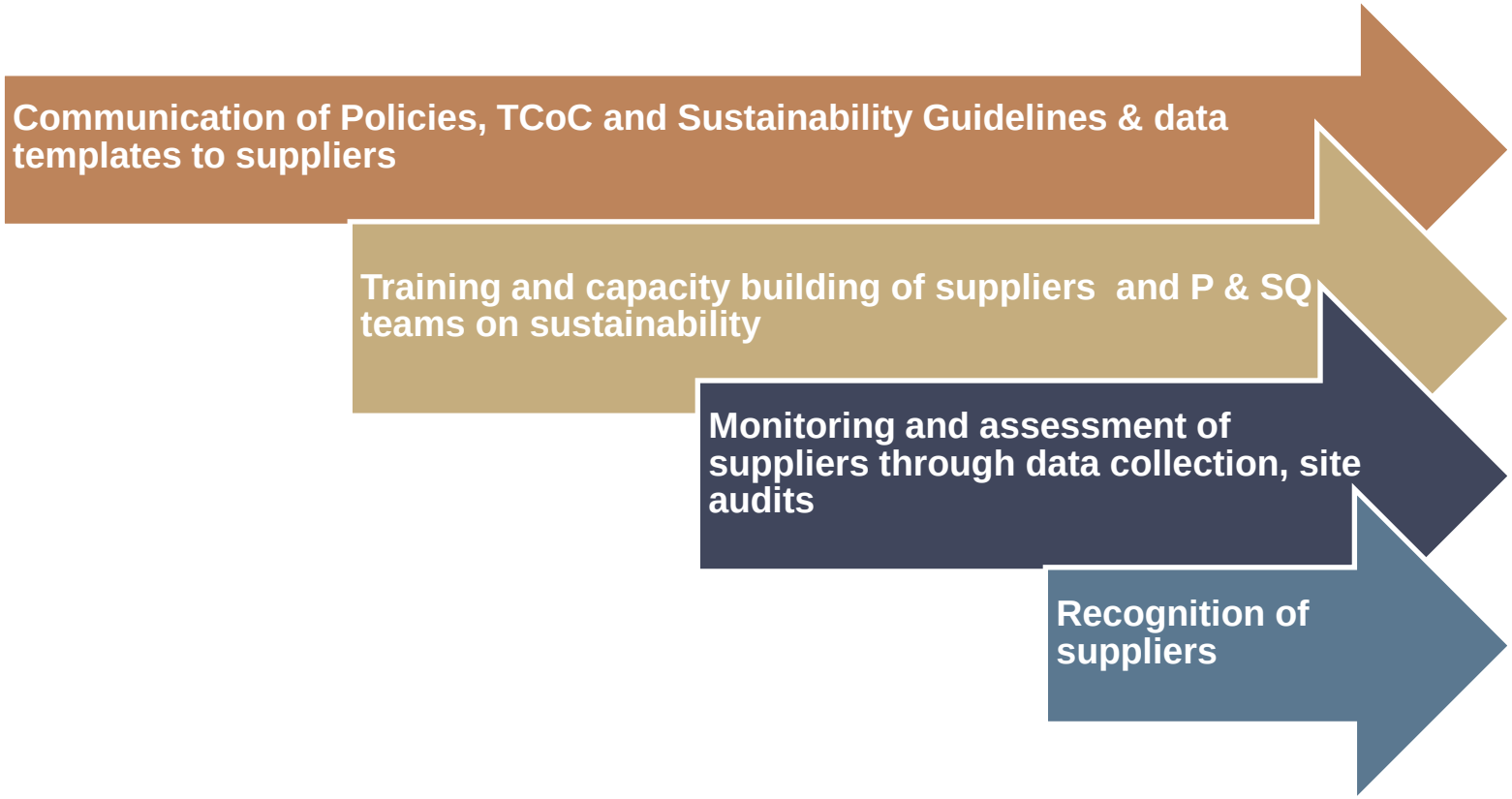
Supplier Evaluation/audit :-



Sustainability Guidelines for Suppliers were prepared covering key topics;

- ✓ Governance
- ✓ Legal Compliance
- ✓ Tata Code of Conduct
- ✓ Management System Certifications
- ✓ Environment & Climate Change
- ✓ Health & Safety
- ✓ Labor & Human Rights
- ✓ Transparency & Reporting

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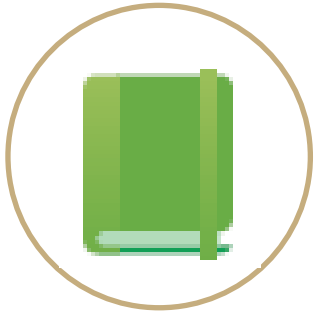
Connecting Aspirations



Green Procurement Policy

Education and awareness

Resource Conservation through SCM Systems

Efficiency Improvement Program for Suppliers

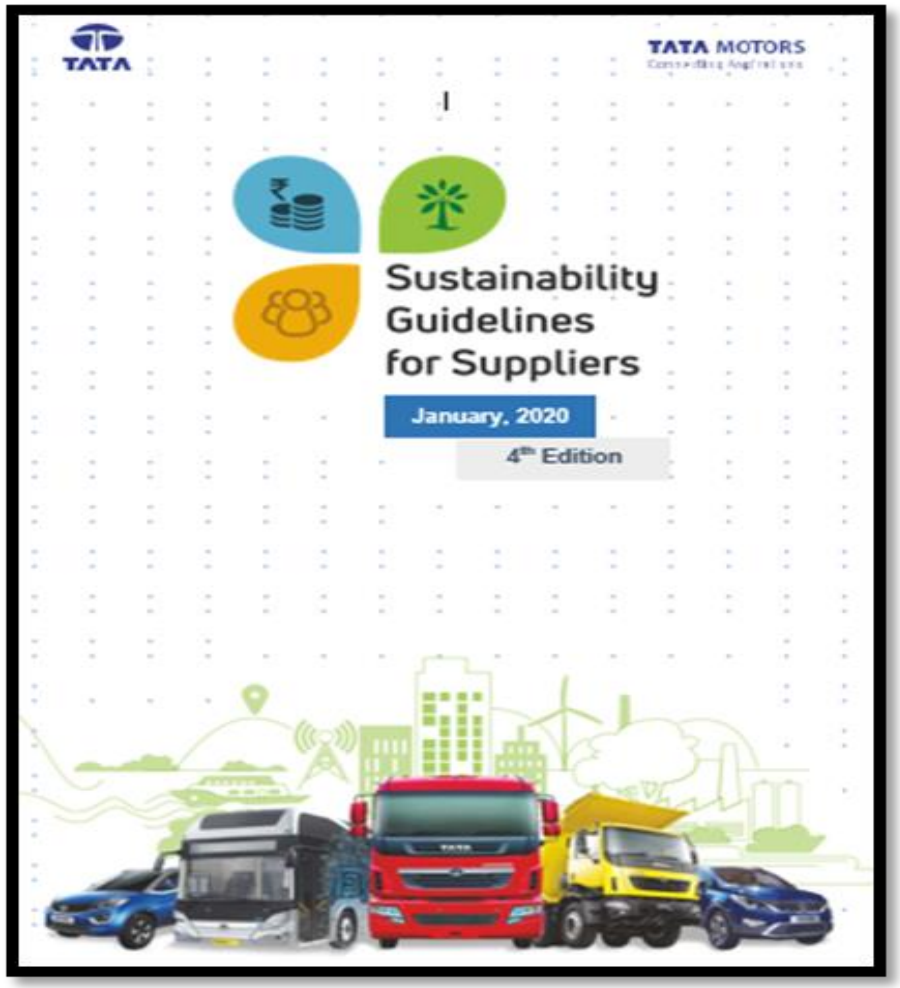
Resource Intensity Reduction in Supply Chain

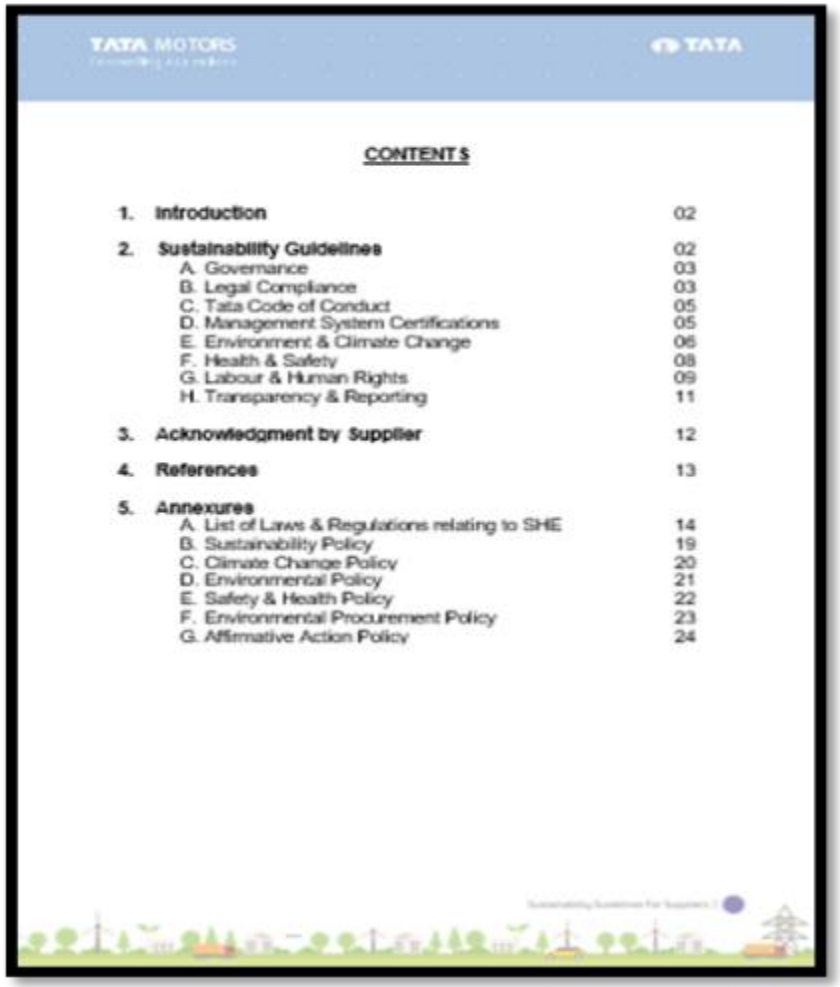
Baseline and target for reduction of Supplier's Resources Consumption

Year on Year Reduction Targets for suppliers :

Parameter	Short Term	Medium Term	Long Term
Energy, Water, Waste	3%	5 %	5-10 %

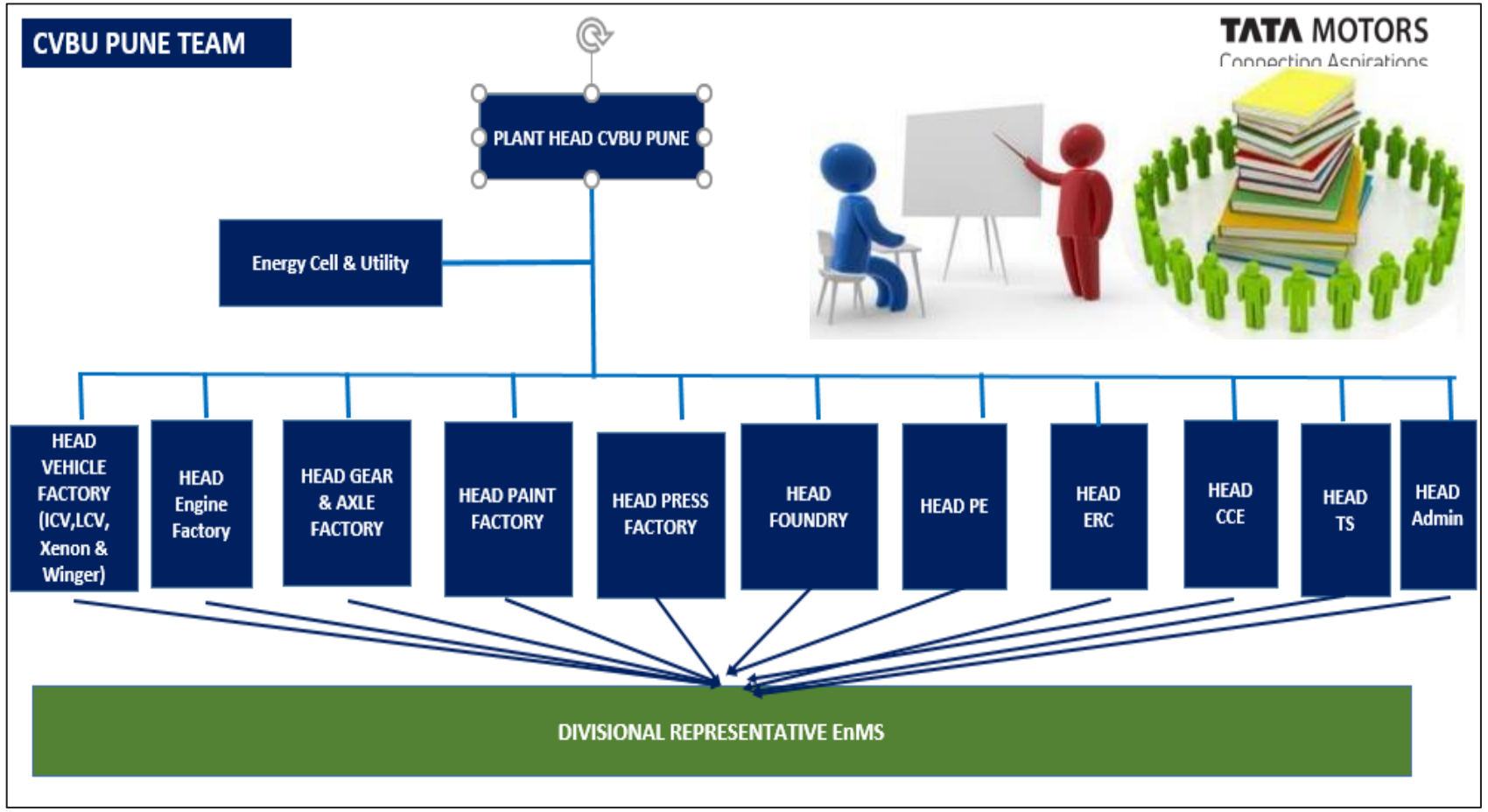
Sustainability Guidelines for Suppliers :-





11. EMS System and other requirements :- Team Work, Employee Involvement & Monitoring

Review meeting chaired by Plant Head. (Hierarchy of Energy Management System)



TML CVBU Pune Team		
Sr No	Energy Team Members	Name
1	Champion CVBU Plant	Mr A K Bala
2	Axle	Mr Balasaheb Pawar
3	Gear	Mr. Manish Salodkar. Mr. Sanjay Dhake Mr. Mahadev Lohar
4	Engine	Mr. Girish Kulkarni. Mr. Sanjay Gaikwad Mr. Rahul Pawar
5	E block	Mr. Pankaj Thaman Mr. Suraj Kumar Sahu
6	Paint Shop	Mr. Nitin Kashid Mr. Sachin Kasture Mr. Anil Pacharne
7	ICV	Mr. .Yogesh Sakhare Mr. Santosh Londhe Mr. Sangram Patil
8	LCV	Mr. Dhananjay Sahane Mr. Parth Karche
9	Xenon	Mr. Pankaj Joshi Mr. A Harikumar
10	Winger	Mr Vijaykumar Mulay
11	CMS Energy Cell	Mr. Vivek Deshpande Mr. Arjun Panwar Mr. Mandar Pande Mr. Mahesh Raste
12	CC&E Energy Cell	Mr. Hemanta Das Mr. Milind Mench Mr. Naresh Gokhale Mr. Ananda Kale Mr. Mahendra Hingse

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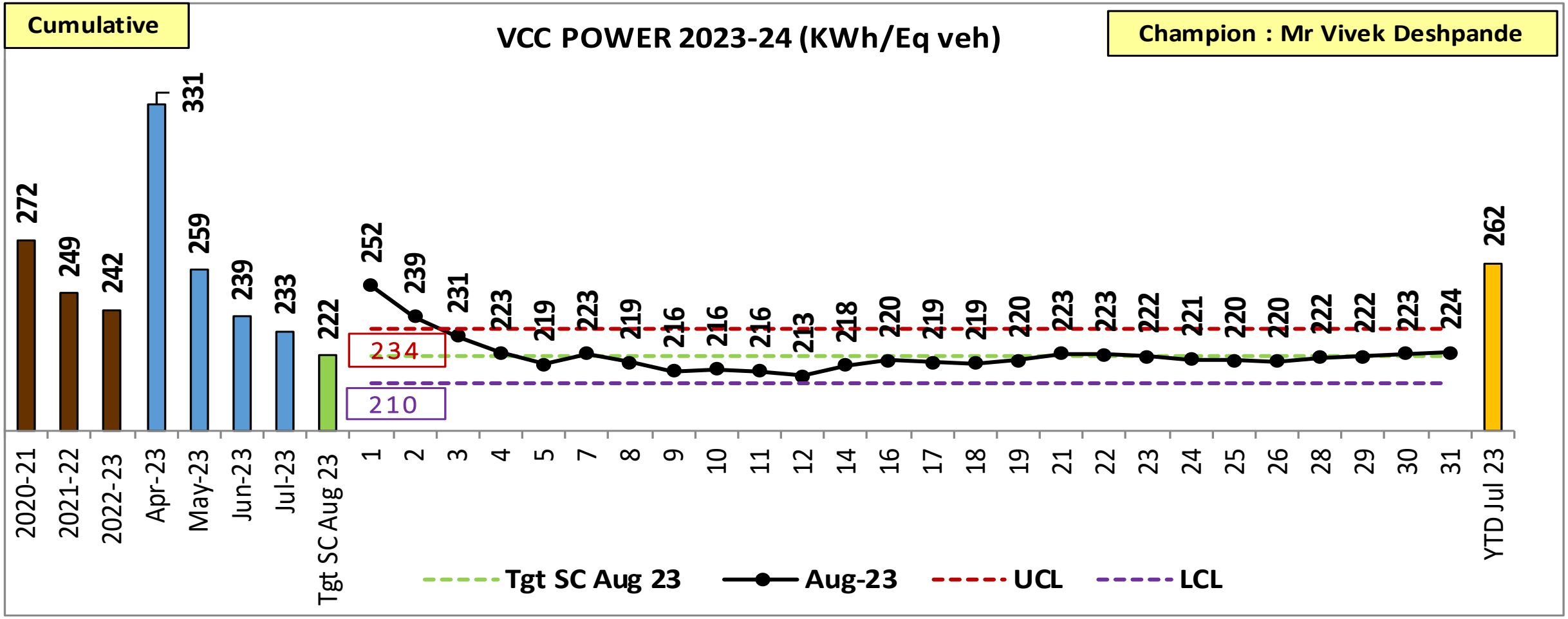

DWM : Power Element Review by Plant Head

11. Energy Performance Monitoring

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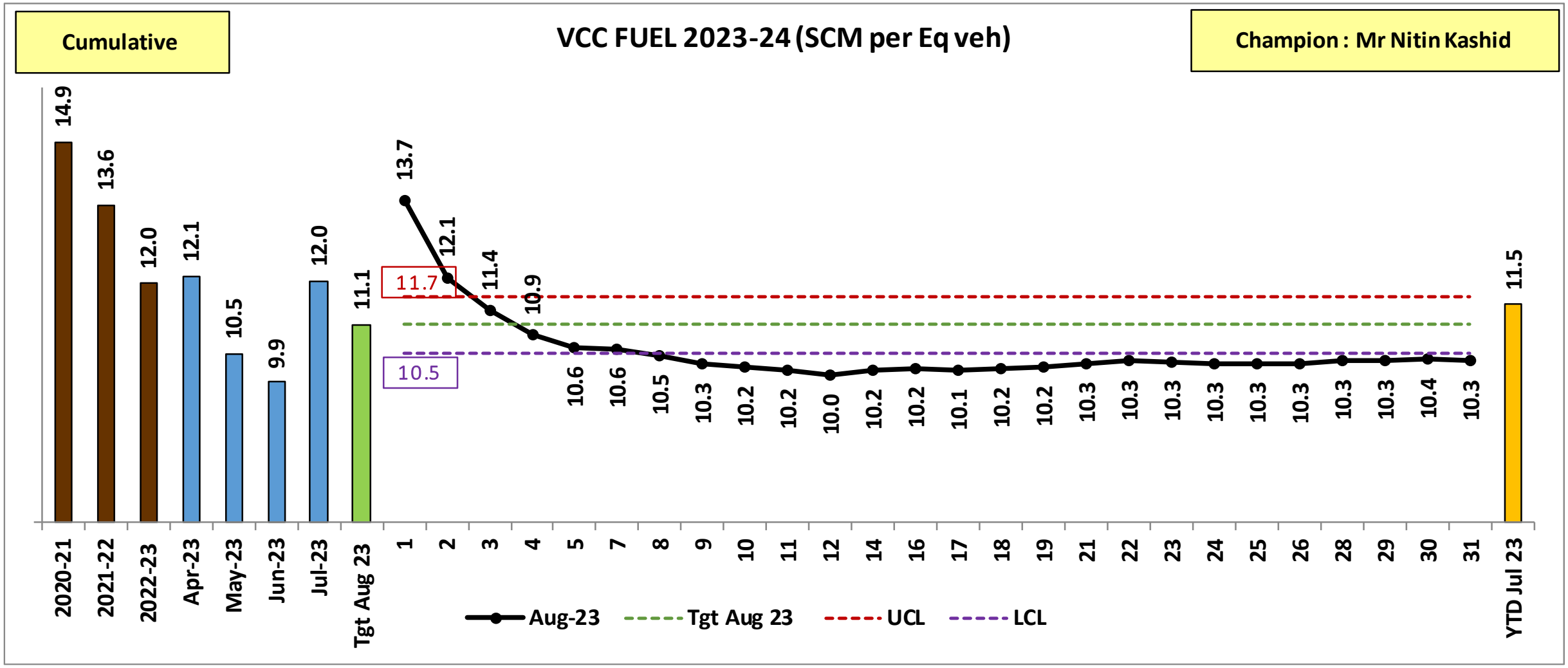

DWM : Fuel Element Review by Plant Head

11. Monitoring

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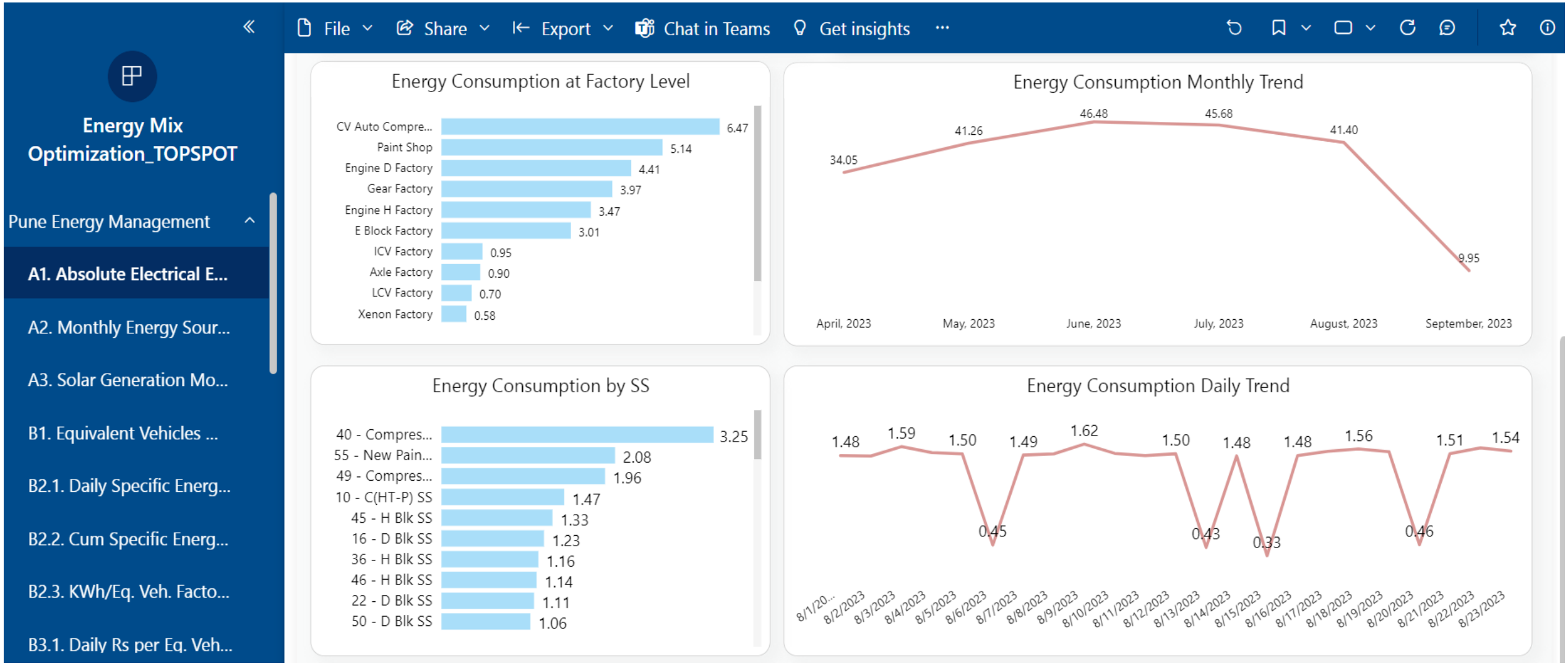

11. Digitization : Digital Journey - 6 Key Themes and 2 Key Enablers added

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Connecting Aspirations

Connected Shops for Lean Manufacturing KT1

- Connected Manufacturing linked through Heinjunka based Assembly Sequence Number to support uniform flow at optimized Inventory Levels

Real Time Equipment Monitoring KT2

- Digital analytics for Cost Optimization and Reduction in GHG Emissions (Scope 1 & 2)
- OEE improvement through Health Monitoring & Prescriptive Maintenance

Online Process Control & Traceability KT3

- Digital Monitoring, Traceability and Analytics of Parts, Processes and Parameters critical for Quality

Process Digitization & Automation KT4

- Digitalization/ Automation for WCR and Digital Work Flow Management
- Leverage Digital Twins for Process Optimization

Leveraging Technology to Enhance Safety Systems KT5

- Digitize Robust deployment in areas identified by Sub-Committees in PDCA
- Leverage Digital for Risk Mitigation as per Hierarchy of Control and Prediction of Potential Hazards

Digital Warehouse Management KT6

- Develop a Model Smart Warehouse using interconnected technologies like smart kitting, AMRs, etc. for end to end supply chain visibility

Digital Workforce KE1

- Develop employee capabilities through upskilling to adopt to new technologies and better communicate, collaborate and connect

4 Layer Architecture

L1	Equipment Connectivity
L2	Networking
L3	Data Aggregation
L4	Application/ Analytics

Business Analytics KE2

- Develop Actionable Business Insights and Predictive Analytics by leveraging AI tools for Key Business Processes

Digitization Roadmap evolved **around 6 Key Themes with Digital Workforce and Business** Analytics being the **2 Key Enablers**

11. Digitization : KT 2 Real time Equipment monitoring : CLT Team Structure

Key Themes	Leader	Co leader	Plant SPOC	TML IT SPOC	Analytics SPOC	DPDS SPOC
Real time equipment monitoring	Amitav Sahay	Adil Bala	Jamshedpur : Biswajit Sarkar Pune : Satish Uttarwar Dharwad: Vinayak Patil Pantanagar : Sudhakar Kumar Lucknow: Nitansh Kambhoj	Mr Saurabh Jain	Mr Abhishek Sharma	Mr Avijit Santra

11. Digitization : IOT 4.0 CV Road map

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	KEY THEMES	FY 20-21	FY 2021-22	FY 2022-23	FY 2023-24	TARGET
KT-1	Connected Manufacturing for Lean Manufacturing	* ATTT dashboard for all Vehicle and Aggregate Assembly Lines * 9 Vehicle Assembly Lines * FBV, Jsr	• Vehicle Assembly Lines • Aggregate Assembly Lines • FBV Vendors IPMS 4.0 | MES | SAP | FLM	• Critical Component Lines • Critical Parts Suppliers • Smart Stores IPMS 4.0 | WMS | PTL	• Critical Suppliers • Digital Kitting E2E Logistics Tracking | AGV | RTLS | eKanban	❑ **25% reduction in ATTT** ➢ Adherence to roadmap of IPMS 4.0 deployment in vehicle and aggregate assembly lines ➢ > 90% ASN Adherence ➢ 30% reduction in WIP Inventory ➢ > 85% OEE
KT-2	Real Time Equipment Monitoring	* Paint Shop, Jsr	• Paint Shops • Heat Treatment & Foundry (POC) • Condition Monitoring in Paint Shop (POC) Smart Meters | Smart Vibration Sensors | Edge Gateway | Analytics	• Heat Treatment • Utilities • Condition Monitoring for Critical Equipment AI-ML | Predictive Process Model	• Energy monitoring for all high energy consumption processes and equipment • Condition Monitoring for Critical Equipment Predictive Maintenance | Prescriptive Process Model	❑ **10% reduction in Specific Energy Consumption** ➢ % of power meters digitized ➢ % of fuel meter digitized ➢ % Deployment of analytics dashboard ❑ **Improving availability by 10%** ➢ Improving MTBF of machines under condition monitoring by 10%
KT-3	Online Process Control & Traceability	* Paint Shop, Jsr * Track & Trace, Pune(POC)	• Track & Traceability of critical parts • Track & Traceability of critical process parameters of Vehicle Assembly and Engine Assembly • Online process monitoring of Paint Shops, Heat Treatment Barcode | Smart Sensors | Edge Gateway | Analytics	• Track & Traceability of all critical process parameters in Aggregate Assembly lines • Online Cp & Cpk measurement of Engine block & head machining (POC) Smart Gauges | Vehicle Genealogy | Predictive Quality	• Online Cp & Cpk measurement of critical machining processes. • AI-ML based Process Control for critical processes. Smart Process Control | Smart Vision Systems	❑ **20% reduction in 3MIS EPV & 30% improvement in 3MIS IPTV** ➢ 100% coverage in traceability of identified critical parts ➢ 80% Pokayoke implementation in identified processes
KT-4	Process Digitization & Automation	* SCARA robot for head cover tightening, Engine Assembly, Jsr * Vision system for bearing shell inspection, Engine Assembly, Jsr	• Work Content Reduction in Vehicle Assy Line • Workflow Automation for redundant activity reduction. • Ergonomic improvement at workplace • Use of Digital Tools (DELMIA) for creating Digital Twins of critical processes. Automated Job Tracking | Automation | Vision Systems | Digital Twin	• Paperless Transactions • Work Content Reduction in Aggregate Assembly Lines • Ergonomic improvement at Workplace • Digital tool for Manpower deployment Cobotics | Smart Automation | Process Digitization | AR	• Work Content Reduction • Ergonomic improvement at Workplace Exoskeleton | Digital Lens | Smart Surveillance	❑ **15 % reduction in Work Content** ➢ Deployment of projects : . Lean Manufacturing concepts . Process Digitization . Deployment of Ergonomic improvement at workplace

– Gist of KT2 :

1) Achieved 93 % digitization of plant level (Sub station) Energy consumption.
2) Achieved 52 % digitization of Equipment level Energy consumption.
3) Achieved 57% digitization of Equipment level Fuel consumption.
4) Completed process parameter monitoring of PTCED line for Paint shop.
5) Daily , monthly , yearly dashboards for real time consumption as well as specific consumption are developed.
6) Completed condition base monitoring at D block for 13 makino machine health and 5 Blower Vibration at D block and paint shop.
7) Energy saving of 1602 kwh/day and 225 SCM/day is achieved at Paint shop from implementation of insights after implementing equipment level digitization.

11. Digitization : KT 2 Real time Dashboard

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Activity Description		JSR			PNE			LKN			UTK			DWD			
		PLAN		Actual	PLAN		Actual	PLAN		Actual	PLAN		Actual	PLAN		Actual	PL
	Areas Planned in Fy 24	Annual	Aug-23		Annual	Aug-23		Annual	Aug-23		Annual	Aug-23		Annual	Aug-23		Annual
1	Electrical power monitoring (Plant level)	90	10	10	100	100	100	100	100	100	100	95	95	100	80	80	98
2	Electric power monitoring (Equipment level)	90	72	72	65	52	52	55	55	55	100	41	41	80	60	60	78
3	Fuel monitoring (Plant Level)	85	51	51	65	57	57	100	70	70	82	80	80	100	100	100	86
4	Fuel monitoring (Equipment Level)	85	51	51	65	57	57	100	70	70	82	80	80	100	100	100	84
5	Real time monitoring of Water	80	0	0	50	0	0	100	0	0	100	0	0	100	5	5	86
6	Condition monitoring of Equipment (No of equipment)	100	41	41	36	18	18	40	2	2	22	4	4	6	2	2	204
7	Condition monitoring of Process (No of Process)	350	320	320	155	146	146	145	90	90	138	138	138	12	12	12	800

11. Digitization : Insights table from Energy and Fuel consumption monitoring CVBU Pune paint shop:

Page 1

Sr.No	Analytics Insight	Project Undertaken	HD	Projected Saving	Status	Status
1	Special mode creation in topcoat booth (base coat) to optimize consumption.	PLC Logic modification to optimise consumption in top coat booth(base coat) ASU area.	1	196 kWH/ Hr	392 KWH/Day	
2	CED Line :- UF2 Pump optimization during non Production Hours.	PTCED line pump on/off time optimization by atomization. for ex:UF2	1	12 KWH/Hr.	108 KWH/Day	
3	Surfacer Paint booth :- Optimisation of Supply and Exhaust Blower frequencies after Shutdown Work.	Air Supply unit no 1 and 2 and Exhaust blower frequencies reduced by PLC Logic Modification	1	10 KWH/Hr.	160 KWH/Day	
4	Clear Coat Paint booth :- Optimisation of Supply and Exhaust Blower frequencies after Shutdown Work.	Air Supply unit no 1 and 2 and Exhaust blower frequencies reduced by PLC Logic Modification	1	48 KWH/Hr.	384 KWH/Day	
5	Air Supply unit Washer Pumps On/off automation wrt Booth Temperature	Atomization done to control the running of washer pumps by modifying PLC logic on actual temperature requirement of 25 Degree.	12	15 KWH/Hr	120 KWH/Day	
6	Polishing booth Air Supply unit Blower working optimization in Winter season	Air Supply unit frequency reduction by PLC Logic Modification during specific Period of Working Hours	1	26 KWH/Hr	140 KWH/Day	
7	Sealant booth Air Supply unit Blower working optimization in Winter season	Air Supply unit frequency reduction by PLC Logic Modification during specific Period of Working Hours	1	18 KWH/Hr	108 KWH/Day	
8	Sanding booth Air Supply unit Blower working optimization in Winter season	Air Supply unit frequency reduction by PLC Logic Modification during specific Period of Working Hours	1	15 KWH/Hr	90 KWH/Day	

11. Digitization : Insights table from Energy and Fuel consumption monitoring CVBU Pune paint shop: Page 2

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Connecting Aspirations

Sr.No	Analytics Insight	Project Undertaken	HD	Projected Saving	Status	Status
9	PTCED Line :- Running time optimization during Low Production	PTCED Line :- To stop PTCED Line in 2nd shift with Float of 70 to 90 in BIW Storage. Tentative Stoppage between 4.30pm to 6pm Depending upon Daily Production .	1		100-200 KWH/Day	
10	Top coat Painting booth :- Running in Batch production	Base coat and Top coat Booth :- To start Base coat and Top coat booth with Minimum accumulation of 30 cabs (TPMS , Josh Blue, Winger 2C 1B)	1		120-150 KWH/Day	
11	Optimisation of Shop Ventilation	Ventilation ASU Number 1 Frequency Optimised During Winter Season	1	8 Kwh/Hr	80 KWH/Day	
12	Sealant Line :- Supply and Exhaust blower optimisation during Recess period.	Switching off ASU and exhaust blowers in PLC Logic in Recess period at Sealant Line	1	6Kwh/Hr	12 KWH/Day	
13	Sanding Line :- Supply and Exhaust blower optimisation during Recess period.	Switching off ASU and exhaust blowers in PLC Logic in Recess period at Sanding Line	1	4Kwh/Hr	08 KWH/Day	
14	Sealant Line :-Oven Auto stop During Gaps and Work over.	To develop Logic at sealant oven considering Entry and exit equipments and switching off oven in Auto Mode	1	---	15 SCM/Day	
15	Sealant Line :- To measure Sealant oven consumption after reduction in Oven temperature from 140 to 125 Degree centegrade	Developing Low bake Prejel sealant. Trials to be taken in Batch in Controlled manner. Validating through ERC/QAME.Measuring the consumption before and after doing changes in temperature.	1	230 SCM/Day	220 SCM/Day	

11. Team Work, Employee Involvement & Monitoring
Idea Generation Workshops

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Approach	Method	Design	Procedure
• Energy Savings Idea Generation Workshop factory level & Plant Level FY 22-23-24.	▪ GEAR Methodology ▪ Virtual Idea Generation workshop.	Tools Developed ▪ GEAR Tool ▪ Horizontal deployment of Good practices.	▪ Factory Level & Plant Level Workshop Year Mapping Plan. ▪ Confirm Adherence of each factory as per planned. ▪ Create a Database of Generated Ideas ▪ Follow up of Ideas up to R stage.

Result

- Workshop Conducted @ **Plant level 1 & Factory level 2 Nos.**
- No. of Ideas Generated @ **104 Nos.**
- Potential Saving in ₹ Lakhs **@ ₹ 968 Lakhs**
- Total Evaluation @ **494 Lakhs**

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ENERGY CONSERVATION WEEK CELEBRATION

- 14Th DEC To 20Th DEC 2022

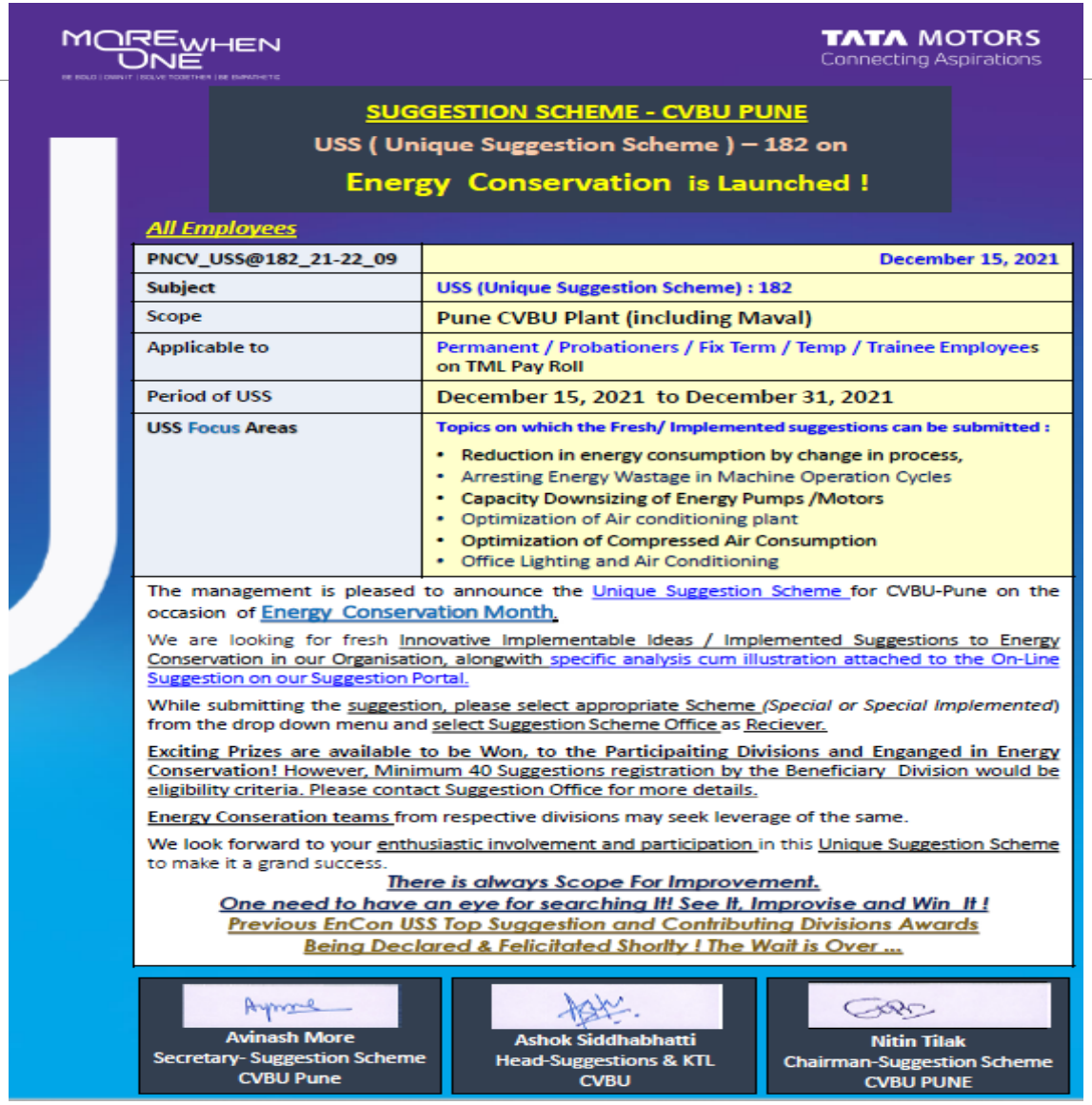
Energy Oath glimpse.








Team Work, Employee Involvement
Energy Suggestion scheme



MORE WHEN ONE

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SUGGESTION SCHEME - CVBU PUNE

USS (Unique Suggestion Scheme) – 182 on

Energy Conservation is Launched !

All Employees

PNCV_USS@182_21-22_09	December 15, 2021
Subject	USS (Unique Suggestion Scheme) : 182
Scope	Pune CVBU Plant (including Maval)
Applicable to	Permanent / Probationers / Fix Term / Temp / Trainee Employees on TML Pay Roll
Period of USS	December 15, 2021 to December 31, 2021
USS Focus Areas	**Topics on which the Fresh/ Implemented suggestions can be submitted :** • Reduction in energy consumption by change in process, • Arresting Energy Wastage in Machine Operation Cycles • Capacity Downsizing of Energy Pumps /Motors • Optimization of Air conditioning plant • Optimization of Compressed Air Consumption • Office Lighting and Air Conditioning

The management is pleased to announce the Unique Suggestion Scheme for CVBU-Pune on the occasion of Energy Conservation Month.

We are looking for fresh Innovative Implementable Ideas / Implemented Suggestions to Energy Conservation in our Organisation, alongwith specific analysis cum illustration attached to the On-Line Suggestion on our Suggestion Portal.

While submitting the suggestion, please select appropriate Scheme *(Special or Special Implemented)* from the drop down menu and select Suggestion Scheme Office as Reciever.

Exciting Prizes are available to be Won, to the Participaiting Divisions and Enganged in Energy Conservation! However, Minimum 40 Suggestions registration by the Beneficiary Division would be eligibility criteria. Please contact Suggestion Office for more details.

Energy Conseration teams from respective divisions may seek leverage of the same.

We look forward to your enthusiastic involvement and participation in this Unique Suggestion Scheme to make it a grand success.

There is always Scope For Improvement.

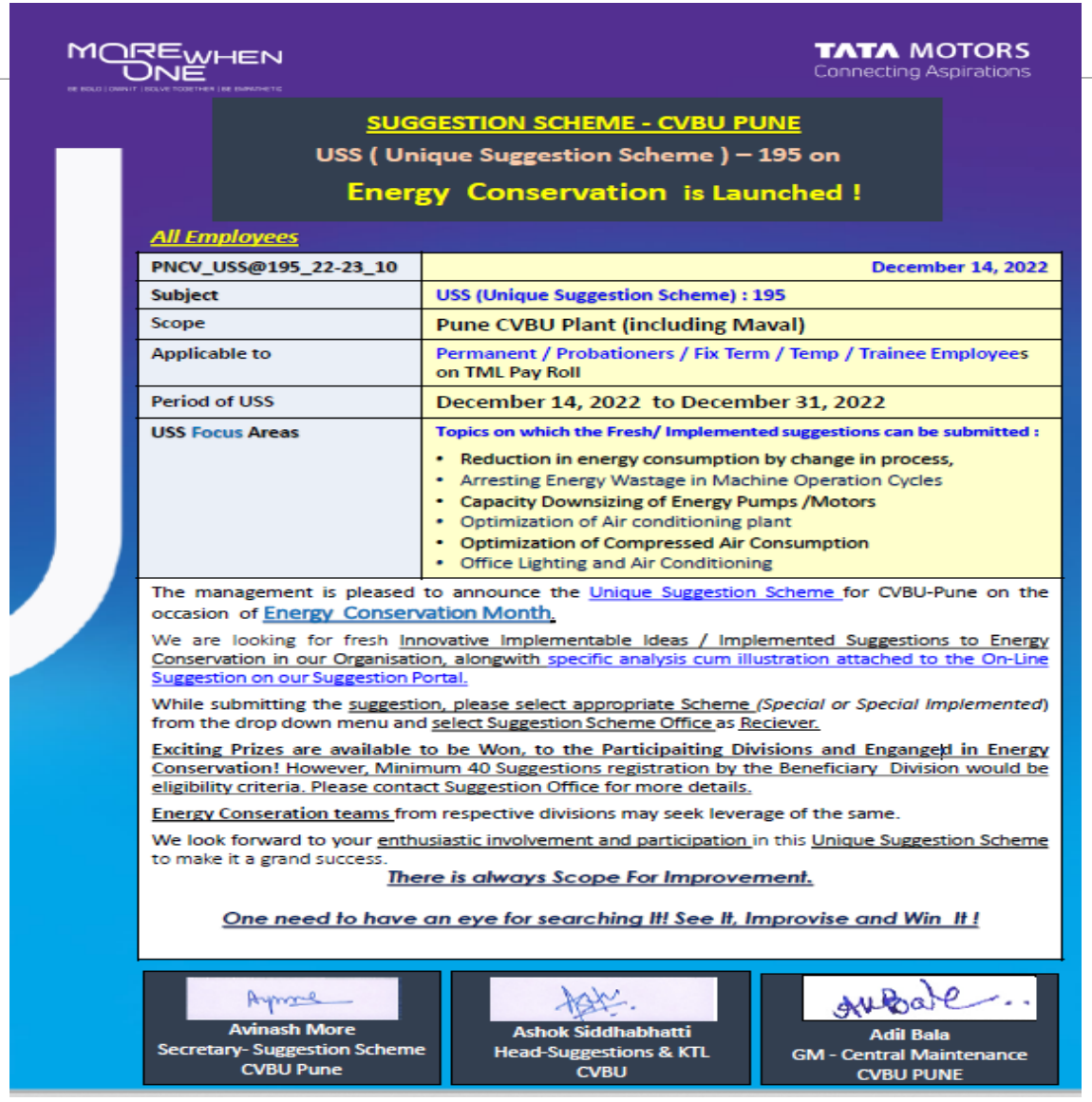
One need to have an eye for searching It! See It, Improvise and Win It !

Previous EnCon USS Top Suggestion and Contributing Divisions Awards Being Declared & Felicitated Shortly ! The Wait is Over ...

Avinash More
Secretary- Suggestion Scheme
CVBU Pune

Ashok Siddhabhatti
Head-Suggestions & KTL
CVBU

Nitin Tilak
Chairman-Suggestion Scheme
CVBU PUNE



MORE WHEN ONE

TATA MOTORS
Connecting Aspirations

SUGGESTION SCHEME - CVBU PUNE

USS (Unique Suggestion Scheme) – 195 on

Energy Conservation is Launched !

All Employees

PNCV_USS@195_22-23_10	December 14, 2022
Subject	USS (Unique Suggestion Scheme) : 195
Scope	Pune CVBU Plant (including Maval)
Applicable to	Permanent / Probationers / Fix Term / Temp / Trainee Employees on TML Pay Roll
Period of USS	December 14, 2022 to December 31, 2022
USS Focus Areas	**Topics on which the Fresh/ Implemented suggestions can be submitted :** • Reduction in energy consumption by change in process, • Arresting Energy Wastage in Machine Operation Cycles • Capacity Downsizing of Energy Pumps /Motors • Optimization of Air conditioning plant • Optimization of Compressed Air Consumption • Office Lighting and Air Conditioning

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We look forward to your enthusiastic involvement and participation in this Unique Suggestion Scheme to make it a grand success.

There is always Scope For Improvement.

One need to have an eye for searching It! See It, Improvise and Win It !

Avinash More
Secretary- Suggestion Scheme
CVBU Pune

Ashok Siddhabhatti
Head-Suggestions & KTL
CVBU

Adil Bala
GM - Central Maintenance
CVBU PUNE

Award and Recognition CVBU Pune FY22-23

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TATA MOTORS CVBU Pune Bags 23rd "**National Energy Leader"** and "**Excellent Energy Efficient Unit**" award for Excellence in Energy Management 2022. Also **TATA MOTORS CVBU is BVI Certified for ISO50001-2018 Company .**

ISO 50001- 2018 EnMS Standard Recertification :

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TATA MOTORS LIMITED

HEAD OFFICE: PIMPRI, PUNE – 411 018, MAHARASHTRA, INDIA.

This is a multi-site certificate. additional site(s) are listed on the next page(s)

Bureau Veritas (India) Pvt. Ltd. (Certification Business) certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the Management System Standard detailed below

Standard

ISO 50001:2018

Scope of certification

DESIGN, DEVELOPMENT AND MANUFACTURE OF LCV, MCV, HCV AND MULTI-UTILITY VEHICLES.

MANUFACTURING OF ALUMINIUM CASTINGS. MANUFACTURING OF AUTO PARTS FOR COMMERCIAL AND MULTI-UTILITY VEHICLES.

Original cycle start date: 07 September 2013

Recertification cycle start date: 06 September 2022

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: 06 September 2025

Certificate No: IND.22.15096/EN/N Version: 1 Issue date: 06 September 2022

Certification Authority
Jagdheesh N. MANIAN
Director – CERTIFICATION, South Asia
Commodities, Industry & Facilities Division

Bureau Veritas Certification

NABCB

TATA MOTORS CVBU Pune is Certified as a ISO50001-2018 (EnMS Standard) in Sep 2022

ISO 50001-2018

TATA MOTORS LIMITED

Standard

ISO 50001:2018

Scope of certification

DESIGN, DEVELOPMENT AND MANUFACTURE OF LCV, MCV, HCV AND MULTI-UTILITY VEHICLES.
MANUFACTURING OF ALUMINIUM CASTINGS. MANUFACTURING OF AUTO PARTS FOR COMMERCIAL AND MULTI-UTILITY VEHICLES.

SITE	SITE ADDITION DATE	ADDRESS	SCOPE
HEAD OFFICE	07-09-2013	PIMPRI, PUNE – 411 018, MAHARASHTRA, INDIA.	DESIGN, DEVELOPMENT AND MANUFACTURE OF LCV, MCV, HCV AND MULTI-UTILITY VEHICLES
SITE 1	07-09-2013	CHINCHWAD, PUNE – 411 033, MAHARASHTRA, INDIA.	MANUFACTURING OF ALUMINIUM CASTINGS MANUFACTURING OF AUTO PARTS FOR COMMERCIAL AND MULTI-UTILITY VEHICLES

Certificate No. IND.22.15096/EN/N Version: 1 Issue date: 05 September 2022

Certification Authority
Jagdheesh N. MANIAN
Director – CERTIFICATION, South Asia
Commodities, Industry & Facilities Division

Bureau Veritas Certification

NABCB

In Dec-2020, we have transition from ISO:50001:2011 version to ISO:50001:2018 version.

The ISO 50001-2018 standard helped in emphasizes on below aspects :

- Future energy planning
- Risk & opportunity Identification and assessment.
- Understanding needs and expectations (Internal/External Stakeholder)
- Standardize process of evaluation of legal and other requirement.
- External Issues / Internal Issues.

TATA MOTORS
Connecting Aspirations

Our sustainability pillars for planet resilience

Driving Net Zero

Products driven
- PV by 2040, CV by 2045

Operations driven
- Sourcing 100% renewable electricity by 2030

Following science-based approach for emissions reduction

Pioneering circular economies

Operational circularity
- Zero Waste to Landfill by 2030
- Water Neutral by 2030 and Water Positive by 2040

Product circularity

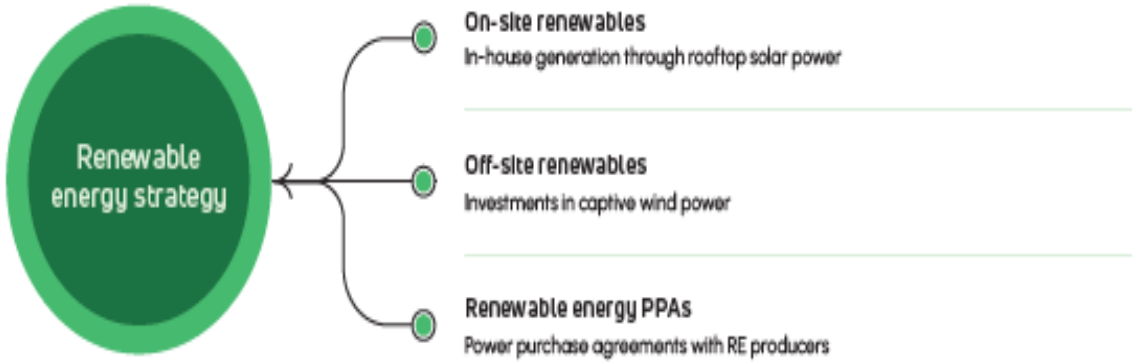
Preserving nature and biodiversity
- Aligning to Global Biodiversity Framework
- Aligning to science to map and set targets across our value chain
- Taking up flagship projects for Nature-based-Solutions

Products Driven : Target by 2045 and
Operations Driven : Sourcing 100%
Renewable Electricity Target by 2030.

Driving decarbonization with renewable power.

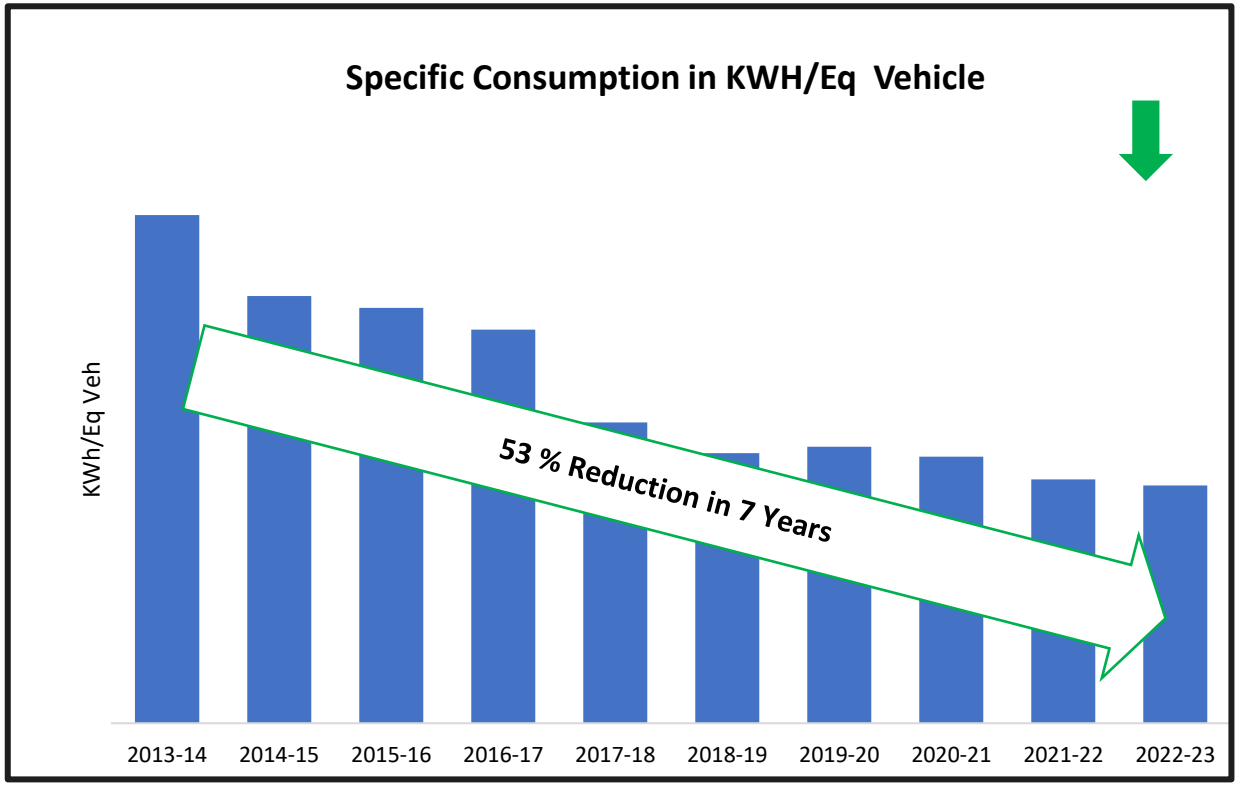
Driving decarbonisation with renewable power

At Tata Motors, decarbonisation in operations will be primarily driven by transitioning to renewable energy sources. We are collaborating with power companies to drive our renewables initiatives forward.



And Journey Continues…

THANK YOU



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