

*“One must forever strive for excellence, or even perfection, in any task however small, and never be satisfied with the second best” – JRD Tata*



**CII National Award for Excellence in Energy Management 2023:  
Tata Motors Passenger Vehicles Ltd, Pune Chikhali Unit**

Team TMPVL Pune



Presenting Team :

Anand Lapalkar (DGM Technical Services)  
Arjun Mahajan (DGM Manufacturing)  
Arani Roychaudhary DGM Strategy  
Manoj Cherian Senior Manager -Operations

Mentor :

Abhay Kulkarni (General Manager -Operations)

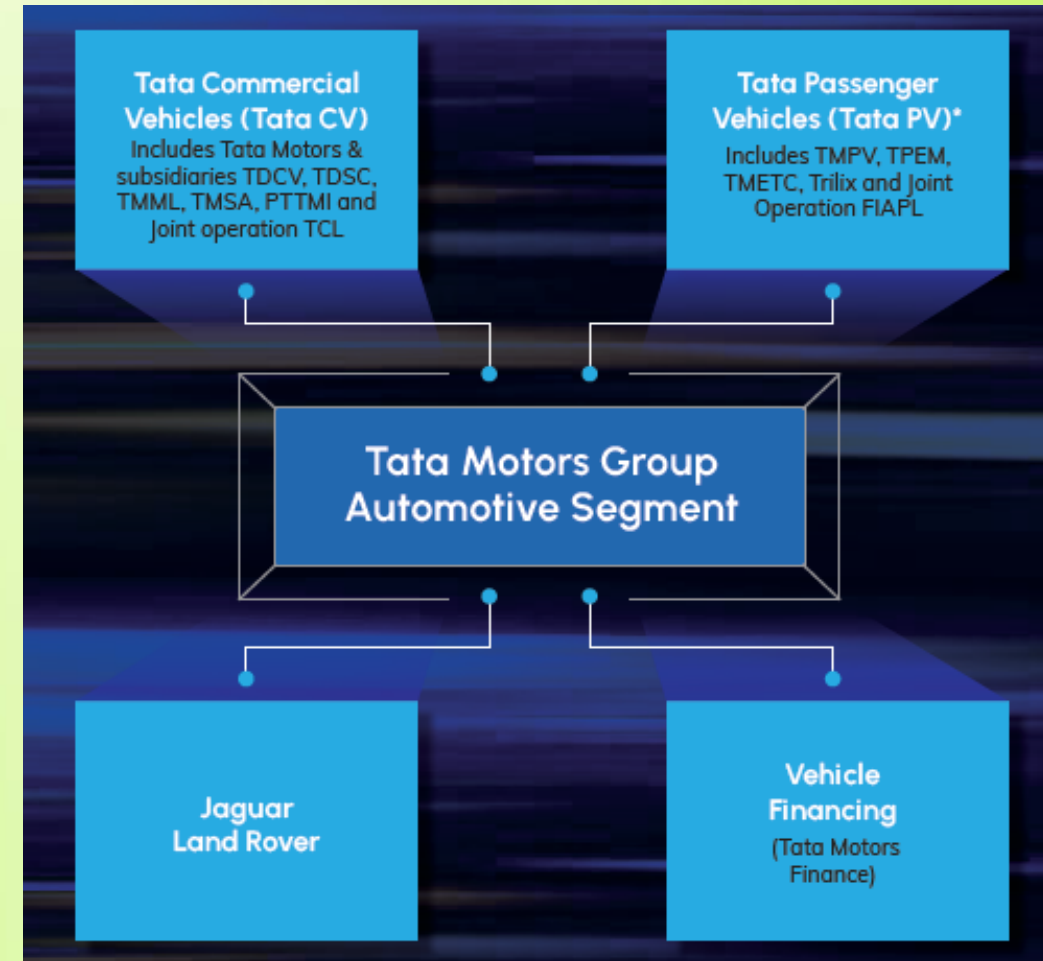
- ❑ Company Profile
- ❑ Energy Data
- ❑ Benchmarking
- ❑ ENCON Project in past 3 years'
- ❑ Innovative Projects (IOT 4.0)
- ❑ Utilization of Renewable Energy
- ❑ Waste Utilization Management
- ❑ GHG Inventorisation
- ❑ Green Supply Chain Management
- ❑ Team Work, Employee Involvement and Monitoring
- ❑ Learning from CII Energy Award Program

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# Company Profile

- ❑ Part of Tata Group founded by Jamsetji Tata in 1868.
- ❑ Tata Motors is among the world's leading manufacturers of automobiles
- ❑ We believe in 'Connecting aspirations' by offering through innovative mobility solutions that are in line with customers' aspirations



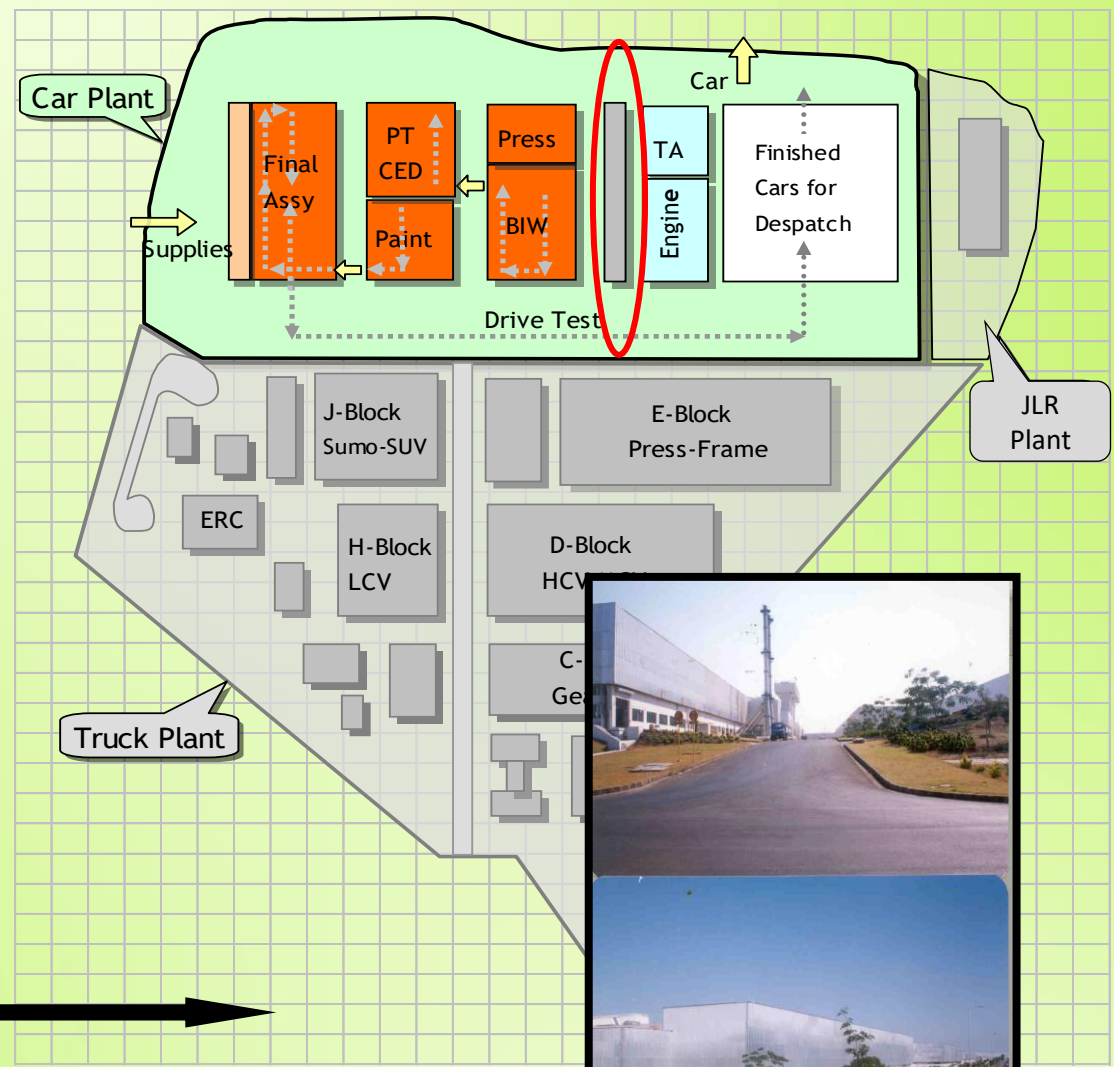
# Car Plant, Pune

## Pune Car Plant was set-up in 31 months

- ❑ Car Plant area : 214 Acres
- ❑ Construction started – March 1996
- ❑ Completed – April 1998
- ❑ Plant capacity – 25 K / Annum (@ Start) ~ 295 K / Annum (Now)
- ❑ Cost – 1700 Cr

**Equipment's:**

- ❑ Nissan Plant – Engine assembly and testing , Weld and Paint shop conveyors , Paint shop equipment.
- ❑ Ford plant in Australia – 3 machining lines were purchased, modified to suit Tata requirements.



# Winning Proactively and Sustainably



**SAFARI/HARRIER**



**NEXON EV/ICE BIW**



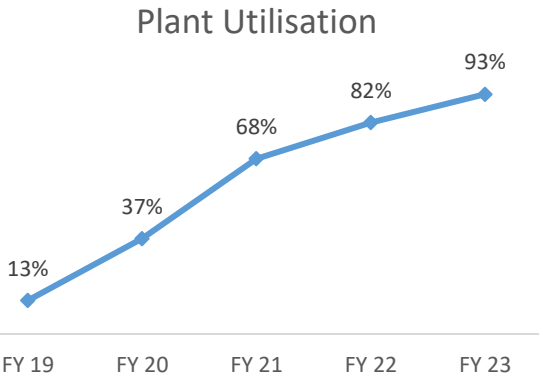
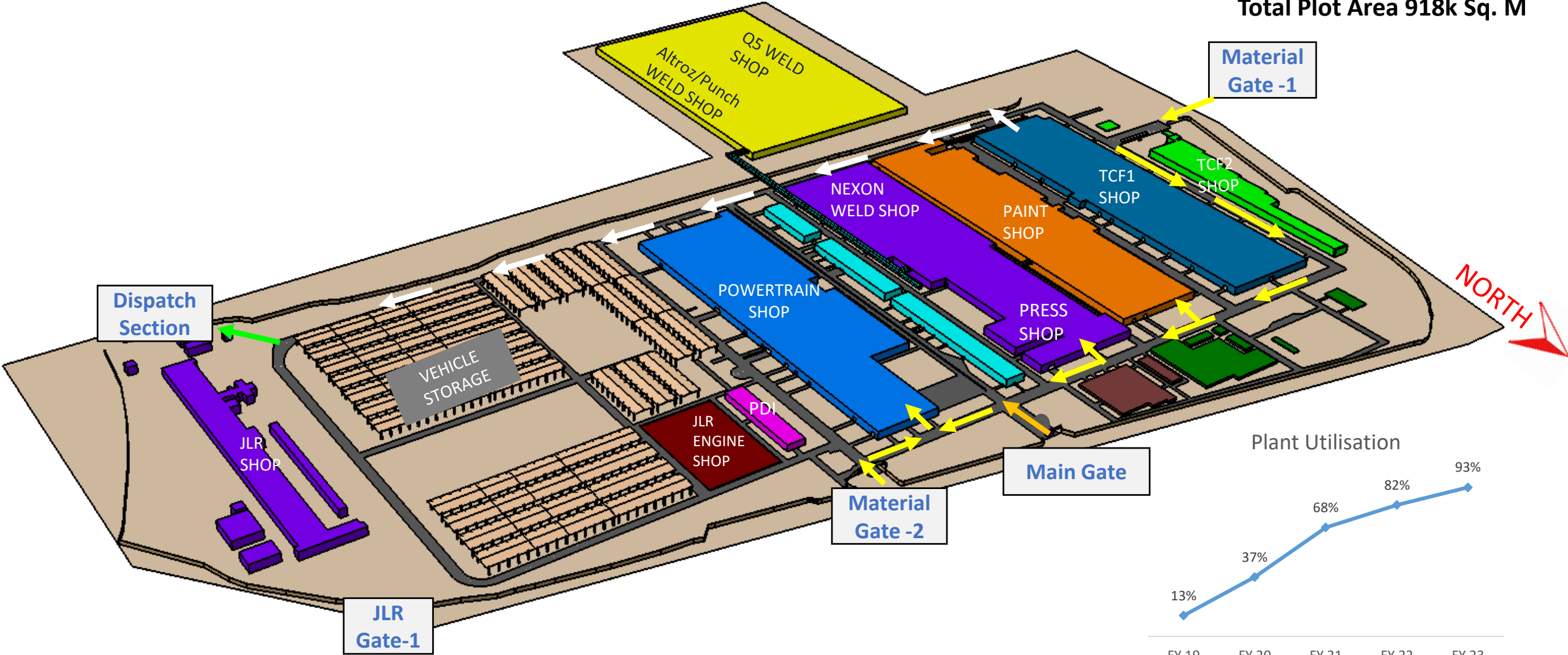
**PUNCH**



**ALTROZ**

# TMPVL Pune Plant Layout

Total Plot Area 918k Sq. M



# Process Flow

**Press Shop**



**Weld Shop**



**Paint Shop**



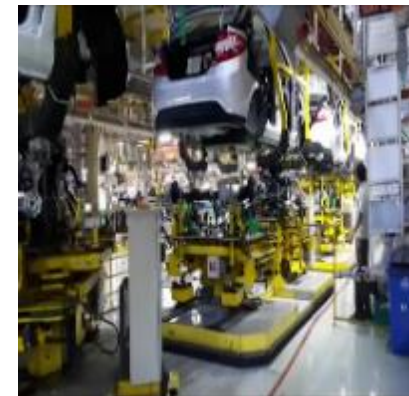
**Powertrain Shop**



**Powertrain Shop**



**TCF Shop**





# Plant Objective: Vision, Mission, Values

## TMPV

### Mission

We innovate mobility solutions with passion to enhance quality of life

### Vision

By FY 2024, we will become most aspirational India auto brand, consistently winning by:

- 1) Delivering superior financial returns,
- 2) Driving sustainable mobility solutions,
- 3) Exceeding customer expectations, and
- 4) Creating a highly engaged work force

### Values

<i>Be Bold :</i>	Risk & Agility
<i>Own it :</i>	Empowered & Owner's Mindset
<i>Solve Together :</i>	Accountable & Collaborate
<i>Be Empathetic :</i>	Diversity & Customer Delight

## Pune Plant Objective

To be **Centre of Manufacturing Excellence by 2024:**



**Zero Safety Incidences**



**Benchmark Quality Products**



**Lowest Cost of Manufacturing**



**Exceed Market Delivery Expectations**



**Creating a Highly Engaged Work force**



**Sustainable Plant Operations**

**Vision Pune Plant - Centre of Manufacturing Excellence**



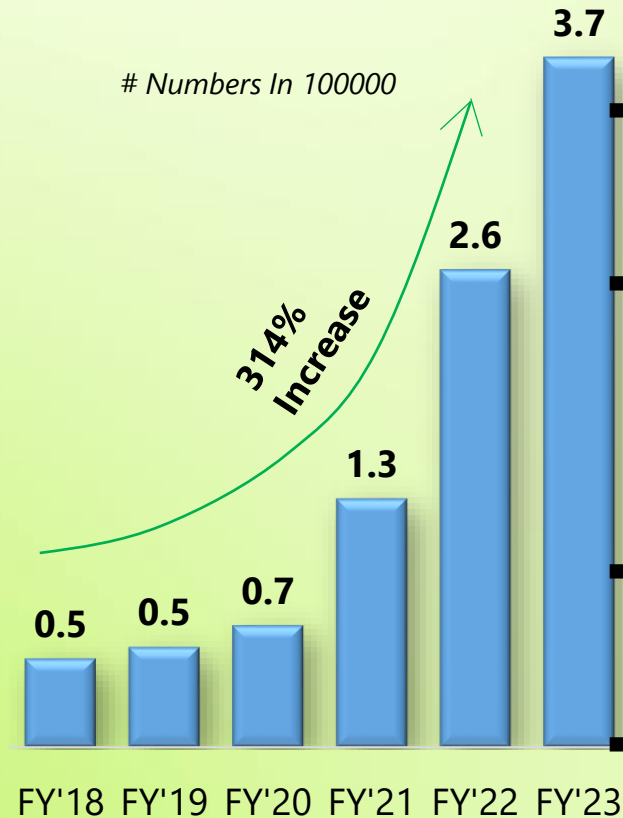
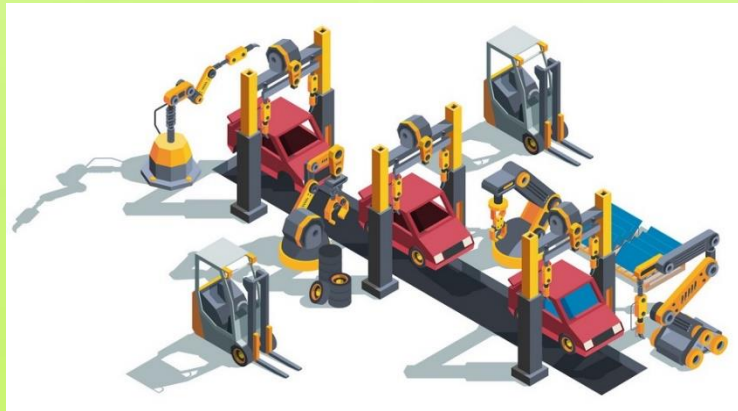
**Sustainable Development is key focus area through various Energy Conservation drive**

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## TMPV Pune Production



**Indian  
Benchmark  
on Production  
Ramp-up**



*Outstanding Production Volume Ramp-up at TML Pune Plant*

*During period affected with challenges of:*

- *Covid-19 Pandemic with 3 waves*
- *Semiconductor shortage and Global Supply chain disruptions*

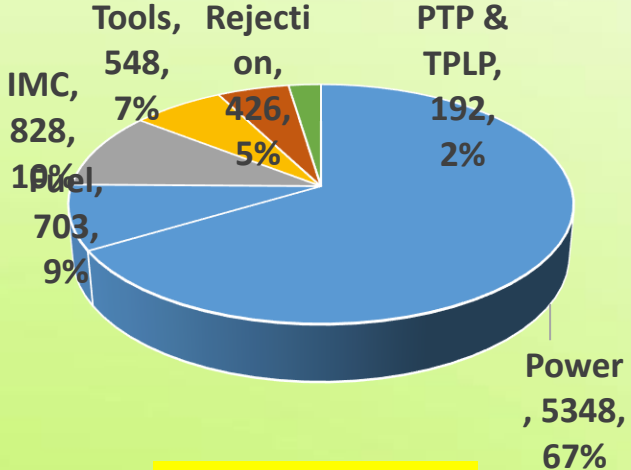
*Y-o-Y 100% improvement in Production Volume from FY20*

*May22: Achieved No:2 Position in Market with highest ever production of 43277 No*

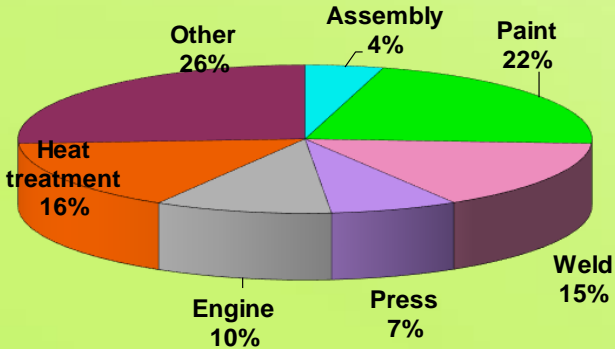
**Production ramp-up in spite of Covid 19 Pandemic and Semiconductor shortages**

# Energy Mapping

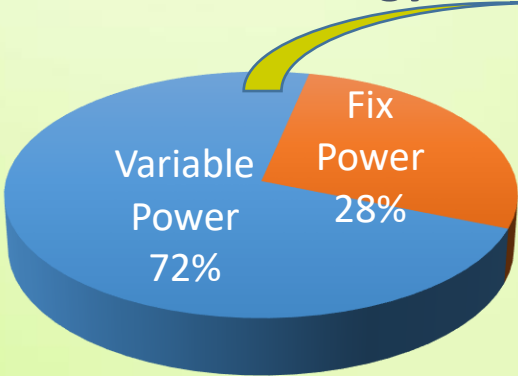
## VARIABLE COST



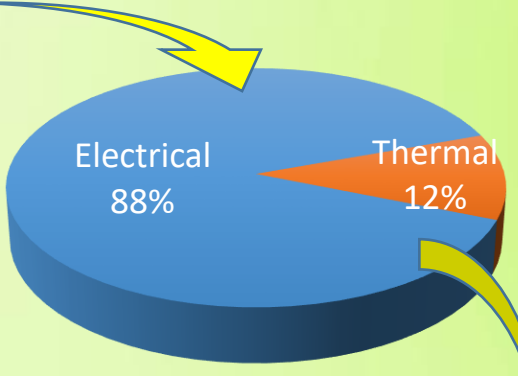
## SHOP WISE POWER



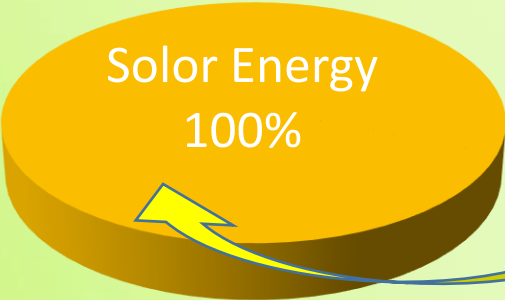
## Electric Energy



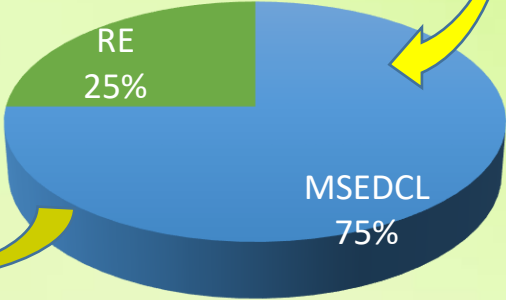
## Total Energy



## Renewable Energy

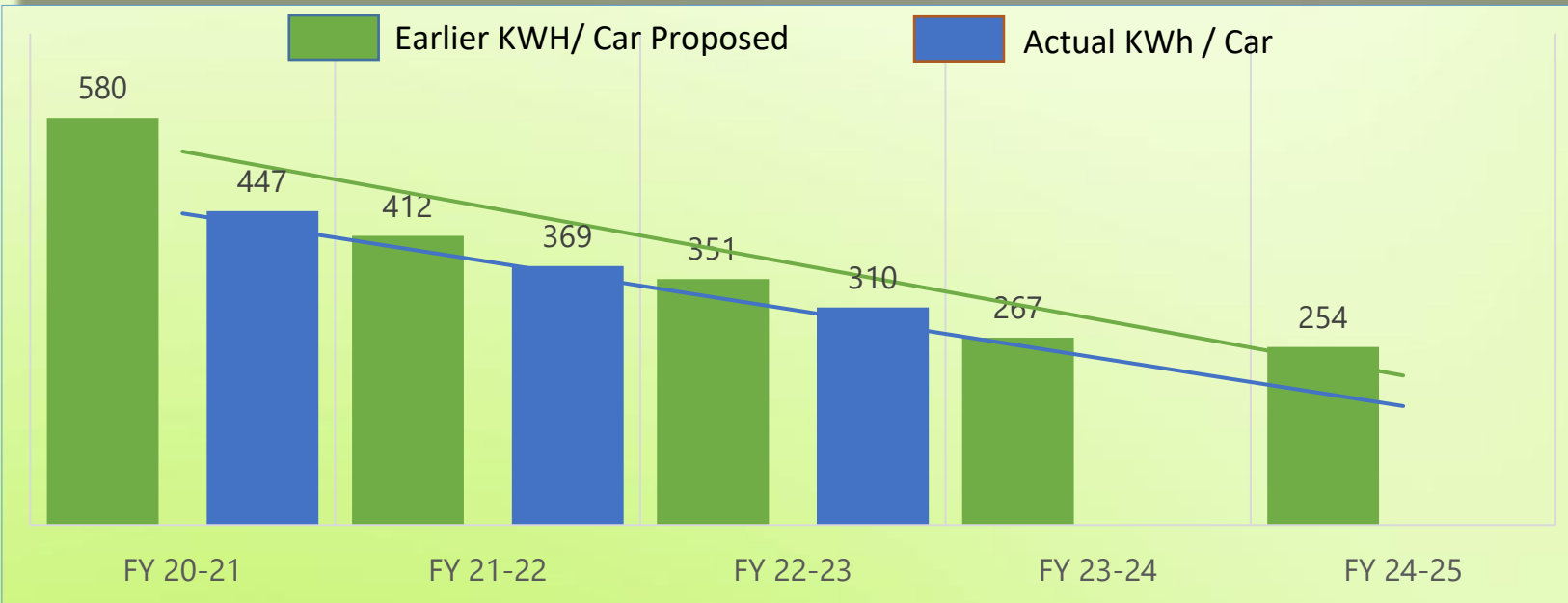


## Power



**Focused Area is Paint Shop and Compressor House**

# TMPVL Pune Plant ENCON Strategy



**Methodology**

- Opportunity identification and bench marking
- Prioritization of idea and identification of project
- Idea generation through people involvement
- Feasibility study for implementation
- Cost benefit analysis and business case
- Top management review and budget approval
- Implementation of project & Monitoring results
- Horizontal deployment across all plant

## FY 20-21

1. Renewable Energy (Under installation – 86.40 L KWH/Yr.)
2. LED Lighting (Migration to LED – end Jan 21, 1 Cr./Yr. →3 Crs./yr.
3. Compressed Air leakage reduction : target 10% of overall consumption

## FY 21-22

1. Waste heat recovery project for Compressor House
2. Electric Pump for Paint Kitchen
3. Compressed Air leakage reduction target 8% of overall consumption

## FY 22-23

1. Multistage Rectifier CED Paint shop
2. Compressed Air leakage reduction target 6% of overall consumption

## FY 23-24

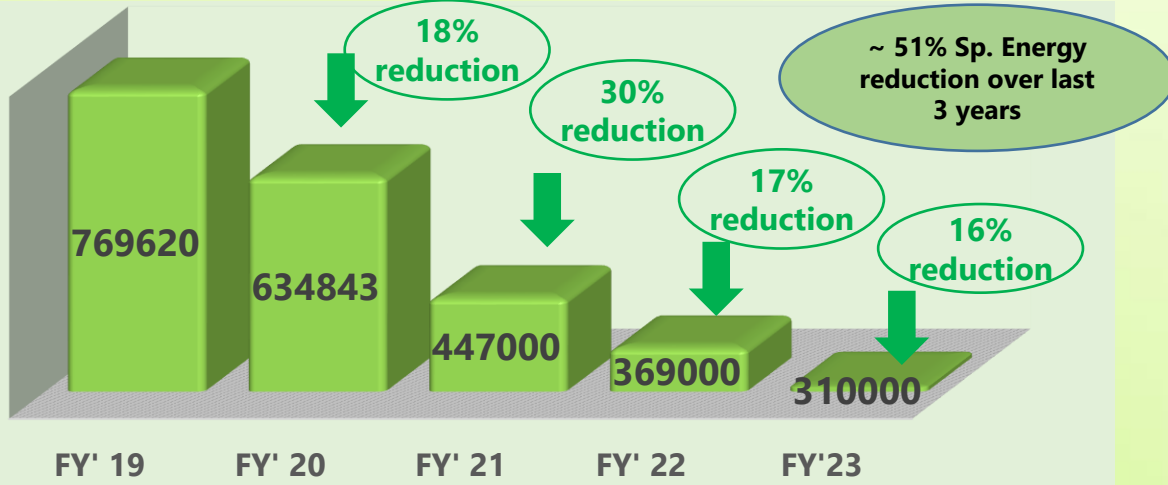
1. New 1500 CFM compressor with VSD technology
2. New Air dryers of 2500 CFM's with VSD technology

## FY 24-25

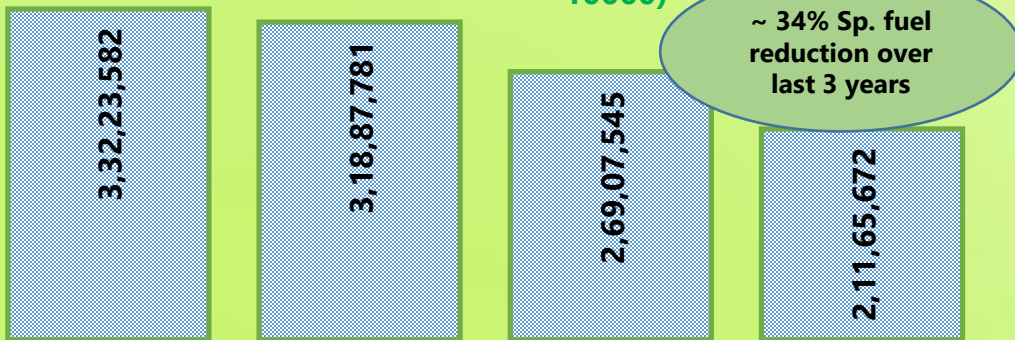
1. Energy Saving assessment and its implementation with pay by saving mode
2. Waste heat recovery projects in furnace at TA shop

## Energy Data

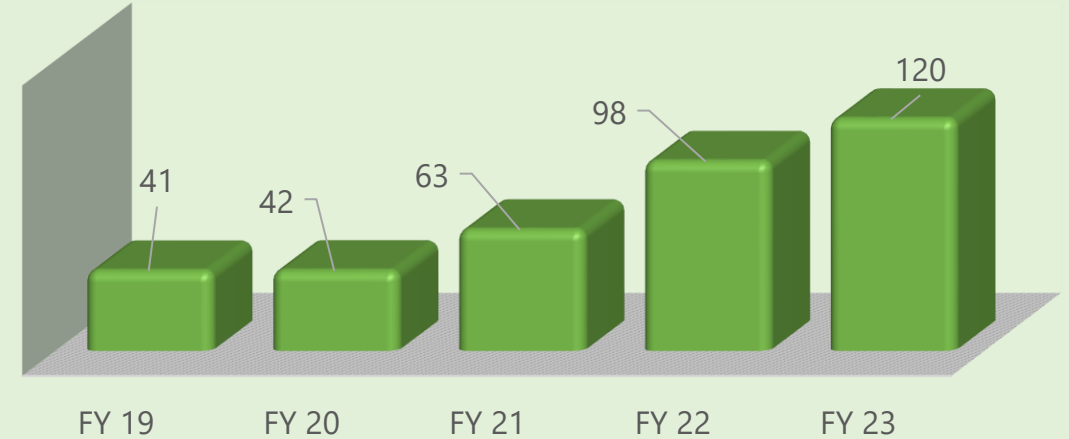
Specific Energy Consumption (KWH/1000 Cars)



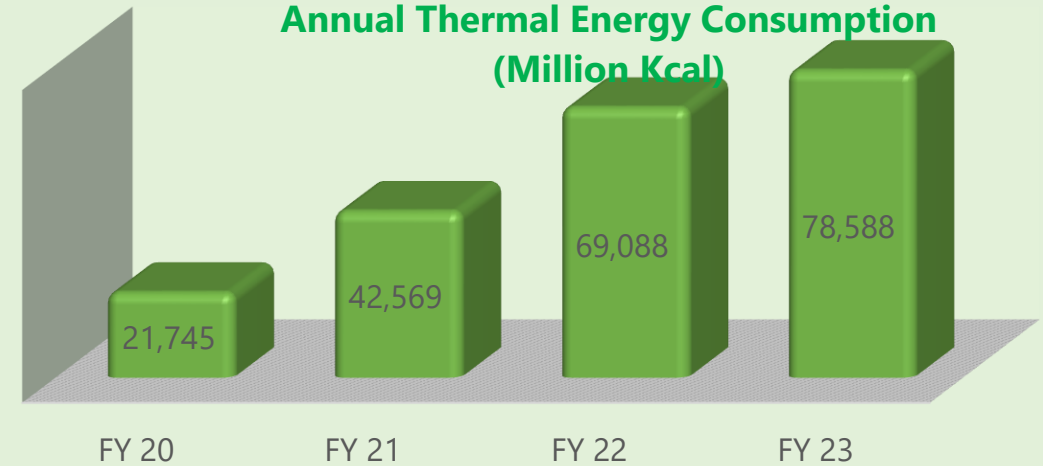
Specific Thermal Energy Consumption (KCal / Eq. Vehicle in 10000)



Annual Electrical Energy Consumption (Million KWH)



Annual Thermal Energy Consumption (Million Kcal)



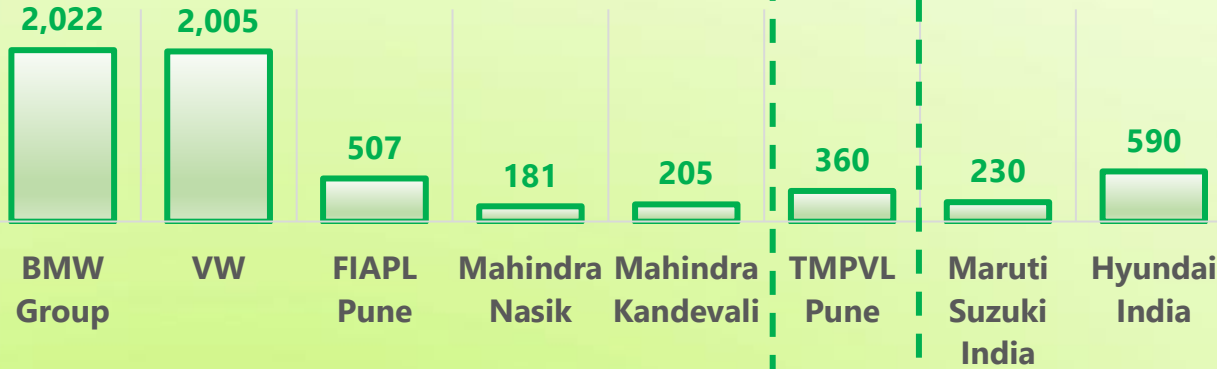
**Continuous reduction in Specific Energy power (~ 16% Y-o-Y) and Thermal Energy fuel @ 20 % Y-O-Y.**

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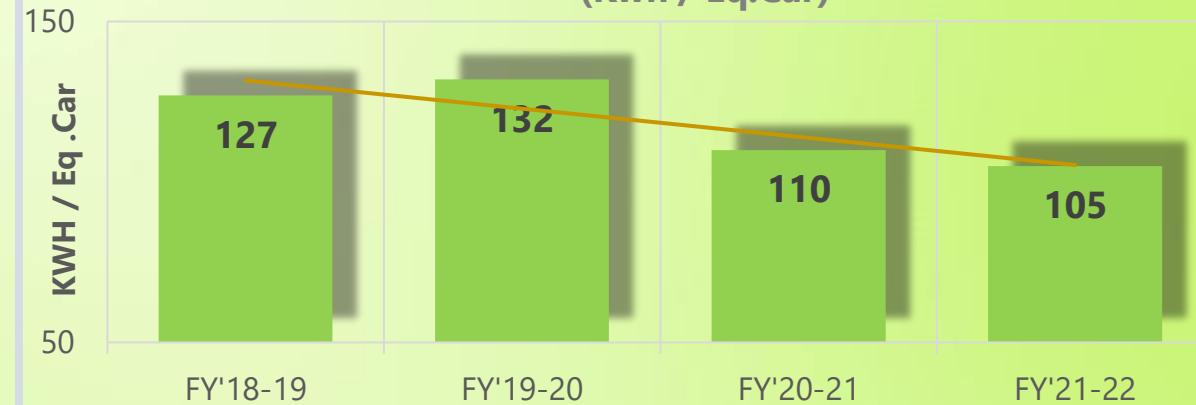


# Benchmarking (Competitor, Global and National)

**Specific Energy Consumption  
(KWH / Vehicle)**



**Paint shop Power Consumption  
(Kwh / Eq. Car)**



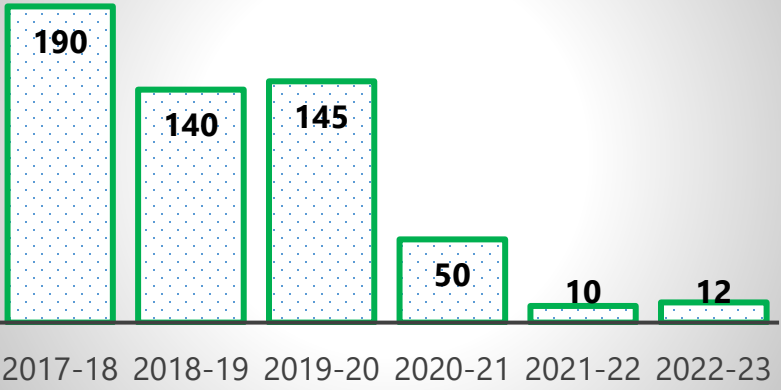
KPI	Honda Motor	BMW Group	Toyota Motor	GM	Daimler	Ford	PSA	Renault Nissan	M&M	VW
<b>Reporting Year</b>	<b>2018-19</b>	<b>2019</b>	<b>2018-19</b>	<b>2018</b>	<b>2018</b>	<b>2018-19</b>	<b>2018</b>	<b>2018</b>	<b>2018-19</b>	<b>2019</b>
<b>Scope 1 Emissions (CO2e)</b>	13,80,000	6,42,259	25,00,000	17,63,555	12,47,000	12,70,000	8,57,661	8,89,444	45,768	37,70,000
<b>Scope 2 Emissions (tCO2e)</b>	40,90,000	3,02,574	51,50,000	43,22,761	16,87,000	31,10,000	4,16,827	23,39,883	2,34,351	38,00,000
<b>Specific GHG Emission (tCO2e/Veh)</b>	-	0.3	0.712	0.670	1.216	0.730	0.345	0.490	0.191	0.675
<b>Total Energy Consumption (GJ)</b>	4,95,00,000	2,15,08,650	9,25,00,000	6,30,16,506	4,17,85,200	4,96,80,000	2,24,71,391	3,43,00,382	-	8,43,12,000
<b>Specific energy consumption (GJ/Veh)</b>	-	7.344	8.610	7.308	18.504	8.489	7.452	6.288	1.288 (GJ/Eq Veh)	7.236

**At par with Benchmark (Global & National Auto OEM's)**

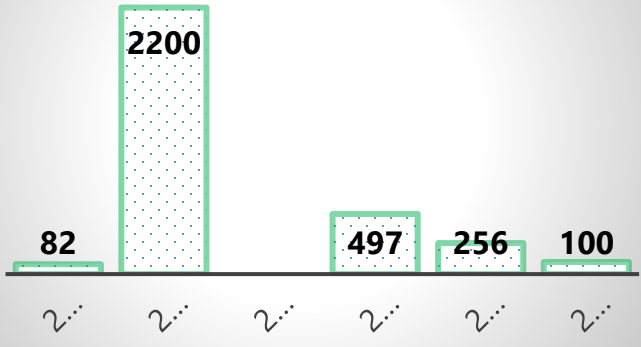
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# Summary of Energy Saving Projects executed in past 3 years

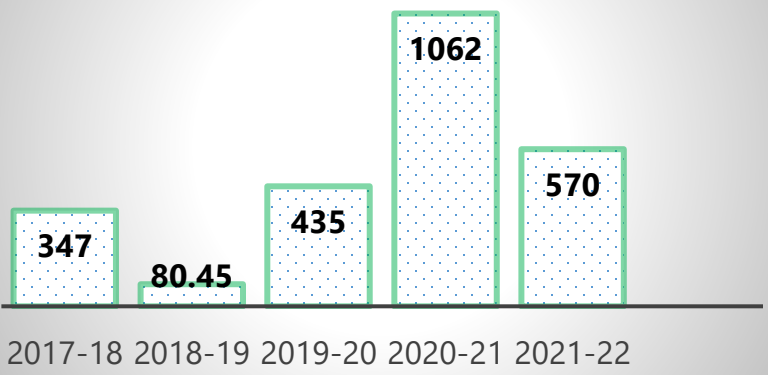
**No of Proposals**



**Investments (Rs.Lakhs)**



**Savings (Rs. Lakh)**



Year	No of Proposals	Investments Lakhs	Savings (Lakhs)	Remark
2017-18	190	82	347	
2018-19	140	2200	80.5	
2019-20	145	0	435	
2020-21	50	497	1062	OPEX -PPA(Solar) -LED
2021-22	10	256	570	OPEX -PPA(Solar) -LED
<b>Total</b>	<b>535</b>	<b>3035</b>	<b>2494</b>	

**Methodology**

- Opportunity identification and bench marking
- Idea generation through people involvement
- Prioritization of idea and identification of project
- Feasibility study for implantation .
- Cost benefit analysis and business case .
- Scope finalization.
- Top management review and budget approval

**~ 25 Crores saved through various ENCON Projects and savings are in recurring nature**

# List of RE and ENCON Projects : FY 2022-23

#	Shop	Equipment	Description of work	Saving expected in KWh / year	Investment in Rs. Lakhs	Target Completion Month	Power Tariff impact in Rs./ KWh	Cost Saving in Rs. Lakhs	Reduction in TCO@e / year	Project Mode
1	Plant Level	9.4 MWp Solar	OPEX based 9.4 MWp Solar plant installation	13160000	0	Dec 22	4	468	10396	Lease
2	Press / Weld / J1 to J7 / JLR	LED lighting	OPEX based LED lighting installation	1860000	0	Dec 22	9	167	1469	Lease
3	Compressor house	IFC system	Effective Pressure controlling	501875	30	Mar 23	9	45	396	CAPEX
4	Compressor house	Compressor	System optimisation, new compressor installation	3300000	800	Feb 23	9	297	2607	CAPEX
5	Paint Shop	Paint Kitchen Pump	Conversion of pneumatic pumps to electrical	2064381	887	Jan 23	9	186	1631	CAPEX
6	Paint Shop	VFD	VFD installation across equipment - 40 nos	7277700	230	Dec 22	9	655	5749	CAPEX
7	TCF 1	Air supply plant - 6 nos.	Use of EC motor to ASP blower of 90 KW	972000	180	Jan 23	9	87	768	CAPEX
8	Engine Shop	Air supply plant - 2 nos.	Use of EC motor to ASP blower of 90 KW	324000	60	Jan 23	9	29	256	CAPEX
9	Engine Shop	Air supply plant - 1 nos.	Use of EC motor to ASP blower of 37 KW	81000	15	Mar 23	9	7	64	CAPEX
10	TA Shop	Air supply plant - 3 nos.	Use of EC motor to ASP blower of 90 KW	486000	90	Mar 23	9	44	384	CAPEX
11	TA Shop	Air supply plant - 3 nos.	Use of EC motor to ASP blower of 37 KW	243000	45	Feb 23	9	22	192	CAPEX
12	JLR Engine	Air supply plant - 3 nos.	Use of EC motor to ASP blower of 15KW	60000	30	Feb 23	9	5	47	CAPEX
13	PVBU offices	Remote controlled ceiling fan	Supply and installation of Remote controlled fan - 500 nos	60000	18	Jan 23	9	5	47	CAPEX
14	JLR Engine	Adiabatic chiller	Adiabatic Chiller for Voltas & Daikin - 2 nos	63000	9	Jan 23	9	6	50	CAPEX

<b>Total Investment needed in Rs Lakhs</b>	<b>2394</b>
<b>Total Saving expected in Rs. Lakhs / year</b>	<b>2025</b>

**24K Tonnes of Co2 Reduction planned through RE & ENCON Projects in FY 23**

# List of RE and ENCON Projects : FY 2021-22

## TML PV Pune (Chikhali) Plant - List of Energy Conservation Efforts during year 2020-2021

Sr. No.	Description of Energy Conservation Efforts / Encon Activity	Annual Saving in Lakh KWh	Annual Savings in GJ due to kwh savings	Fuel Savings SCM	Annual savings in GJ due to fuel savings	Annual CO <sub>2</sub> Reduction in tCO <sub>2</sub> e	Annual Saving Rs. in Lakhs	Investment Rs. In Lakhs
1	Migration from Conventional lighting to LED lighting in complete TCF shop	6.23	2243	0	0	510.86	50.8	Opex based leased rental
2	Migration from Conventional lighting to LED lighting in paint shop	8.00	2880	0	0	656.00	65.3	Opex based leased rental
3	Compressed air reduction in Engine shop from 349CFM to 138 CFM	16.34	5882	0	0	1339.88	133.3	8.0
4	Compressed air reduction in TA shop 357 CFM to 227CFM							
5	Compressed air reduction in X1 BW shop 357CFM to 219 CFM							
6	Compressed air reduction in J block							
7	Compressed air reduction in paint shop from 312 CFM to 205 CFM							
8	Compressed Air leakage reduction in TCF shop from 445CFM to 195CFM							
	<b>Air leakage reduced from 15.63 percent to 8.82 Percent</b>							
9	Installation of HVLS fans	1.07	385	0	0	87.74	8.7	25
<b>Total - PV Pune(Chikhali) Plant</b>		<b>31.64</b>	<b>11390.40</b>	<b>0.00</b>	<b>0.00</b>	<b>2594.48</b>	<b>258.18</b>	<b>33.00</b>

# List of RE and ENCON Projects : FY 2020-21

## TML PV Pune (Chikhali) Plant - List of Energy Conservation Efforts during year 2019-20

Sr. No.	Description of Energy Conservation Efforts / Encon Activity	Annual Saving in Lakh KWh	Annual Savings in GJ due to kwh savings	Fuel Savings SCM	Annual savings in GJ due to fuel savings	Annual CO <sub>2</sub> Reduction in tCO <sub>2</sub> e	Annual Saving Rs. in Lakhs	Investment Rs. In Lakhs
1	HVLS fans	0.57	205	0	0	46.74	4.6	30
2	Chiller Unit Installation at Paint Shop, PVBU Pune	8.22	2959	0	0	674.04	65.8	42
3	LED highbay lamps (480 nos. in TA & Engine shop)	5.20	1872	0	0	426.40	41.6	0
4	LED street lights (80 nos.)	0.26	94	0	0	21.32	2.1	0
5	LED highmast lamps across PVBU plant (135 fitting - 15 high mast)	2.84	1022	0	0	232.88	22.7	0
6	LED tube lights at TA & Engine shop	1.40	504	0	0	114.80	11.2	0
7	Compressed air leakage reduction	15.00	5400	0	0	1230.00	120.0	0
8	Godrej AC units in J block	8.00	2880	0	0	656.00	64.0	7
9	Compressed air piping modification in engine and TA shop	4.38	1577	0	0	359.16	35.0	0.8
10	Paint Shop optimization by managerial control of Top Coat ASU/Exh booth frequency.	0.85	306	0	0	69.70	6.8	0
11	Paint Shop Topcoat running time optimization.	1.00	360	0	0	82.00	8.0	0
12	Paint Shop Switching off the wax booth exhaust by providing almonard fans in polishing area.	0.75	270	0	0	61.50	6.0	0
13	GMN spindle drives Kept off in B shift in Engine shop	1.08	389	0	0	88.56	8.6	0
14	Ingersoll Henry coolant system to be run on single coolant pump in engine shop	0.90	324	0	0	73.80	7.2	0
15	Use of Gehring machine for 4 cylinder block honning in engine shop	1.00	360	0	0	82.00	8.0	0
16	SC 1 Furnace kept at 760 deg for 2 days a week and 8 days in month in Hard Shop of TA area	0.75	270	0	0	61.50	6.0	0
17	Optimization in running hours of Zest Closure Pump House of Weld shop done	0.82	295	0	0	67.24	6.6	0
18	Paint Shop replaced conventional tube lights with LED tube lights - 1500 Nos.	1.18	426	0	0	96.97	9.5	0
19	Paint Shop Installation of new CED oven.	2.40	864	157894.7	5760	323.14	73.2	0
20	Paint Shop - increased load of Incinerator & optimized running time.	0.00	0	78947.4	2880	161.57	27.0	0
<b>Total - PV Pune(Chikhali) Plant</b>		<b>56.60</b>	<b>20376.94</b>	<b>236842.11</b>	<b>8640.00</b>	<b>4929.32</b>	<b>533.82</b>	<b>79.80</b>

# Energy Saving Projects

## PVBU Plant – HVLS Fan Installation



Shop – Across All shop in PVBU, Chikhali

### Equipment Details – HVLS Fan

**Process Change**  
Earlier 750 mm Almond air circulator was in use for air circulation purpose inside all shop. 40 nos. of HVLS fan was installed in against 750 Air circulator

### Details of Energy Saving Achieved

4.3 Lakhs KWh unit  
 387 TCO2 reduction  
 Rs. 32.65 Lakhs  
 7.48 KWh/ Eq. Car

## VFD Installation Project Across Plant (Qty-110)



Shop – All Shops Across PVBU, Chikhali

**Process Change**  
Most of load across all shops in PVBU plant were operating with less optimization. In Phase 1, 66 nos. of drives were converted on VFD mode for efficient optimization and remaining in phase 2.

### Details of Energy Saving Achieved

52Lakhs KWh unit  
 4700 TCO2 reduction  
 Rs. 414 Lakhs  
 102 KWh/ Eq. Car

## Compressed Air Leakage Rectification Across All Shops

Under Ground Compressed air pipeline Pressure Testing Data						
Sr.No	Description	Pressure Hold when valve closed in PSI	Pressure Hold Time	Pressure Drop Observed in PSI	Difference	Remark
1	Press Shop	77	15 Min	76	1	Ok
2	Engine shop	76	15 Min	75	1	Ok
3	X1 Shop	76	15 Min	75	1	Ok
4	TCF Shop	77	15 Min	75	2	Ok
5	JLR shop	76	15 Min	75	1	Ok



Shop – Across all shops

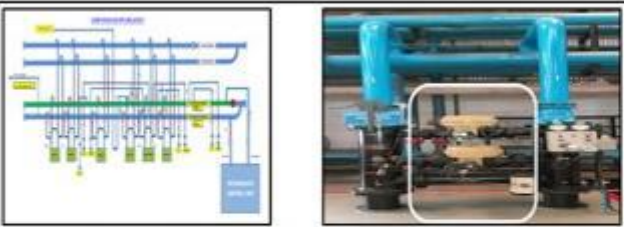
### Equipment Details – Compressed air line

**Process Change**  
Compressed air leakages were 13.5% across all shops of PVBU, Chikhali Pune plant.  
Leakage reduction initiative taken shop wise to reduce it.  
This achieved leakage reduction from 13.5% to 8.67%

### Details of Energy Saving Achieved

14Lakhs KWh unit  
 1109 TCO2 reduction  
 Rs. 70 Lakhs  
 14 KWh/ Eq. Car

## Energy Savings IC Unit at Compressor House

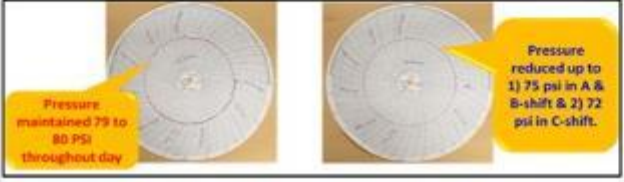


Shop – Compressor House

**Process Change**  
Compressor house was having no facility of Pressure optimization. This was causing pressure variation. Intermediate Control Unit on distribution Header line at PVBU Compressor house installed & commissioned without affecting compressed air services.



### Details of Energy Saving Achieved

1.09 Lakhs KWh unit  
 98.4 TCO2 reduction  
 Rs. 8.75 Lakhs  
 2 KWh/ Eq. Car





# Energy Savings Projects with Focus on Consumption Reduction


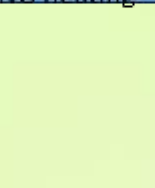

### Energy Saving KAIZENS

Shop/Area : Engine Shop      Date : 02/05/2021	
Kaizen by: Mr. Sandeep Bhandarkar, Mr. S.L. Jadhav, Mr. Girish Sakhare, Hemant Ghule	
Line/Station : F. Block petrol trim line	Kaizen by: Mr. Sandeep Bhandarkar, Mr. S.L. Jadhav, Mr. Girish Sakhare, Hemant Ghule
<b>Before Kaizen</b>	<b>After Kaizen</b>
<p>We used compressed air from F Block compressor house in all three shift and also on Sunday working , block closure , and F Block running in only A and B shift. So C shift power required to run compressor was booked on PVBU @ 500 kw/h/day</p>	<p>To avoid compressed air losses we installed portable compressor and we used this portable compressor in C shift , block closure , Sunday working and when F Block is not running.</p>
	
Power debit on engine shop of 500 kw/h/day	Zero power debit as portable compressor installed

### Energy saving KAIZENS on shop floor

Shop/Area : Engine Shop      Date : 13/06/2021	
Kaizen by: Mr. Uday Malpanikar and team	
Line/Station : E Block petrol trim line	
<b>Before Kaizen</b>	<b>After Kaizen</b>
<p>Petrol Trim Line Incoming Supply From P.P.NO 32.2 Column No 27, E2 Before there is no any separate energy meter for petrol trim line</p>	<p>Now installed new separate energy meter for petrol trim line to observed how much energy consumed by petrol trim line. And also we take reading on daily basis.</p>
	
No actual measurement of Power consumption possible	Submeter power consumption monitoring started with use of Energy Meter



Kaizen Sheet		Shop/Area : Engine shop	
Line/Station : Engine shop – Cylinder block line – Makino Machines		Date: Feb/20	
<b>Operation</b>	<b>Problem</b>	<b>Measures Taken</b>	<b>Results</b>
<p>Machining of cylinder block and head on makino machines. Total 8 machines</p>	<p>Panel AC and Oil cooling units of makino machines were getting on along with mains power ON. Panel AC=1KW, Oil Cooler – 3KW</p>	<p>Panel AC and Oil cooler units interlocked with machine control ON.</p>	<ol style="list-style-type: none"> <li>Power cost saving of 11520 Rs / Year due to panel AC</li> <li>Power cost saving of 34560 Rs /Year due to oil cooler</li> </ol>
<b>Panel AC Interlock with Control ON</b>			
			
<p style="text-align: right;">Oil cooler 3 KW ,8 Machines. Total Connected Load=24 kw</p> <p style="text-align: left;"><b>Cost saving: 0.46 Lacs / Year</b></p>			



Kaizen Sheet		Shop/Area : Engine shop	
Line/Station : Engine shop – Washing machines		Date: Implementation started from June'20 onwards	
<b>Operation</b>	<b>Problem</b>	<b>Measures Taken</b>	<b>Results</b>
<p>Washing machines coolant media temperature required for process is 50 deg.</p>	<p>Earlier electrical heaters were used to heat coolant media which are being converted into NG heating. NG price is Rs 43 / kg and also NG system requires lot of maintenance</p>	<p>Cold washing media is developed and implemented successfully on 2 machines. Rest 7 machines are WIP. NG supply is stopped for the 2 machines</p>	<ol style="list-style-type: none"> <li>Power cost saving due to change over from electrical to NG system is 34.28 Rs / Eq car</li> <li>NG fuel cost saving due to cold washing media is 21.5 Rs / Eq Car</li> </ol>
			
<p style="text-align: right;"><b>Cost saving: 12.9 Lacs / Year</b></p>			



## Employee Engagement through Kaizen drive for ENCON



# Energy Saving Kaizen

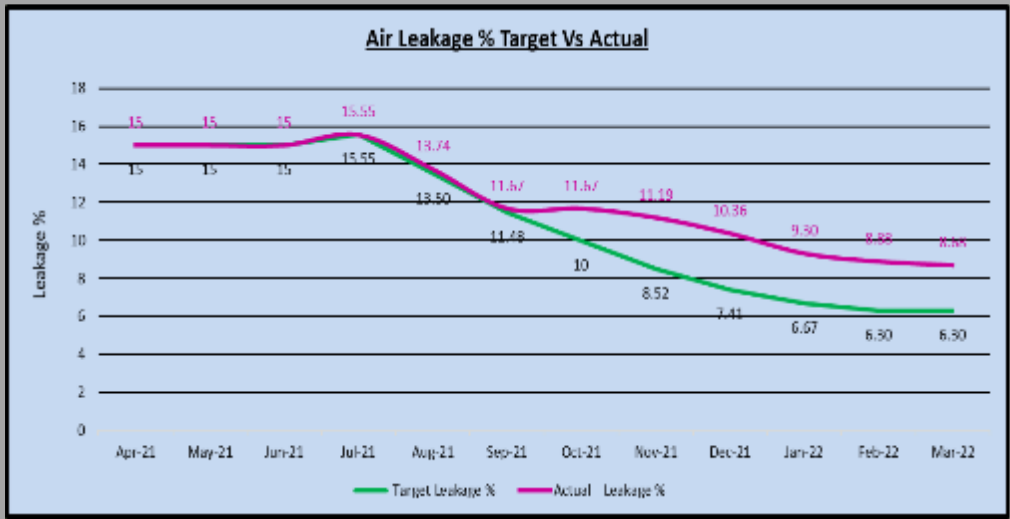
<b>Power SAVING TEAM-Ganesh Kapse, Amol, Bhalekar, Phalke</b>		Shop : TCF Shop	
Line/Station : All Lines		Date : Mar-22 –Apr-22	
Operation	Problem	Measures Taken	Results
High rating 90kw qty 6 nos, ASPs START /STOP control is provided at central location with indication to switch off as per requirement (Other than timer set duration)	ASP remaining ON and physically person was to arrange to send to stop ASPs at location. ASP was remaining ON during non productive hour.  Hence total consumption during such non productive hrs was-150kwh per day	1. Centrally controlling and Monitoring indicating panel is fixed to ensure ASP running status. And can be made OFF immediately from <u>centre</u> .	Daily Saving on ASP timer control = 150 kwh/day.  Daily Saving In Rs 1223/- Monthly saving- Rs0.3 Lac and per car basis saving is 0.5 kwh per car
<b>BEFORE KAIZEN</b>		<b>AFTER KAIZEN</b>	
PHYSICALLY PERSON HAD TO GO TO START AND STOP ASP.			
			

<b>Power SAVING TEAM-Ganesh Kapse, Amol, Bhalekar, Phalke</b>		Shop : TCF Shop	
Line/Station : All Lines		Date : Mar-22 –Apr-22	
Operation	Problem	Measures Taken	Results
High rating 90kw Qty 6 nos. ASPs are provided with timers to switch off the ASPs automatically during break times and at the shift end	ASP remained ON during break time. ASPs required to be switched OFF manually. Till then ASP remained ON during non productive hour. Hence total consumption during break time was-1350kwh per day	Timers are provided for each ASPs with set time duration of each break time in a day	Daily Saving on ASP timer control = 1350 kwh/day.  Daily Saving in Rs. 10523/- Monthly saving- Rs2.7 Lac and per car basis saving is 1 kwh per car
<b>BEFORE KAIZEN</b>		<b>AFTER KAIZEN</b>	
MANUAL CONTROL TO START AND STOP ASP			
			

<b>Kaizen No : 51</b>			Shop/Area : X4 BIW	
Line/Station : - X4 PUMP HOUSE			Month : APR-22	
Operation	Problem	Root Cause	Measures Taken	Results
Water circulation for cooling of equipment	High power consumption.	Not considered during initial design.	Modified water tank of cooling tower – internally connected with Hot water tank. Hot water pumps made OFF during Rainy & Winter Seasons.	1) Reduction in Power consumption by <b>105 kWh/Day.</b> 2) Equipment life improved.
<b>BEFORE KAIZEN</b>			<b>AFTER KAIZEN</b>	
				
Separate tank for Cooling & circulation purpose.			Circulation & Cooling water tank connected internally. Hot water pumps made off during Rainy & Winter seasons	

## Employee Engagement through Kaizen drive for ENCON

# Compressed Air Leakage Reduction Initiative



COMP. AIR REDUCTION ACTION PLAN & AIR LEAKAGES RECTIFICATION STATUS							
Sr.no.	Action Plan for Leakage rectification	Leakage points Arrested till date	Previous leakage in Cfm as per leakage test on 1/3/22	Target leakage reduction after rectification to achive goal (Tentative)	Actual reduction after rectification Leakage test done on 26/3/22	Status	Target Date.
1	TCF-1 Shop leakages identified & rectified		113 cfm	100cfm	113 cfm	Completed	
2	TCF-2 Shop leakages identified & rectified		97 cfm	50cfm	97 cfm	Leakage rectification WIP.	
3	Engine Shop leakages identification & rectification ,Further WIP.		73cfm	80 cfm	73cfm	Completed	
4	Transaxel Shop, leakages identification & rectification done		97 cfm	95 cfm	97cfm	Completed	
7	Weld-X1 shop leakage identification & rectification	169	195cfm	100 cfm	195cfm	WIP	13-04-2022
8	Press shop leakage identification & rectification		73 cfm	80 cfm	73cfm	Completed	
9	Paint shop leakage identification & rectification	220	150 cfm	125 cfm	150cfm	WIP	15-04-2022
10	Q-5 leakage identification & rectification	151	186 cfm	100 cfm	166cfm	WIP	19-04-2022
11	X-451 leakage identification & rectification	14	113 cfm	100 cfm	105cfm	WIP	20-04-2022
12	Air leakage test planned on 24/04/2022 at plant level to identify effectiveness.						

### Summary of Compressed Air Leakage Identification & Rectification work at Car Plant

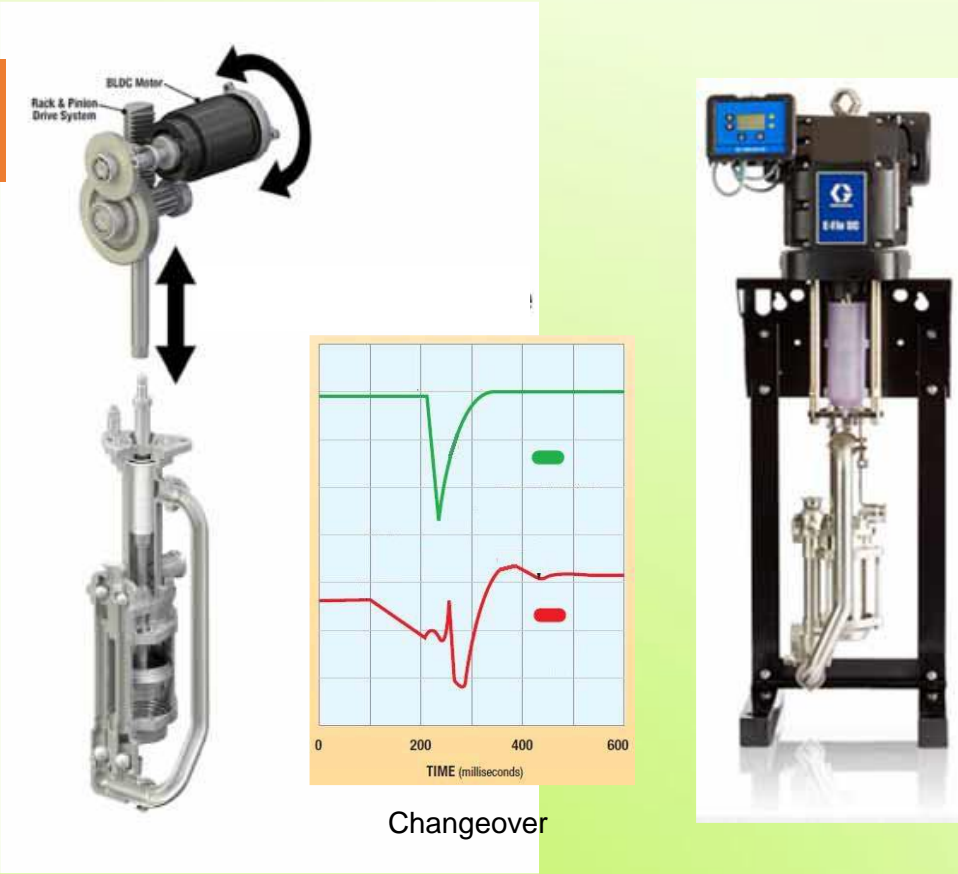
Shop Name	TOTAL POINTS	Number of points Identify	Number of points Arrested	Pending Points	Remarks
Engine Shop	685	685	685	0	5 <sup>th</sup> round of leakage rectification completed
TCF Shop	905	905	905	0	5 <sup>th</sup> round of leakage rectification completed
New TCF	105	105	105	0	4 <sup>th</sup> round of leakage rectification WIP
Transaxle Shop	580	580	565	15	5 <sup>th</sup> round of leakage rectification completed
Weld X-1 Shop	1480	1480	1457	23	5 <sup>th</sup> round of leakage rectification WIP
Press Shop	52	52	52	0	5 <sup>th</sup> round of leakage rectification completed
Paint Shop	1556	1556	1538	18	5 <sup>th</sup> round of leakage rectification completed
Q-5	734	734	718	16	5 <sup>th</sup> round of leakage rectification WIP
X-451	202	202	202	0	5 <sup>th</sup> round of leakage rectification WIP
J-5 to 8	705	705	685	20	5 <sup>th</sup> round of leakage rectification WIP
J-1 to 3	385	385	357	28	5 <sup>th</sup> round of leakage rectification WIP
<b>Till Date Total points rectified</b>	<b>7389</b>	<b>7389</b>	<b>7269</b>	<b>120</b>	<b>Leakage reduction till date 8.68 % = 1215 cfm</b>

**Air Leakages reduced from 11% to 8%**

- Company Profile
- Energy Data
- Benchmarking
- ENCON Project in past 3 years'
- Innovative Projects (IOT 4.0)
- Utilization of Renewable Energy
- Waste Utilization Management
- GHG Inventorisation
- Green Supply Chain Management
- Team Work, Employee Involvement and Monitoring
- Learning from CII Energy Award Program

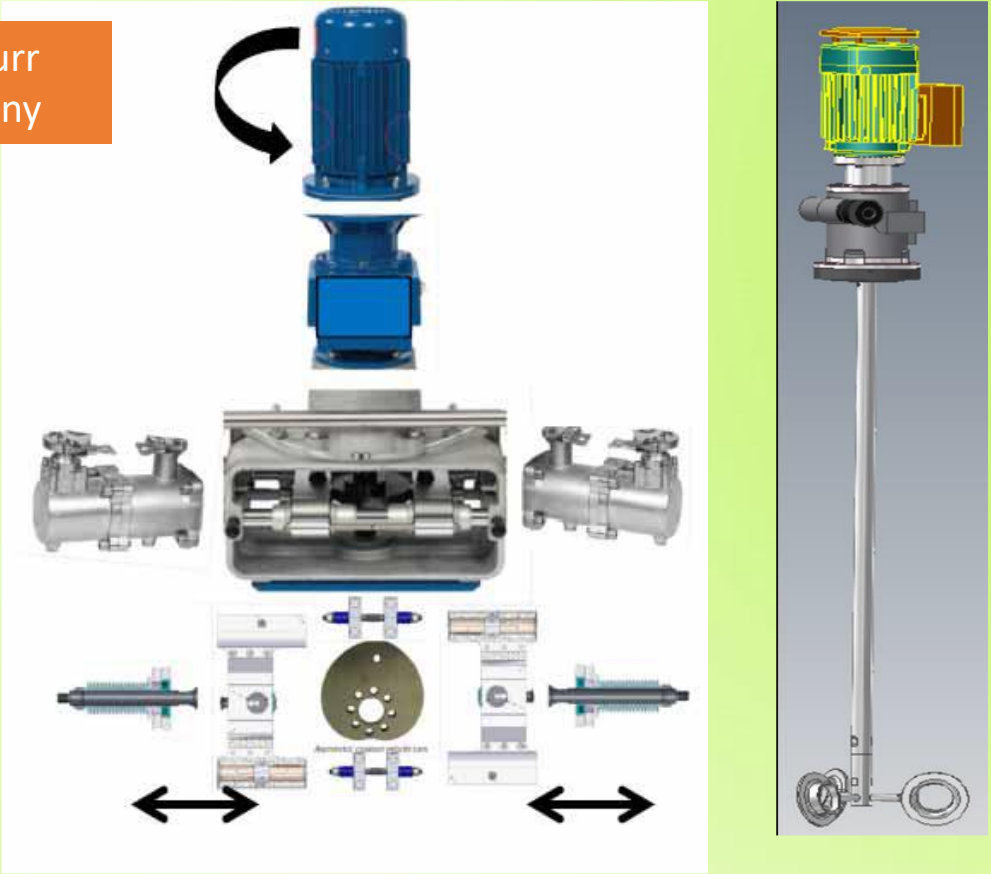
# Electric Pumps: M/s Graco vs M/s Durr

M/s Graco  
USA



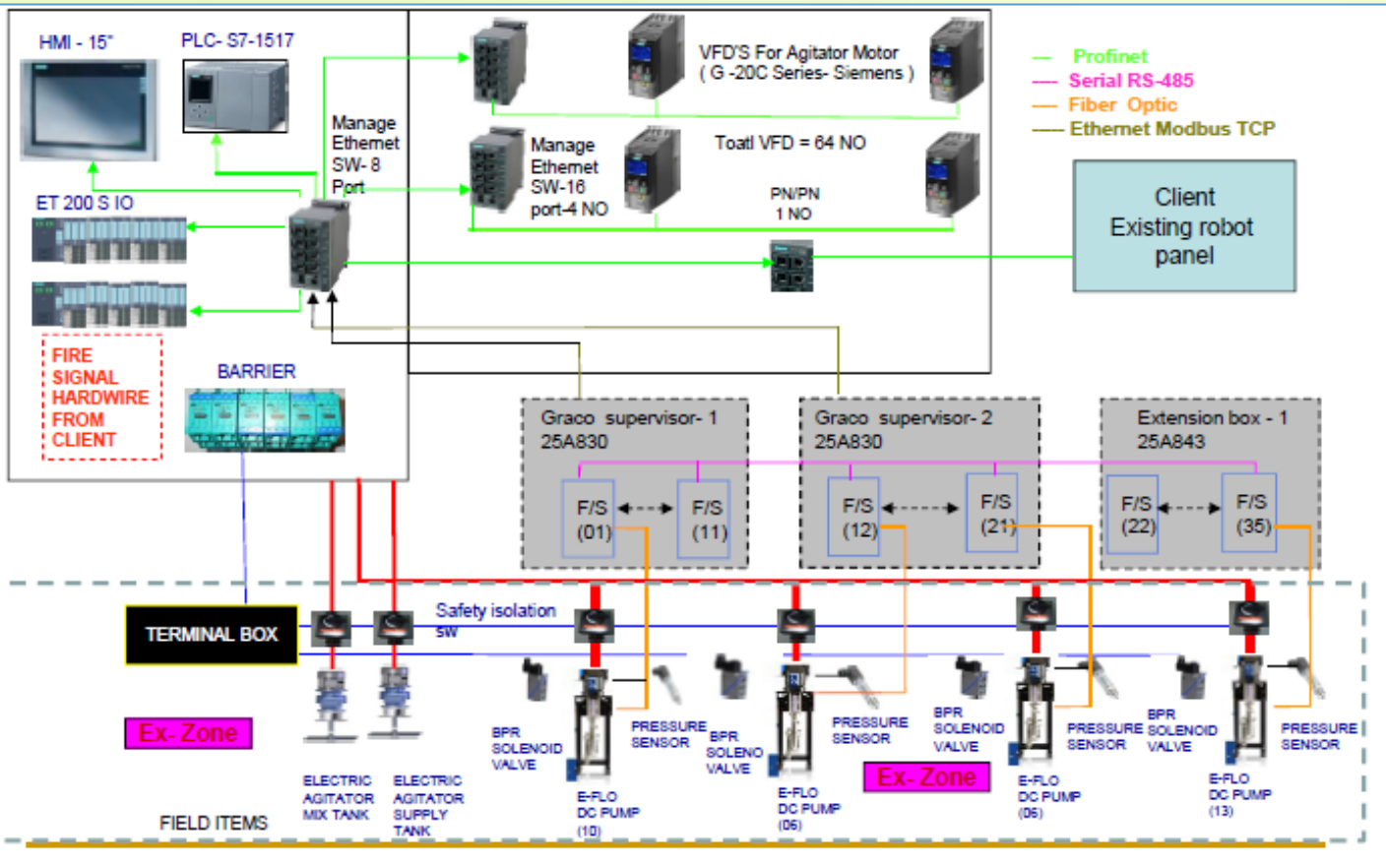
Left and right run is converted directly into vertical movement.  
Only a few power transmitting components necessary  
Compact Design

M/s Durr  
Germany



Rotary is converted into horizontal linear motion.  
More power transmitting parts

Both types of motors requires a method to convert the rotary motion of the motor to the linear reciprocating motion of a positive displacement piston pump



CE 0359

Ex II 2 (1) G

Ex db [ia op is IIA T4 Ga] IIA T4 Gb  
0°C≤Ta≤40°C  
FM12ATEX0067X  
IECEx FMG 12.0028X

FM US

APPROVED For Class I, Div. 1, Group D T4.  
Class 1, Zone 1, AEx db [ia op is IIA Ga] IIA T4 Gb  
0°C≤Ta≤40°C  
Ex db [ia op is IIA T4 Ga] IIA T4 Gb  
0°C≤Ta≤40°C  
FM17US0033X  
FM17CA0018X



**E-Flo® DC Motor**

PART NO.	SERIES NO.	MFG. YR.	SERIAL NO.	VOLTS	Um: 500 VAC	kVA	Hz
							50/60

Explosion proof with intrinsically safe [Ex ia] electrical and inherently safe optical connections. For Class I, Div 1, Group D T4.  
Class 1, Zone 1, AEx db [ia op is IIA T4 Ga] IIA T4 Gb, Ex db [ia op is IIA T4 Ga] IIA T4 Gb, 0°C≤Ta≤40°C.

Install per 24Z541. Use cables rated 70°C minimum. Conduit seal required within 18 inches for US and Canada. Utiliser des câbles résistant à 70 °C minimum. Joint de conduite nécessaire à moins de 457 mm (18 po.) pour les États-Unis et le Canada.

CE 0359 Ex II 2 (1) G

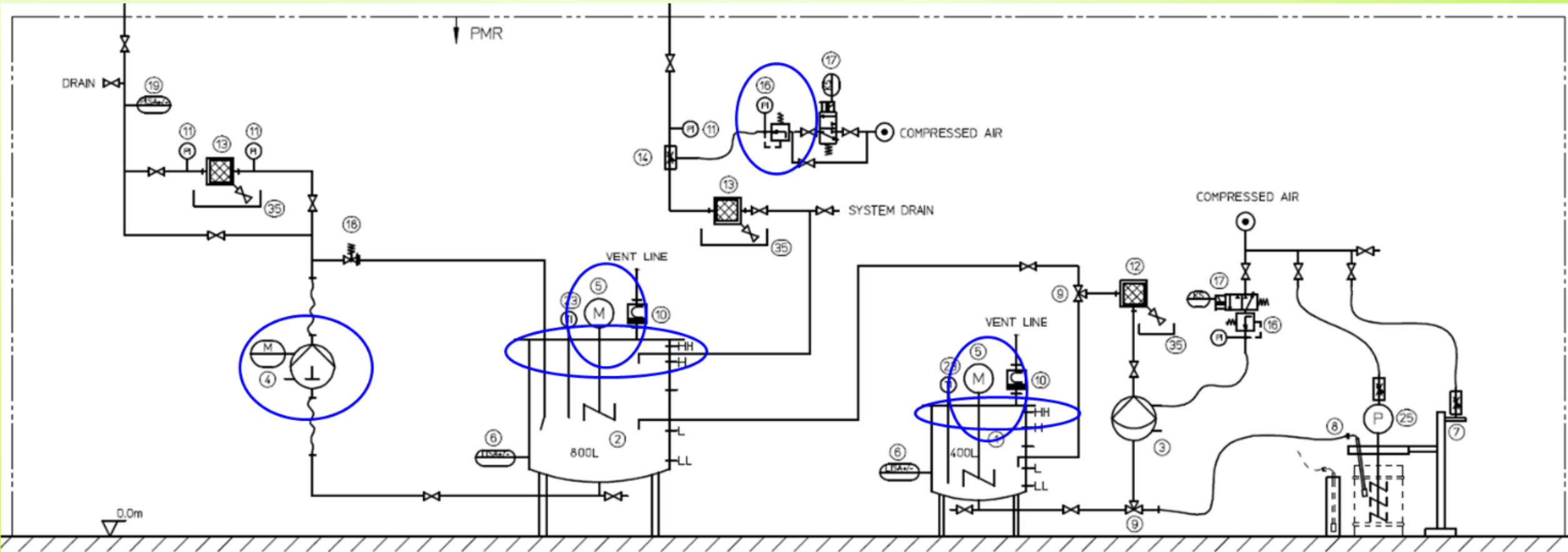
FM US APPROVED FM17US0033X FM17CA0018X

GRACO INC. P.O. Box 1441 Minneapolis, MN 55440 U.S.A.

### List of Standards

- FM 3600:2018
- FM 3610:2018
- FM 3615:2018
- FM 3810:2018
- ANSI/ISA 60079-0:2013
- ANSI/ISA 60079-11:2014
- ANSI/UL 60079-1:2015
- ANSI/UL 60079-28:2017
- CSA-C22.2 No. 0.4:2017
- CSA-C22.2 No. 0.5:2016
- CSA-C22.2 No. 30:R2016
- CSA-C22.2 No. 60079-28:2016
- CAN/CSA-C22.2 No. 60079-0:2015
- CAN/CSA-C22.2 No. 60079-1:2016
- CAN/CSA-C22.2 No. 60079-11:2014
- CAN/CSA-C22.2 No. 61010-1:R2017
- EN 60079-0:2012+A11:2013
- EN 60079-1:2014
- EN 60079-11:2012
- EN 60079-28:2015
- IEC 60079-0 (Ed. 6.0)
- IEC 60079-1 (Ed. 7.0)
- IEC 60079-11 (Ed. 6.0)
- IEC 60079-28 (Ed. 2.0): 2015

All safety standards/parameters studied, Certified by our Safety Dept.

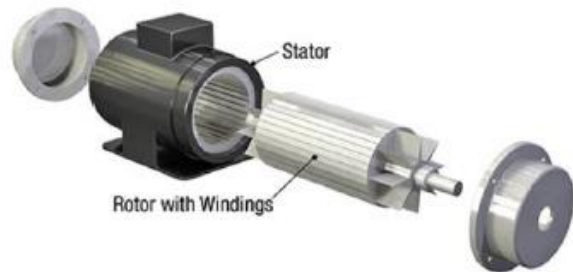


1. Conversion of Existing Pump to Electrical
2. Conversion of Agitator to Electrical
3. Replacement of Mechanical BPR to Pneumatic BPR
4. Modification of Existing Tank Lid to accommodate the agitator and sensors
5. IOT enable
6. Stand by one set up & one Motor.
7. In put supply will be provided by TML to Control Panel with power back up.

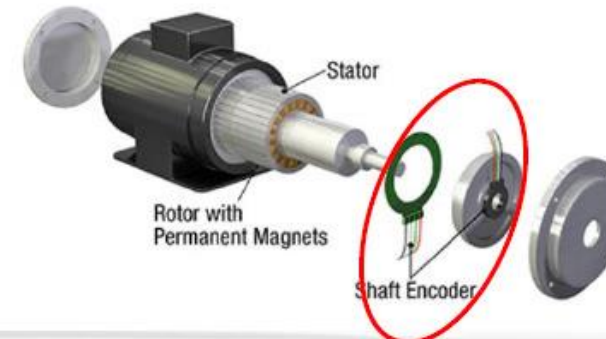
## Why choose brushless DC motor drive

- Brushless DC motors (BLDC) are much smaller in size and weight than AC motors for any given power stage.
- Brushless DC motor (BLDC) has good starting performance, stable drive and low heat generation
- The brushless DC motor (BLDC) responds quickly to changes in system torque and maintains a constant torque output at low or even zero speeds, helping users to easily and efficiently build the constant voltage self-balancing mode required by the coating system.
- No need to purchase a variable frequency controller (VFD) and an electronic program card to control the speed and torque (flow and pressure) like an AC motor, saving investment and making it easier to use.
- There is no need to install an overflow valve on the paint supply line like an AC motor, no work is done, and unnecessary paint cutting is reduced.
- The energy efficiency of brushless DC motors (BLDC) is 25% higher than that of AC AC motors.


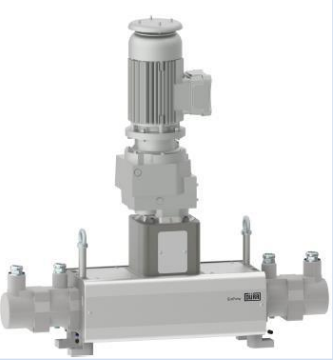
AC Motor Components



BLDC Motor Components



VFD less technology, Brushless DC motor with 25% higher eff. Than AC motor

#	Lever	M/s Graco (USA) by Patvin	M/s Durr (Germany) by Durr India	Remarks
1	Make / Type / Model Pump Volume / stroke Flow rate @ 20 Cycle/min Max Pump Pressure Electric Motor Type Motor Power Foot Print W x D Weight	E-Flo DC 2000 2000 CC 40 LPM 17.9 Bar BLDC Servo with Encoder 1.5 Kw (2HP) 450 x 518 mm 112 Kgs	 <p>HPE 800                      800 CC                      16 LMP                      21 Bar                      AC Induction Motor                      1.5 Kw (2 HP)                      1094 x 290 mm                      188 Kgs</p> 	Graco Pump flow max is at 20 Cycles/min, while Durr Pump can work up to 40 Cycles/min hence can supply up to 32 LPM with optimized movement of cam mechanism for constant flow and no pulsation.
2	Technology	Advanced BLDC Technology is 25% more efficient than AC induction Motor > Motors are Maintenance free > Faster response to change in Pressure & flow requirements because of Permanent magnets in the motor rotor > It Uses Encoder feedback providing precise control of torque and speed, hence better Flow and pressure control > Does not require VFD, More Efficient, Reduces power consumption and heat generation > Can generate full torque at zero speed, hence can be used for dead-end systems like Solvent and Hardeners > Graco Motor can generating More O/P Pressure with less power consumption compared to similar rating AC induction Motor	> Motors are controlled with Energy efficient variable frequency drives. > Motors are maintenance free and Low startup power demands that also protect components on the receiving end > Fast response to change in pressure and flow with continuous monitoring, Controllable starting current levels and acceleration > High durability and longer life spans, optimized cam movement uniform flow and pressure. > Capabilities for multi-phase configurations > High range of usable frequency area/operation area 10 - 80 Hz , 5 - 40 cycles / min > Parts coming contact with Fluid are optimized for low-shearing flow without	As mentioned



# Apple to Apple Comparison

#	Lever	M/s Graco by Patvin	M/s Durr	Remarks
3	Safety	<p>FM, Atex, IEC, EN, TIIS, KEC, CE approval</p> <ul style="list-style-type: none"> <li>&gt; Completely safe with Motor Voltage, Current &amp; Temperature monitoring</li> <li>&gt; All communication with safest Optical fiber network</li> </ul>	<p>Atex approval ATEX Ex II 2G IIA T4, DIN EN ISO 12100, DIN EN 1127-1, DIN EN 13463-1, DIN EN 809, DIN EN 12162, IEC, CE approvals.</p> <ul style="list-style-type: none"> <li>&gt; Completely same with current, voltage and temperature monitoring.</li> <li>&gt; Communication to main fail safe PLC.</li> </ul>	Compliance
4	Services / Maint	<ul style="list-style-type: none"> <li>&gt; Graco Pumps has less mechanical moving parts hence more reliable and Maintenance free over longer run</li> <li>&gt; Due to divorced design, pump / motor individually can be opened and repaired</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Less moving parts, Modular and easy to maintain pump design enables fast changes of wearing parts e.g. mainly seals</li> <li>&gt; Wear less pistons with ceramic coating.( Ref presentation)</li> <li>&gt; Gap-free pump connection in combination with reliable technology of Eco Tube fittings.</li> <li>&gt; Indicator is provided in the Pump to monitor the seal leakage .</li> <li>&gt; Pump doesn't need any Lubrication</li> </ul>	Low maintenance
5	Integration	<p>E-Flo DC has embedded intelligence to deliver a target pressure or flow rate without an integrator program</p> <ul style="list-style-type: none"> <li>&gt; Stand Alone Pump with BPR Controller is sufficient to achieve Local as well as Remote Automation</li> <li>&gt; Further IOT &amp; Industry 4.0 Integration is available with ALL Graco Architecture &amp; Warranty</li> <li>&gt; Pump has LOCAL CONTROL as well, can manage and update flow/pressure set points without additional integrator support</li> <li>&gt; Integrated Runaway Protection &amp; Password protected pump settings</li> <li>&gt; Can easily switch between Production &amp; Non-Production mode with Auto BPR</li> </ul>	<p>The Eco Pump HPE is suitable for handling fluids like water- and solvent-borne paints and the corresponding purging material With an inside shaft seal this Eco Pump HPE is specially designed for ring pipe systems as well as transferor- or paint supply pump.</p> <ul style="list-style-type: none"> <li>&gt; IIOT &amp; industry 4.0 integration is available (through PLC) and configuration can be done based on customer's system configuration and is optional.</li> <li>&gt; System will be configured and run in standby and production and non-production mode (automatically) in which individual parameters can be set and monitored.</li> <li>&gt; easily switch over to assigned modes like production, non production.</li> <li>and clean mode with different level of password protection</li> </ul>	As mentioned

# Apple to Apple Comparison

#	Lever	M/s Graco by Patvin	M/s Durr	Remarks
6	Trial feed back (Trial conducted for 15 days)	No any abnormality observed More Vibrations observed than M/s Durr Pump Serge suppressor required No noise < 64 DB Sufficient flow rate, no starvation observed Good service support during trials Pump got tripped because of power fluctuation No any safety incidence happened	No any abnormality observed Less Vibrations observed Serge suppressor not required No noise < 64 DB Sufficient flow rate, no starvation observed Good service support during trials Pump got tripped because of power fluctuation No any safety incidence happened	Both Pumps trials successfully done
7	Delivery	16 – 20 weeks	16 – 20 weeks	Can be negotiated
8	Investment & ROI			M/c Purchase to evaluate based on final negotiations
9	BOT option (Built, Operate, Transfer)	Available, Ownership will be transferred after 5 Years.	Available , Ownership being transferred once equipment is commissioned	M/c purchase/Finance to evaluate with financial perspectives
10	Continuous power with power Back up	Applicable	Applicable	CPED to make a provision for Power back up, Investment to be worked out & considered

Power back up thru Gen set or Power Bank to be considered, in TML scope

## CFT

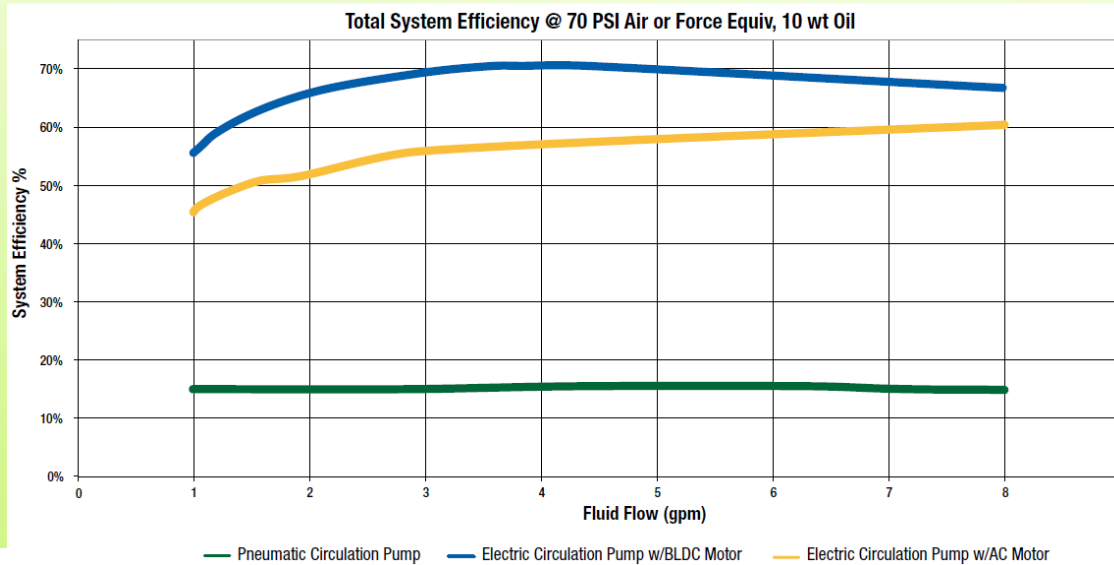
#	Name	Department
1	Anand Shinde	TS
2	Anand Lapalkar	TS
3	Ranjitsinh Yadav	Mfg
4	Davinder Singh	Mfg
5	Pramod Patil	TS
6	Ashok Pote	Safety
7	Narayan Katve	M/c Purchase
8	Rahul Patil	Finance
9	Chudaman Zamare	Fire Security

Facilitated by Head ME

## Summary - Comparison

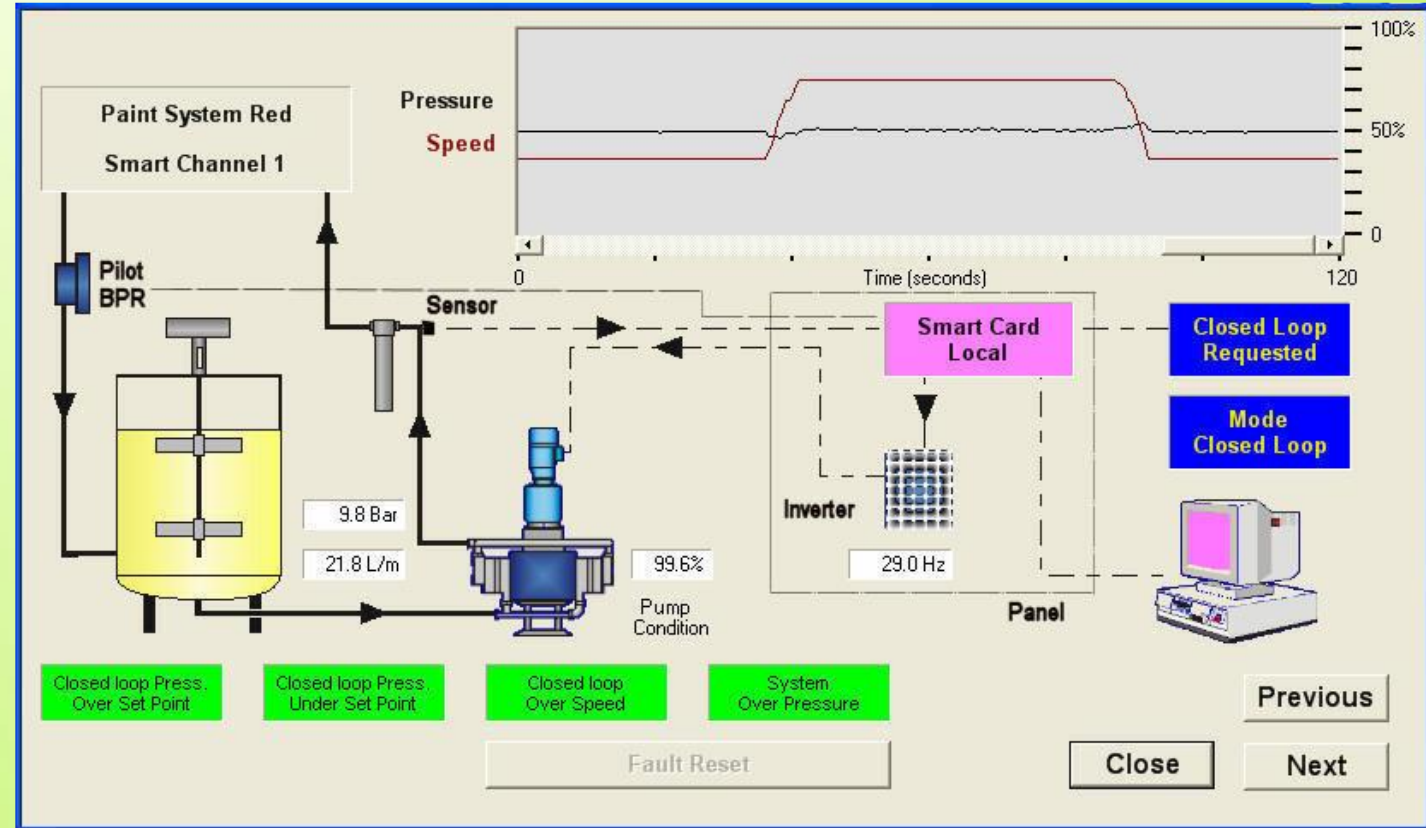
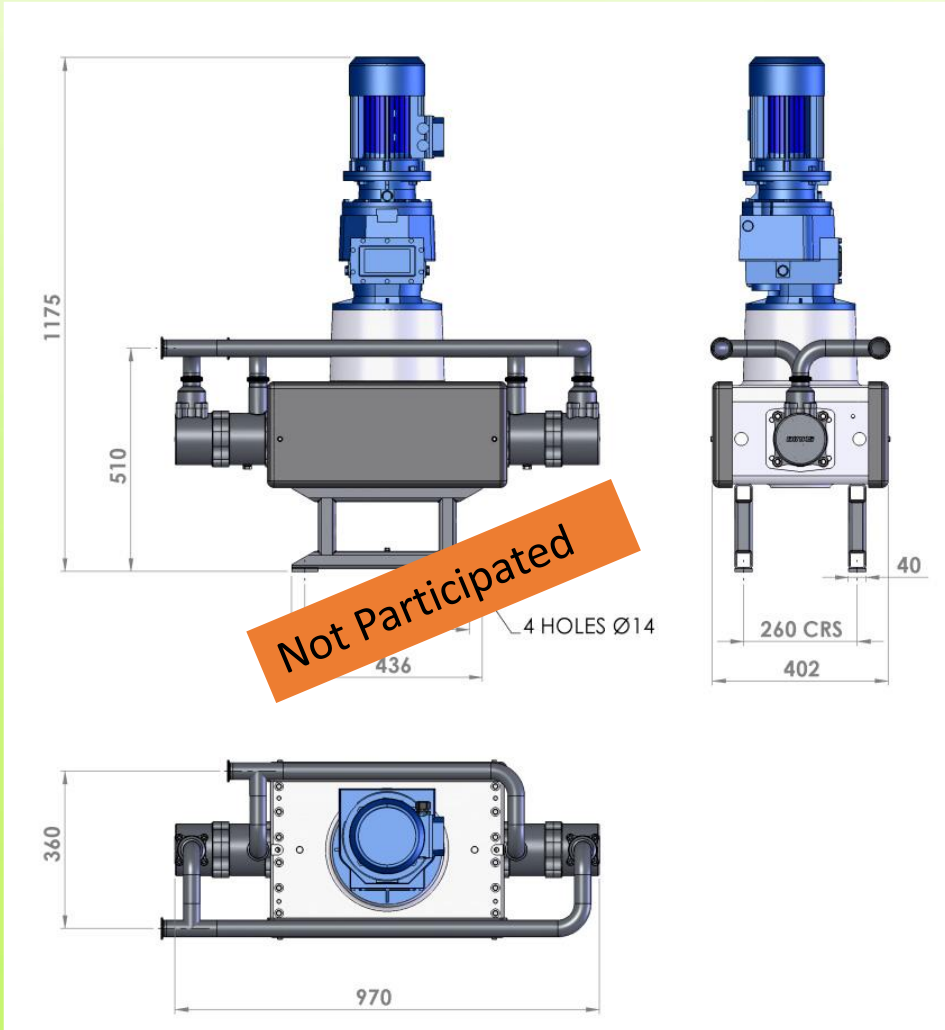
#	Levers	M/s Graco	M/s Durr
1	Safety	At Par	At Par
2	Technology	Best	Better
3	IOT enabled	Yes	Yes
4	Maint free Warrantee	5 yrs.	5 yrs.
5	Quality	Best	Better
6	Productivity	Best	Better
7	Cost (m/c purchase to check)		
8	Services	Pune based	Pune based
9	Spares	For 10 yrs	For 10 yrs
10	Installations	FIAPL RJV, M&M Chakan, MG Motors, MSL Gurgaon	Trial pump at MSL Gujrat VW, Skoda, Audi at Europe, JLR UK

Based on Safety, Technology, Quality & Cost decision to be taken



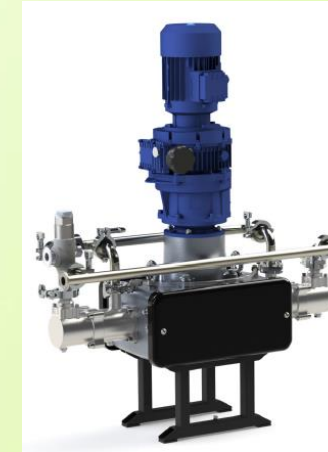
<b>E-Flo DC SQDCM Aspects</b>	<b>Graco Key Differentiator</b>
Safety	1 - Total 7 Global approvals - ATEX, FM,CE, IEC, KEC, EN 2 - IOT/Industry 4.0 compliant with Temperature, Voltage, Current monitoring
Quality	1 - Highest Spending on Reasearch among peers 2 - BLDC Technology much efficient than AC Induction Motor 3 - Automated Manufacturing at Graco with Consistent Product Quality 4 - Divorced Design for Best in class Operation, Maintenance & Service 5 - Less than 1% Warranty Cost
Delivery	1 - 95% + in stock service Level 2 - Established record of A+ Service from last 30+ years in India
Cost	1 - Total Cost of Ownership is less when Downtime cost is considered 2 - Downtime is less due to Divorced design Pumps
Morale	1- Graco Knowhow among industry is Highest 2 - Easier to Operate, Maintain and Service





Screen Shot showing -detailed status of one Channel  
Graph shows historical data 20L/min increase in flow rate.

Electric PUMP ROI Calculation work out		
Annual Operating Expenses		
Basic Details	Description	Unit
No of Systems (Pump + Agitator)	23	nos
Energy Rate	8.10	Rs / KWH
CFM to KW Conversion for Pneumatics	0.19	Constant
Production Hrs	8,760.00	Hrs
3000 CC Pneumatic Pump Annual Operating Cost		
Single Pump Air Consumption in CFM	15.00	CFM
Single Pump Air Consumption in CFM (80% Efficiency)	18.00	CFM
Single Pump Air Consumption in KW	3.42	KW
Total Pump Air Consumption in KW	78.66	KW
Total Power Consumption	689,061.60	KWH
Total Cost	5,581,398.96	INR
Pneumatic Agitator Annual Operating Cost		
Single Agitator Air Consumption in CFM	12.00	CFM
Single Agitator Air Consumption in CFM (80% Efficiency)	14.40	CFM
Single Agitator Air Consumption in KW	2.74	KW
Total Air Consumption in KW	109.44	KW
Total Power Consumption	958,694.40	KWH
Total Cost	7,765,424.64	INR
Electric Pump Annual Operating Cost in Non-Production / Flow Mode		
Single Pump Power rating in KW	1.50	KW
Total Production Hrs for Flow Mode (70% Time)	6,132.00	
KW Consumption in Flow Mode (40% Power, 70% Time)	0.60	KW
Total Pump Power Consumption in KW	13.80	KW
Total Power Consumption (40% Power, 70% Time)	84,621.60	KWH
Total Cost	685,434.96	INR
Electric Pump Annual Operating Cost in Production / Pressure Mode		
Single Pump Power rating in KW	1.50	KW
Total Production Hrs for Pressure Mode (30% Time)	2,628.00	
KW Consumption in Flow Mode (80% Power, 30% Time)	1.20	KW
Total Pump Power Consumption in KW	34.50	KW
Total Power Consumption	90,666.00	KWH
Total Cost	734,394.60	INR
Electric Agitator Annual Operating Cost		
Single Agitator Power rating in KW	0.37	KW
Total Agitator power Consumption in KW	14.80	KW
Total Power Consumption	129,648.00	KWH
Total Cost	1,050,148.80	INR

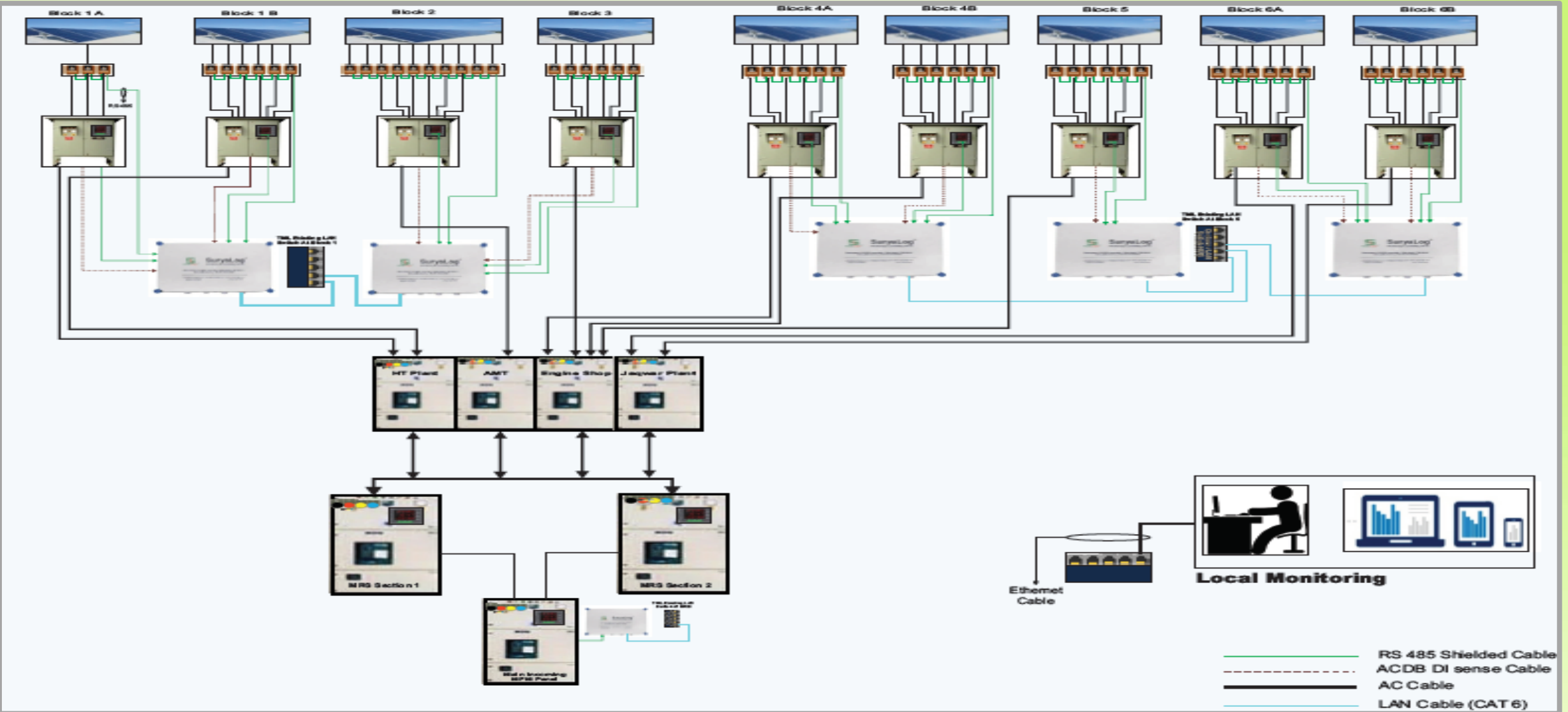


Actual Pump CFM	15.00
Actual Agitator CFM	12.00
Electric Pump Measured KW	1.50
Electrical Agitator KW	0.37

Electric Pump ROI Work out	
Saving & Investment ROI Calculation	
Total Pneumatic Annual Operating Cost	13,346,823.60
Total Electric Annual Operating Cost	2,469,978.36
<b>Total Annual Operating Cost Saving with Electric</b>	<b>10,876,845.24</b>
Monthly Saving	906,403.77
Total Investment Cost for this Project	55,000,000.00
Payback In Years	5.05

- New Technology Adaption
- First Time Migration in Brown Field Project (Running Paint Shop)

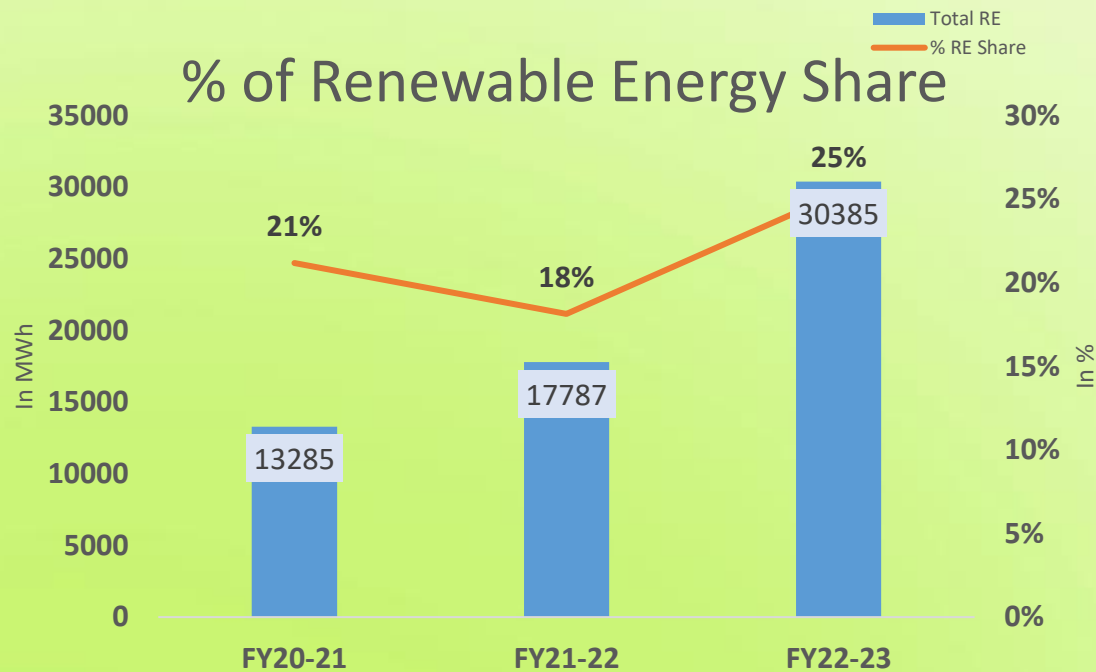
# Innovative Projects : Smart Control of Solar Energy Utilization





- Company Profile
- Energy Data
- Benchmarking
- ENCON Project in past 3 years'
- Innovative Projects (IOT 4.0)
- Utilization of Renewable Energy**
- Waste Utilization Management
- GHG Inventorisation
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- Team Work, Employee Involvement and Monitoring
- Learning from CII Energy Award Program

# Utilisation of Renewable Energy sources in TMPVL



Year	Total RE	Total Energy	% RE Share
FY20-21	13285	62756	21%
FY21-22	17787	98083	18%
FY22-23	30385	120000	25%

# PV Commitment towards Net Zero

2030



Tata Motors is a signatory to RE100 and has committed to meet 100% of its power requirements from renewable sources by 2030.

2037



Tata Motors has committed to Science Based Targets Initiative (SBTi) for setting near-term GHG reduction targets.

2040

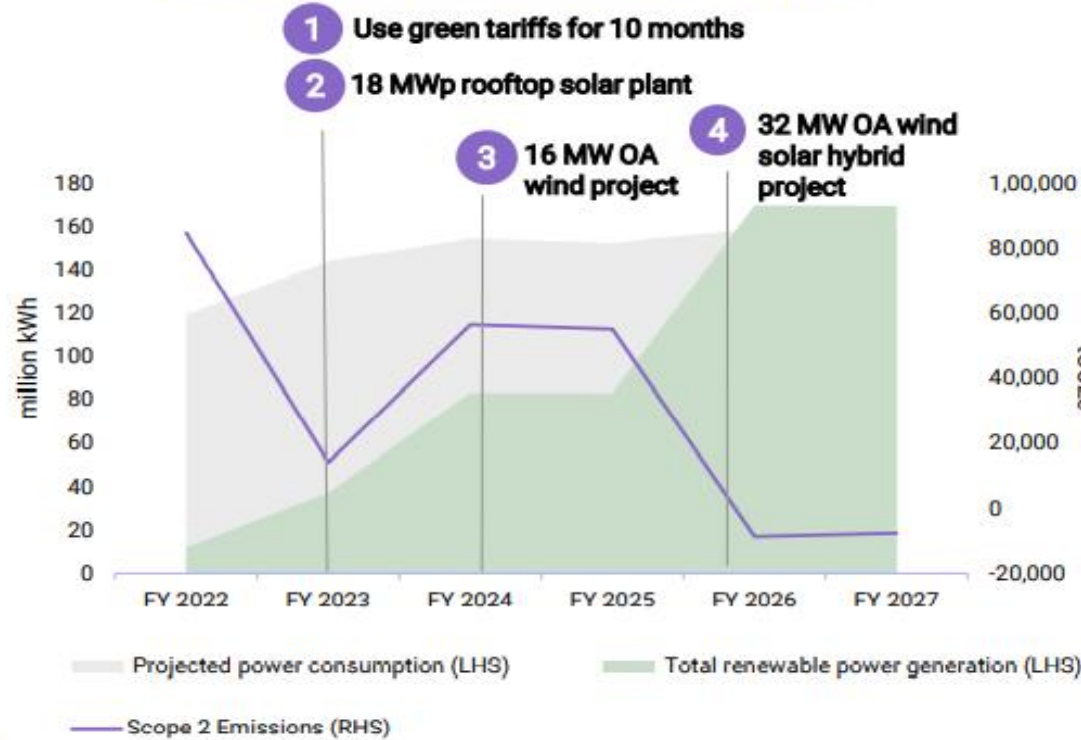


Tata Motors has committed to Net Zero by 2040 for the Passenger Car business and by 2045 for the Commercial Vehicle business

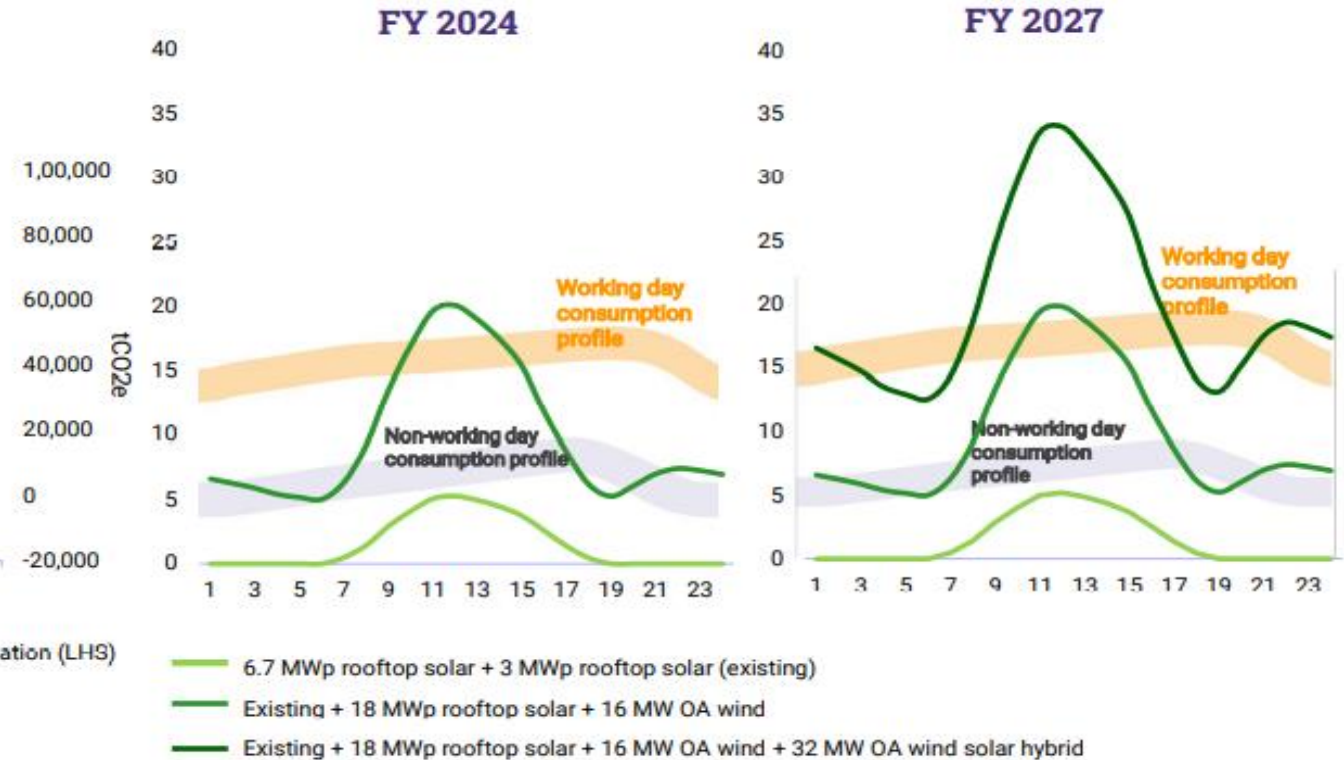
Procurement plan - Maharashtra

## Procurement plan - Chikhali

### Power consumption and RE ramp up plan



### Daily power consumption and generation profile, MW



- The suggested plan is developed based on current policies and regulations. With emergence of new procurement routes in the coming years, the plan may be revised to include more attractive technologies and procurement routes.
- Project sizes may need to be finessed after detailed project output simulation, based on actual project location, design and efficiency of various components.

# TMPVL Pune Plant RE 100 Strategy

## Procurement plan - Maharashtra

### Procurement plan - Chikhali

**1 Use green tariffs for 100% of power in FY 2023**

**2 Install a 18 MWp rooftop solar plant in FY 2023**

**3 Develop a 16 MW OA wind project in FY 2024**

**4 Develop a 32 MW OA hybrid project in FY 2026**

<b>Usable rooftop area</b>	<b>150,700 sq. m.</b>
• Estimated power output	25 million kWh; 18% of power consumption in FY 2023
• Gestation period	4 months
• Metering arrangement	Behind-the-meter (no banking of power with the grid)

46 million kWh; 30% of power consumption in FY 2024

12-15 months

Captive or group captive model  
Explore both inter-state and intra-state options

**Configuration: 24 MW wind + 8 MW solar**

87 million kWh; 55% of power consumption in FY 2026

12-15 months

Captive or group captive model

**Our recommendation: use for 10 months**

• Estimated cost	INR 7.62/ kWh (landed cost: INR 8.19/ kWh)
------------------	--

**Our recommendation: CAPEX model**

• Estimated CAPEX	INR 781 million
• Investment returns	Project IRR: 30%

**Our recommendation: Captive model**

INR 1,280 million
Project IRR: 23%

**Alternative: OPEX model**

• 26% equity investment	NA
• PPA tariff	INR 4.50/ kWh (landed cost: INR 5.18/ kWh)
• PPA term	20-25 years

**Alternative: Group captive model**

83 million
INR 4.50/ kWh (landed cost: INR 5.83/ kWh)
20-25 years

**Rationale**

1. Certainty of delivery of power and simple to execute; more cost effective than buying power on exchange

**Rationale**

1. Lowest effective cost of power, minimal policy risk and attractive investment case for CAPEX model
2. Simple design, construction and operation: outsource on a lumpsum basis to an experienced contractor
3. Delay implementation until end of 2022/ early 2023 for module prices to stabilise at reasonable levels

**Rationale**

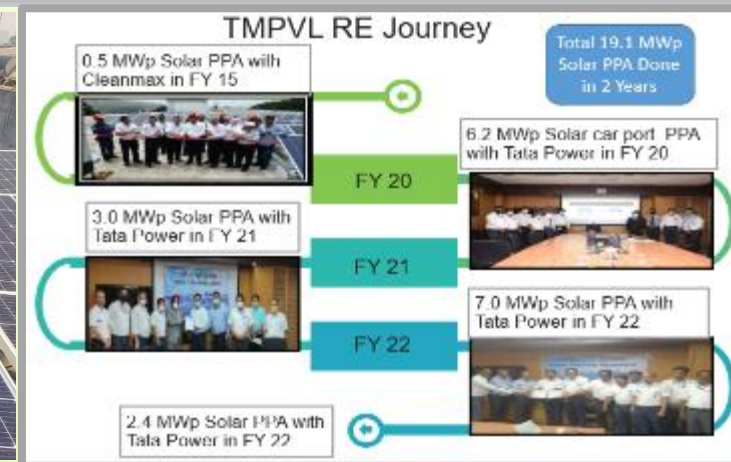
1. Implement OA project in stages to reduce risk of surplus power generation
2. Use captive model and intra-state OA to minimise risk
3. Relatively simple design, construction and operation: outsource on a lumpsum basis to an experienced contractor

**Rationale**

1. Evaluate project size and business model depending on evolving technology and policy landscape
2. Increase contract demand to procure more open access power

# RE 100 Journey

## Solar Power Enhancements



#	Project	Capacity (KWp)	Generation (KWh / year)	Savings (Rs. Cr)	TCO2e reduction per year
1	6.2 MWp Car port	6200	8640000	4.32	6825
2	3 MWp Roof Top	3000	4200000	1.68	3318
3	7.0 MWp Roof Top	7000	9870000	3.49	7797
4	2.4 MWp Roof Top (Proposed)	2400	3700000	1.20	2400
<b>Total</b>		<b>18600</b>	<b>26410000</b>	<b>10.7</b>	<b>20340</b>

**TCO2e Reduction till FY22**

**10144 TCO2e**

h will generate annual

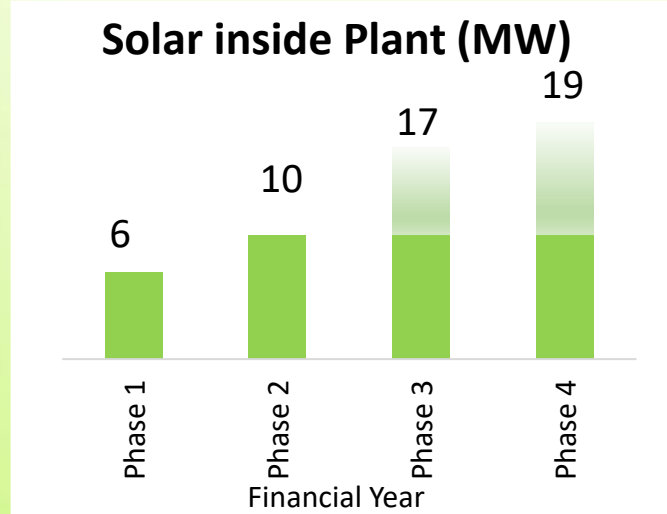
**Cost Saving till FY22**

**Rs. 6 Crores**



**By FY 22-23, TMPV Pune Plant would be India's Largest Solar Plant inside the Manufacturing Plant Premises**

- India's largest Car Port inaugurated on Aug-21
- Solar Power Generation 9.7 MW @ Zero Capital investment (3.99 Rs/Unit)
- Lowest CO2 emission & water use in last 5 yrs
- 2700+ Tree Plantations under Green Initiative
- Lowest Compressed Air Leakage (23% to 8%)
- Zero Discharge Plant



## Adopting Sustainable Methods

# FY 21-22 : 6.2 MWp RE Solar Project Completed

 Solar Injected Block

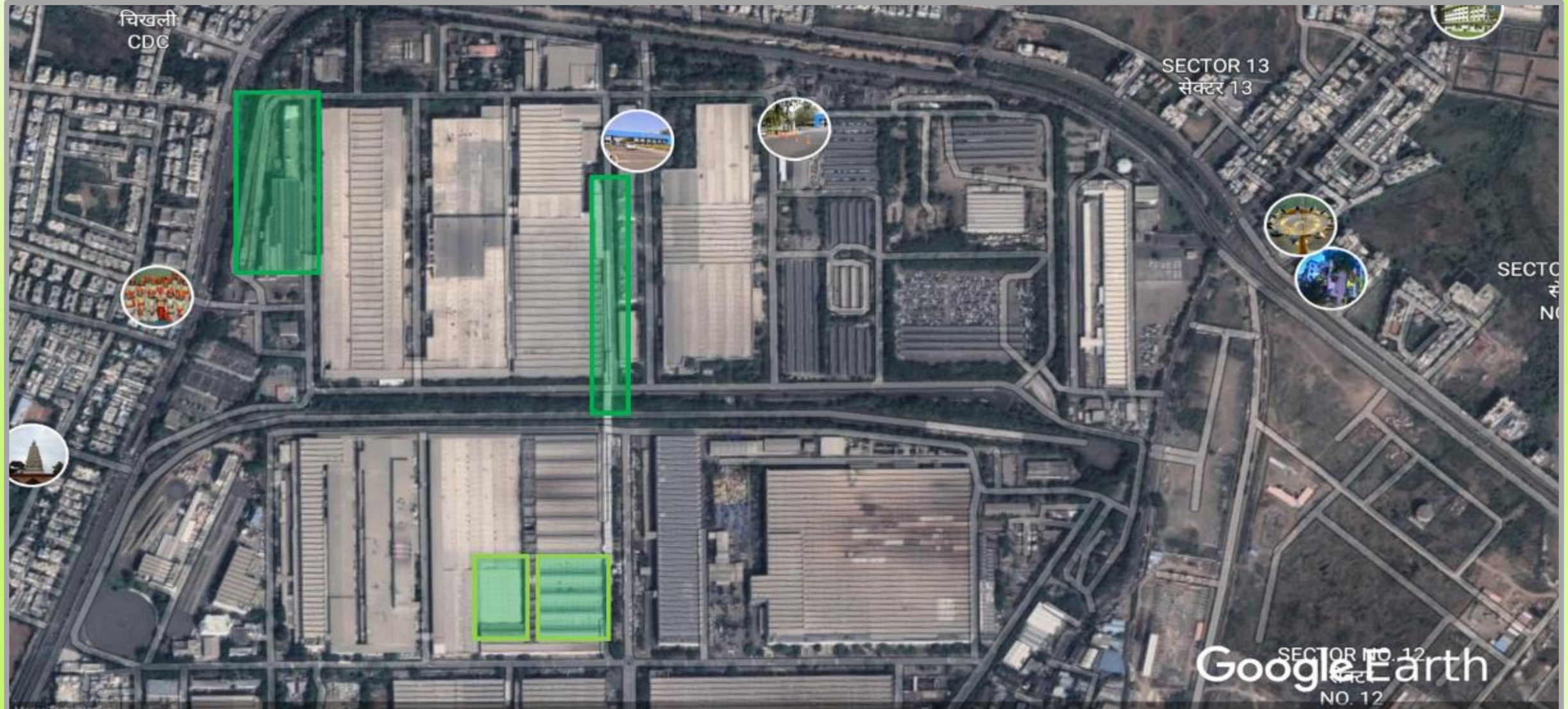


**India's Largest and World's Second Largest Solar Car Port**





# FY 21-22 : 3.0 MWp RE Solar Project Completed



**India's Largest and World's Second Largest Solar Car Port**

# Media Coverage - 3.0 MWp RE Solar Project Completed in FY 21-22

EXTERNAL COMMUNICATION

**ET NOW INSIGHT** WHAT ICICI PRU MF BOUGHT & SOLD

NIFTY 50: 17419.40 (+64.10)

Sensex: 58301.45 (+213.09)

**Tata Motors Signs a PPA with Tata Power: Agencies**

Today: 304.55 (+3.05)

ET LIVE 11:49 AM

EXTERNAL COMMUNICATION

**Tata Motors inks pact with Tata Power for rooftop solar project at Pune plant**

**Going green: Tata Motors to install 3 MWp rooftop solar project at Pune plant**

**Tata Motors takes pact with Tata Power for rooftop solar project at Pune plant**

**3 MW solar rooftop (rooftop) plant**

**Business Standard**, **ET Auto**, **ET Energyworld**

COVERAGE SNAPSHOT (ONLINE)

COVERAGE SNAPSHOT (ONLINE)

EXTERNAL COMMUNICATION

**Tata Motors inks pact with Tata Power for rooftop solar project at Pune plant**

Tata Motors on Tuesday said it has inked a pact with Tata Power to install and operate a 3 MWp rooftop solar project at its passenger vehicle business unit (PVBUI) plant in Pune. The automaker said it has signed a solar power purchase agreement with Tata Power. The solar rooftop project is expected to generate nearly 45 lakh KWh per year, reducing carbon emissions by around 3,538 tonnes.

**Free press Journal**

**Tata Motors pacts with Tata Power for rooftop solar project at Pune plant**

**TATAMOTORS ON Tuesday** said it has inked a pact with Tata Power to install and operate a 3 MWp rooftop solar project at its passenger vehicle business unit (PVBUI) plant in Pune. The firm said it has signed a solar power purchase agreement with Tata Power. The solar rooftop project is expected to generate nearly 45 lakh KWh per year, reducing carbon emissions by around 3,538 tonnes per year, it added.

**After the recent inauguration** of India's largest solar rooftop at our plant in Pune, this project marks a new milestone in our ongoing efforts to reduce our impact on the planet. Tata Motors Passenger Vehicle Business Unit Vice President, Operations - Rajesh Khatri said in a statement.

Energy efficiency is at the core of the company's efforts in reducing CO2 emissions and the carbon footprint of products played a vital role, he added. "We will continue to conserve energy in our manufacturing facilities, exploring consumption of non-renewable fossil fuels, energy production, etc."

**Hindustan Express**

**Tata Motors signs a PPA with TATA Power**

**CHANDIGARH, INDIA:** Developing its commitment to conserve energy and achieve 100% renewable energy source for all its operations, Tata Motors has signed a Solar Power Purchase Agreement with Tata Power to install and operate a 3 MWp rooftop solar project at its Passenger Vehicle Business Unit (PVBUI) plant in Pune. This solar rooftop project is expected to generate nearly 45 lakh KWh per year, reducing carbon emissions by approximately 3,538 tonnes per year. Speaking at the occasion, Mr. Rajesh Khatri, Vice President, Passenger Vehicle Business Unit, Tata Motors said, "After the recent inauguration of India's largest solar rooftop at our plant in Pune, this project marks a new milestone in our ongoing efforts to reduce our impact on the planet. Energy efficiency is at the core of our efforts and reducing GHG emissions and the carbon footprint of our products are a vital role. We will continue to conserve energy in our manufacturing facilities, exploring consumption of non-renewable fossil fuels, energy production, etc."

**Tijarat**

## India's Largest and World's Second Largest Solar Car Port

# FY 23 Ongoing Solar Project : 9.4 MWp RE Solar Project



**India's Largest and World's Second Largest Solar Car Port**

# Media Coverage - 7.0 MWp RE Solar Project Planned in FY 22-23

**PRINT**

**टाटा पावर અને ટાટા મોટર્સ સાત મેગાવોટનું સોલર રૂફટોપ સ્થાપશે**

Financial Express (Gujarati)

**Tata Power, Tata Motors to develop 7MWp solar rooftop**

Tata Power and Tata Motors have collaborated to develop a 7 MWp solar rooftop project at the latter's passenger vehicle plant in Chikhali, Pune. This is the third phase of a joint 17 MWp on-site solar project developed by the two companies, of which 10 MWp has already been installed, a company statement said.

Free press Journal

**Tata Motors and Tata Power join hands for solar rooftop expansion project**

According to the Group secretary, the two companies have joined hands for the development of a 7 MWp solar rooftop project at Tata Motors' Passenger Vehicle Plant in Chikhali, Pune. This is the third phase of a joint 17 MWp on-site solar project developed by the two companies, of which 10 MWp has already been installed, a company statement said.

Maharashtra Times

**ટાટા મોટર્સ ઓર ટાટા પાવર ને સરૂંદરી કી પુર્ણ**

Divya Bhaskar

**તાતા મોટર્સ અને પાવર સોલાર રૂફટોપ માટે જોડાણ કર્યું**

Pudhari

**ટાટા મોટર્સ અને પાવર સોલાર રૂફટોપ માટે જોડાણ કર્યું**

Maharashtra Times

**ONLINE**

**Tata Motors and Tata Power ink Power Purchase Agreement for solar expansion project in Pune**

ET AUTO

**Tata Motors, Tata Power to install 7 MWp solar rooftop expansion project in Pune**

The Economic Times

**Tata Power, Tata Motors collaborate to develop a 7MWp solar rooftop project**

Mint

**Tata Motors collaborates with Tata Power for 7MWp solar rooftop project at PV plant**

Business Standard

**Tata Power, Tata Motors to develop 7MWp solar rooftop**

Moneycontrol

**Tata Motors, Tata Power partner to develop solar rooftop at former's auto plant**

HT Auto

**Tata Motors, Tata Power team up to set a solar rooftop expansion project in Pune**

Business Today

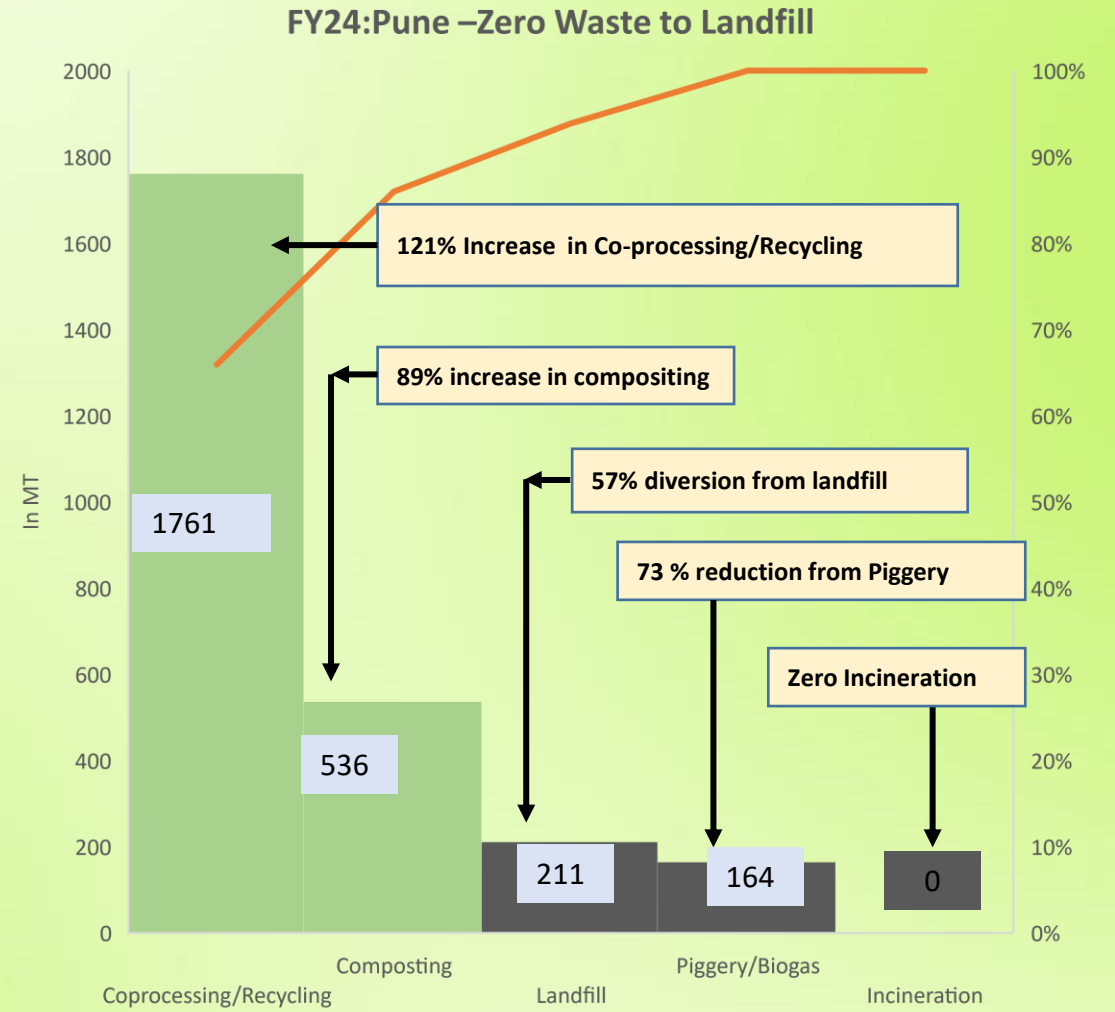
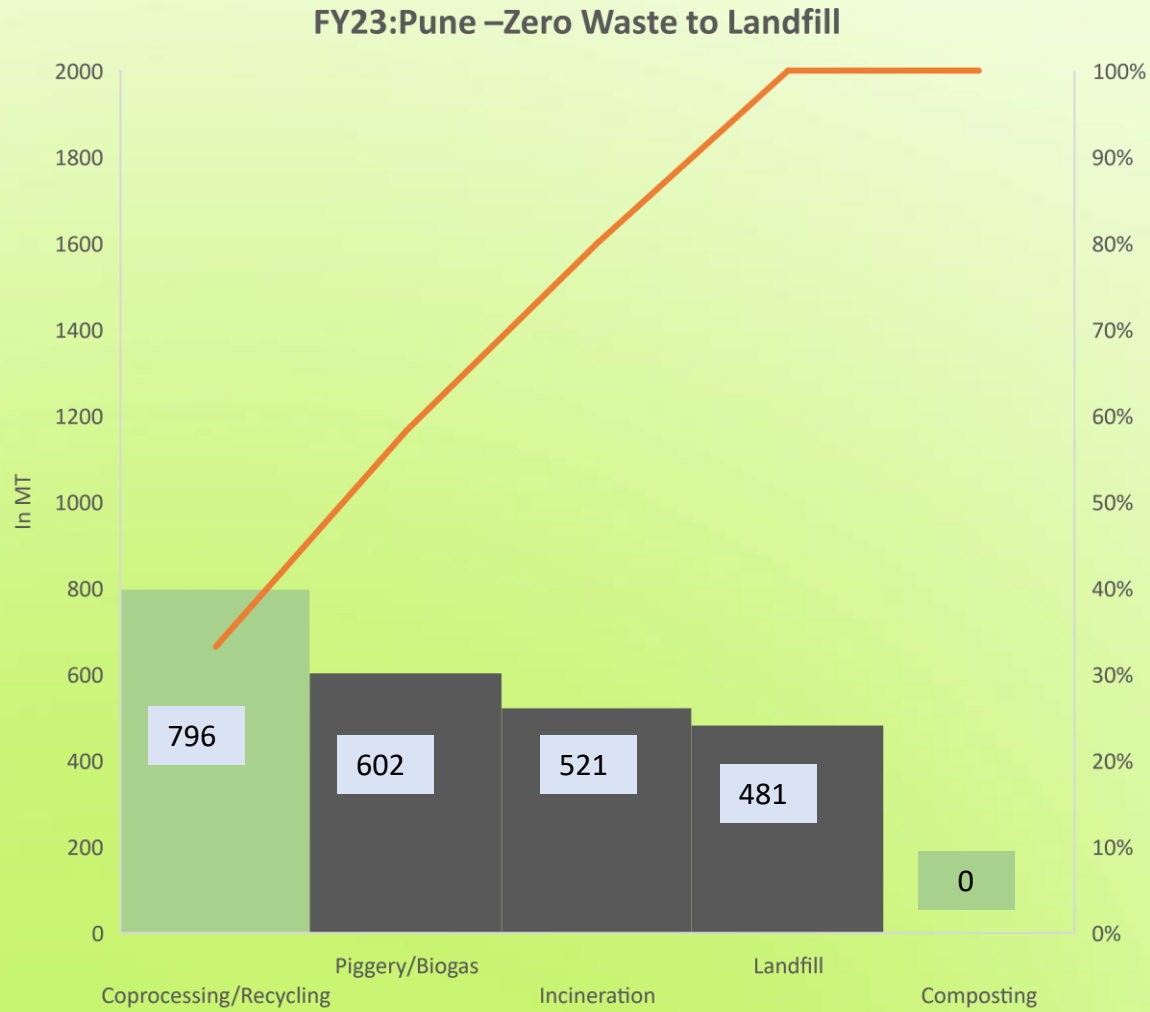
**Tata Motors joins Tata Power To Develop 7MWp Solar Rooftop Project At Chikhali Plant**

Mobility Outlook

India's Largest and World's Second Largest Solar Car Port

- Company Profile
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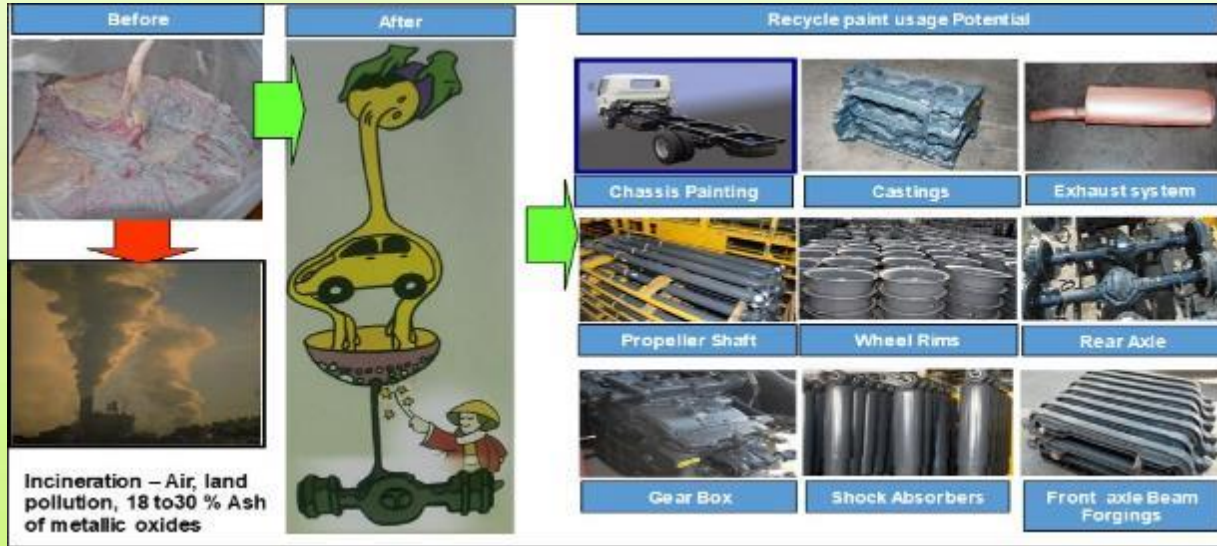
# Pune- Zero Waste to Landfill



✓ **Achieve Zero Waste to Landfill :Increase diversion rate from landfill (62 % to 86 %)**

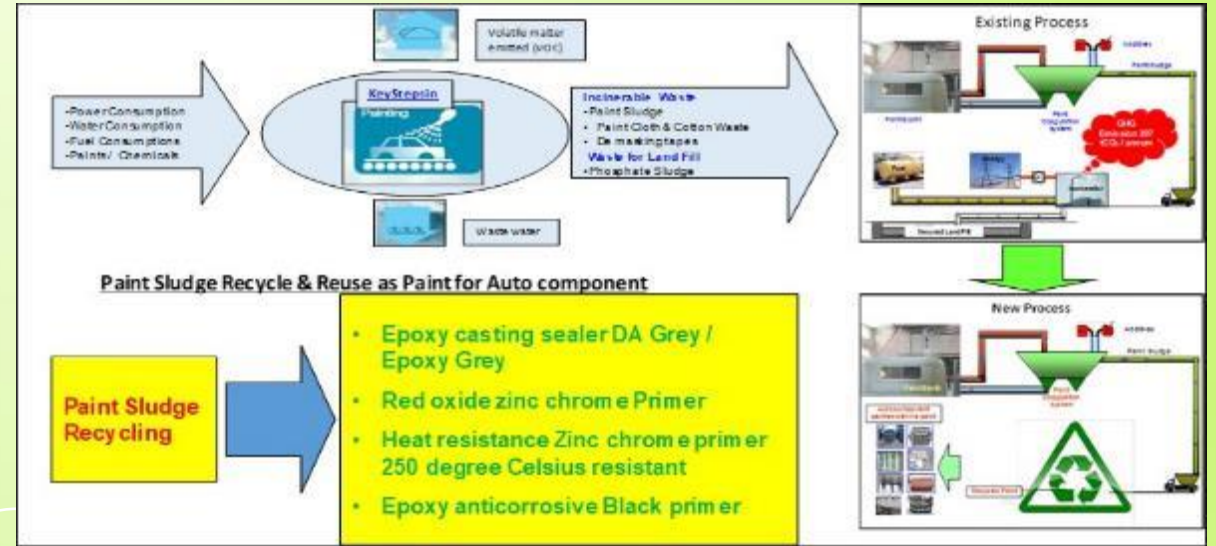
\*Excluding Sheet Metal Scrap

## Paint Sludge recycling and usage potential



### Zero Discharge Plant

## Paint Shop Hazardous Waste Process Mapping



### Green Spots at Plant



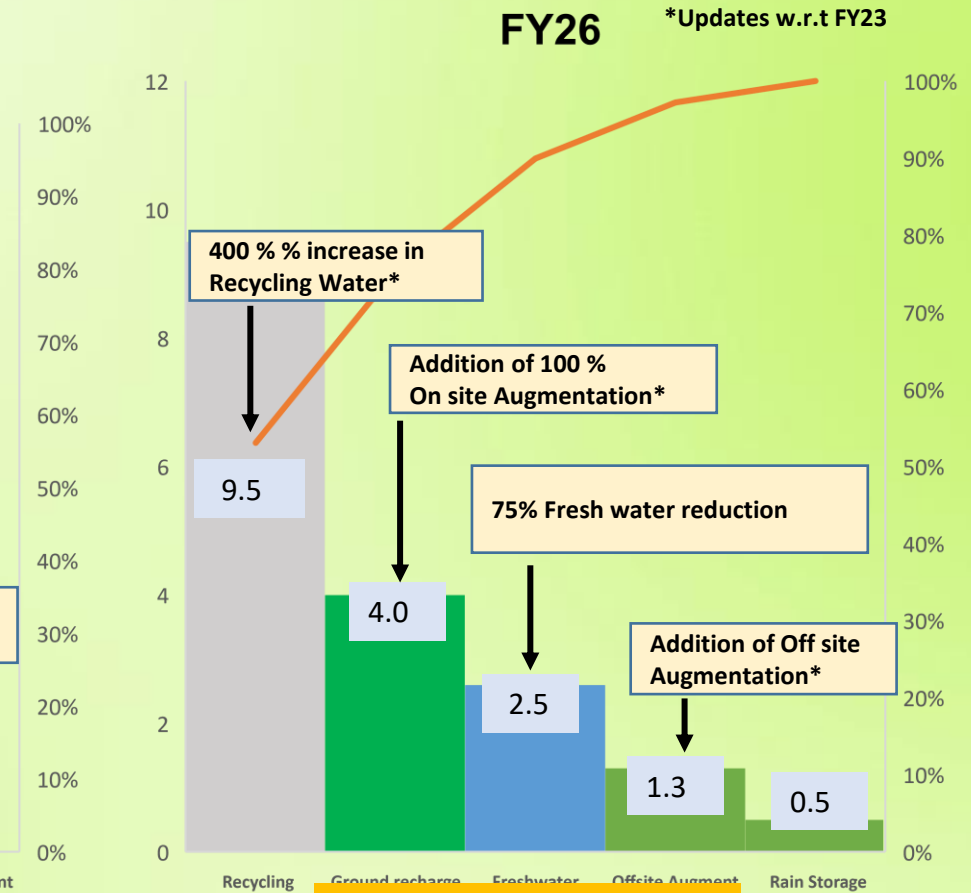
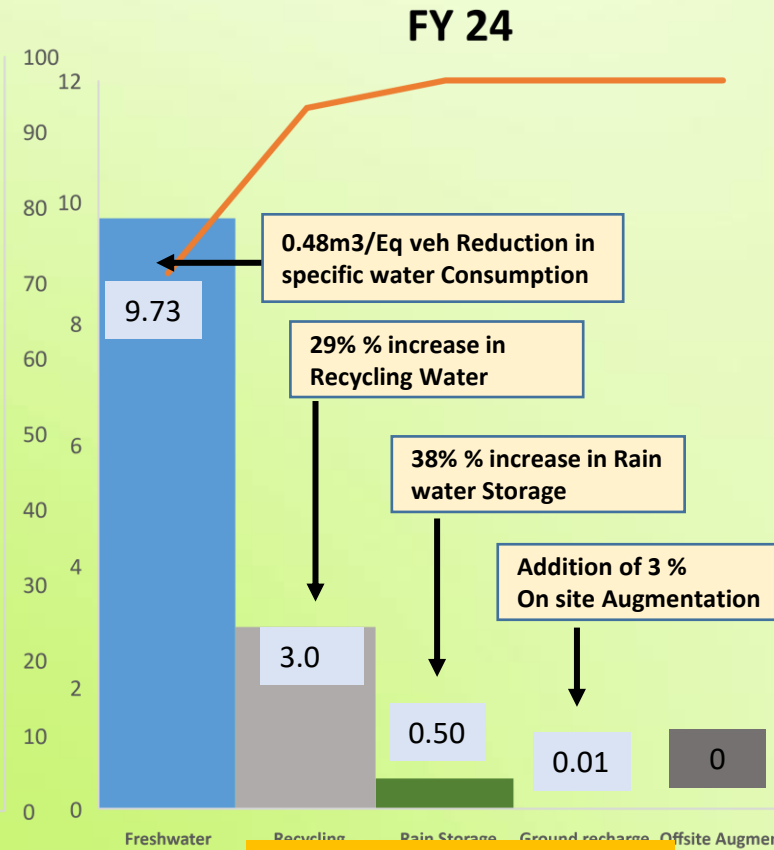
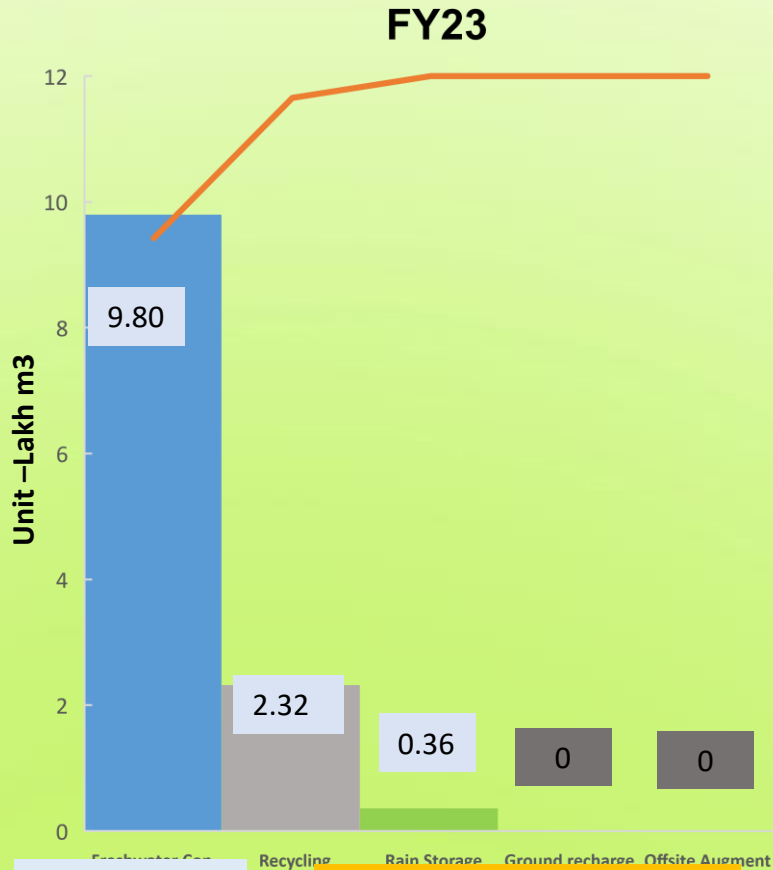


# TMPV Pune :FY26 Water Neutrality Roadmap

Production volume lakh Eq. Veh 3.74

Production volume lakh Eq. Veh 4.58

Production volume lakh Eq. Veh 4.93



Water Consumption → FY 23 :-3.36 m3 /Eq.Veh.

FY 24 :-2.88 m3 /Eq.Veh.  
14% water Reduction

FY 26 :-2.32 m3 /Eq.Veh.  
31% water Reduction\*

✓ Achieve Water Neutrality :Improve water ratio from 0.21 to 1.22 by FY26

# Tree Plantation Drive



*2700+ Tree  
Plantations under  
Green Initiative*



'Green' Plant Initiative



# Water and Waste related projects in FY'23 of TMPVL

Water KPI Lever	Project description	PDC	Reduction Potential (m <sup>3</sup> /year)	Budget Required (INR, lakhs)	Status
Reduce losses	Chikhali: Above ground water line replacement	Mar'23	150,000	84	CAPEX Budget available. Saving will accrue in FY24
	Chikhali: Local overhead water tanks for JLR area	Dec'22	15,000	10	Support required under Rev Budget.
Process optimization	Sanand: VFD and IoT metering in water supply	Jun'22	5,000	4	Completed under Revenue Budget
	Sanand: Low-flow fixtures in canteen & toilets	Sep'22	2,000	4	Completed under Revenue Budget
Rainwater Harvesting	Chikhali: Hydrogeological Survey	Sep'22	---	5.2	Rev budget is available
Effluent re-cycling	Chikhali: Installation of Pre-filter	Dec'22	100,000	30	Trials underway; CAPEX Budget available.
	Chikhali: STP up-gradation (Dedicated tube settler & UF module)	---	100,000	246	Decision depends on outcome of pre-filter trial

**Efforts towards becoming Water Positive Plant**

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# GHG Inventorisation of TMPVL

TATA GROUP DIRECTIONS	
Base line for Net Carbon zero plan	<ul style="list-style-type: none"> <li>15% reduction in absolute CO2e emissions (Scope 1 + 2) from a [2020] baseline by 2025</li> <li>35% reduction in absolute CO2e emissions (Scope 1 + 2) from a [2020] baseline by 2030</li> <li>Net zero CO2e emissions (Scope 1+2+3) before 2039</li> </ul>
Projection of Energy Consumption	Derived from Vehicle Production Plan till FY 29-30 and KWh/ vehicle
Option available	<ul style="list-style-type: none"> <li>Exploring within plant solar roof top installation</li> <li>Exploring group captive or Open access power purchase</li> <li>Use of MSEDCL green power purchase with additional rate</li> <li>Encon Projects implementation</li> </ul>
External Factors involved	<ul style="list-style-type: none"> <li>Vehicle Production</li> <li>Govt Regulations</li> </ul>

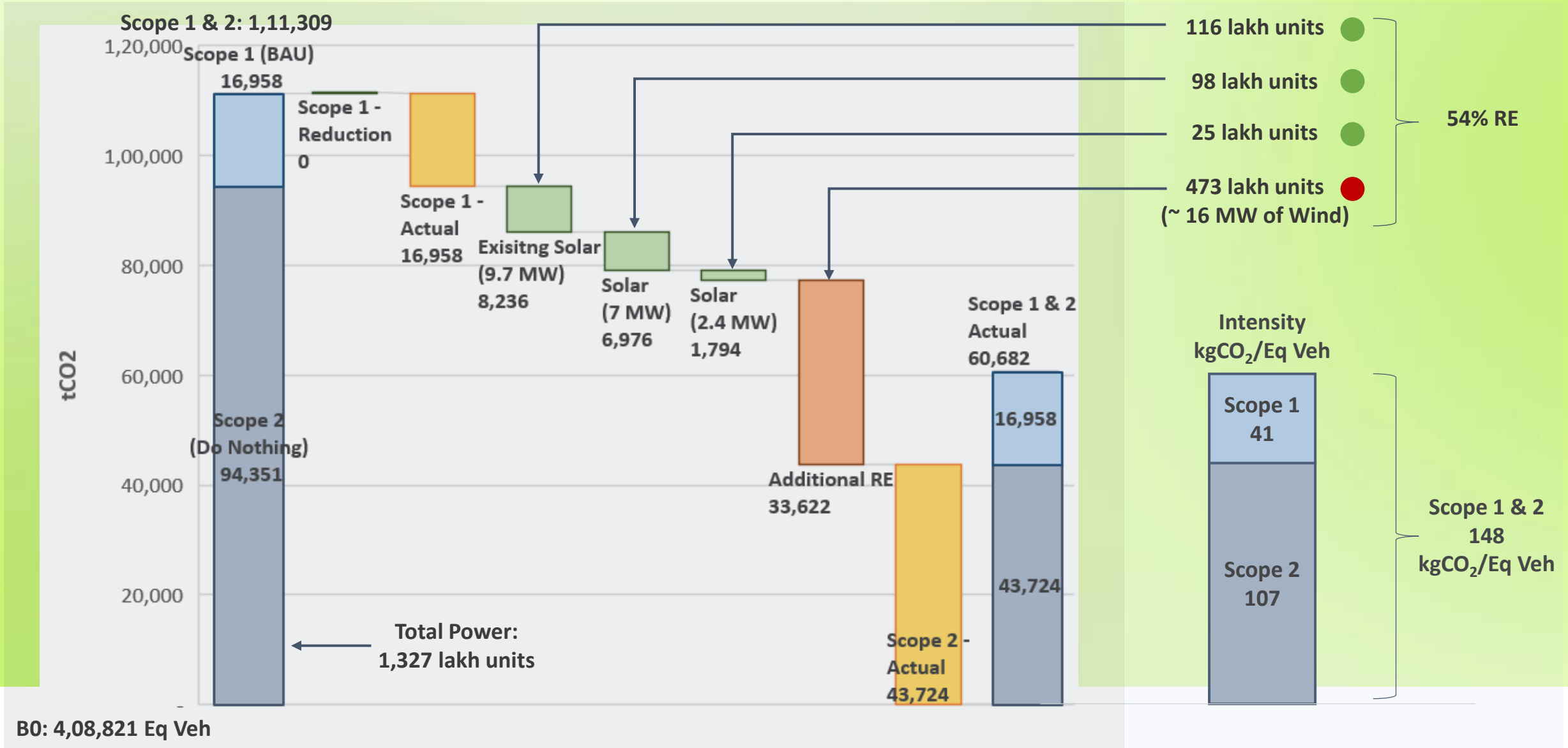
## TMPVL Pune : GHG Performance YTD Mar'23 , TMPVL

### Pune

	2019-20			2020-21			2021-22			2022-23		
	Scope 1	Scope 2	Scope 1 + 2	Scope 1	Scope 2	Scope 1 + 2	Scope 1	Scope 2	Scope 1 + 2	Scope 1	Scope 2	Scope 1 + 2
Chikhali	1,558	21,313	22,871	6,613	41,065	47,678	11,929	63,434	75,363	16,958	73,600	90,558

**GHG Emission monitoring in line with SBTi Commitment**

# FY24 GHG Ask Breakup (Base Scenario)



Scope 1 BAU refers to emissions with respect to FY23 Scope 1 intensity. 2.4 MW solar generation considered for 3 quarters.

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# Green Supply Chain Management Practice of TMPVL

Sr. No.	Projects Implemented	Investment (Rs In Cr)	Benefits (Rs. 10.09 Cr)
1	Reduction of Ocean transit time & Port turnaround time for JLR imported shipments resulted in inventory carrying cost	Nil	5.5
2	Altroz pallet cost saving due to in house ICA family pallets modification	0.5	1.25
3	Transportation cost saving through trolley modification from J to K Block	0.5	0.51
4	Packaging improvement in Nexon BIW parts	Nil	0.27
5	Harrier engine Freight cost optimization from RJV to Pune	Nil	0.23
6	Freight cost optimization for Harrier projects	Nil	0.8
7	Export shipment cost optimization	Nil	0.43
8	Employee transport optimization	Nil	1.0
9	Cost optimization for material transportation from CCD (Console Centre Delhi)	Nil	0.1
11	Plastic waste reduction initiatives (8 Ton reduction / year), Reuse of Plastic (600 Kg / year)	Nil	Plastic weight reduction of 8030 Kg/ Year. 2. Reuse of 594 Kg / year of plastic



## Initiatives towards Green Supply Chain



- Company Profile
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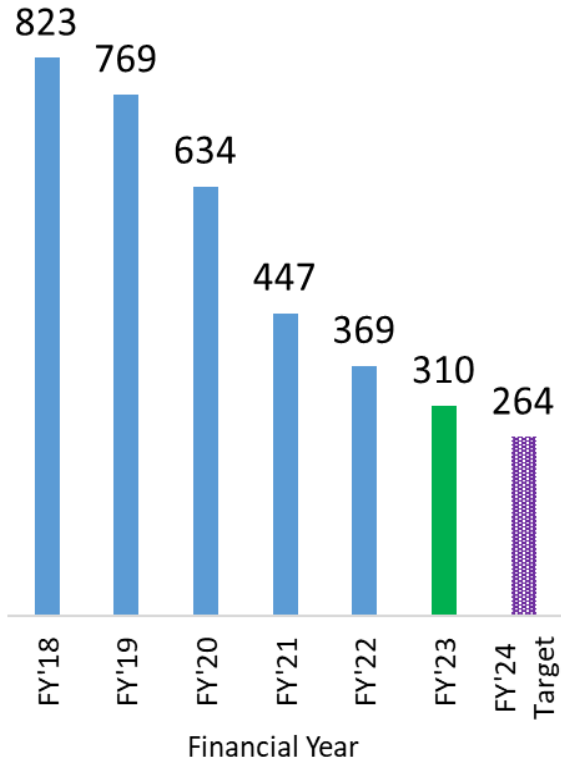
**Energy Conservation Team**

	Shop Champions	Power	Fuel	IMC	Tools	PTP	Rejection	Freight (TPLP)
TCF	Vikas Kattimani	Ganesh Kapse	NA	Ritesh Rajput	Ritesh Rajput	Ritesh Rajput	Dinesh	NA
PAINT	Arjun Mahajan	D. Bhamere	Devinder Singh	Arjun Mahajan	Mukesh Inamdar	NA	Abhay Nahar	NA
WELD	Vikas / Prashant	Balasaheb Landge	NA	Vankatesh Kulkarni	Vikas Dhake	Surendra Shinde	Ajit Patil	NA
PRESS	Sunil Memane	Shrikant & Mali	NA	Mukund Jeodevkar	Shrikant Patil	Mahesh Tambe	Vijay Sagare	NA
ENGINE	Paresh Zende	Paresh Zende	Vaibhav Karandikar	Atul Patil	Sanjay Shejul	Atul Patil	Vaibhav Sewant	NA
T/A	Nilesh Tilak	Nilesh Tilak	Jaysankar	Deepak Mujumule	Suyog Mashelkar	Suyog Mashelkar	Hemant Mahamuni	NA
OTHERS	D. Suresh & Rahul & Deepak	D. Suresh	Suhas Kulkarni	Milind Shah	Deepak Barate	Deepak Barate	Milind Shah	Shirish Athavle

**Shop wise and component wise teams created to drive VCC reduction**

# Daily Energy Monitoring System

(KWH/Eq Veh Production)

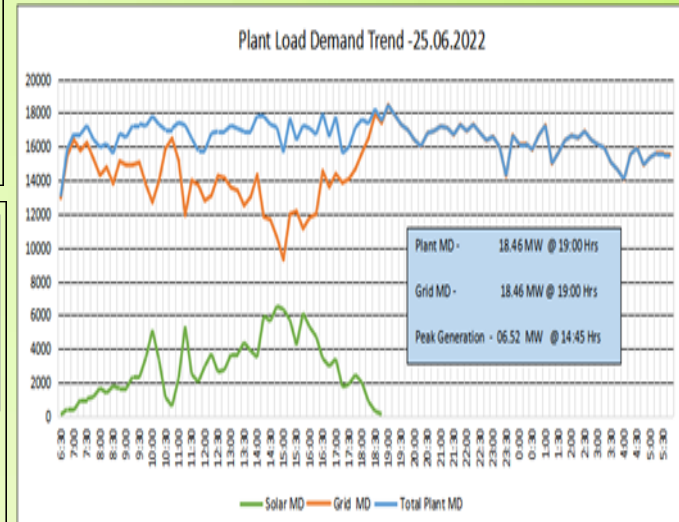
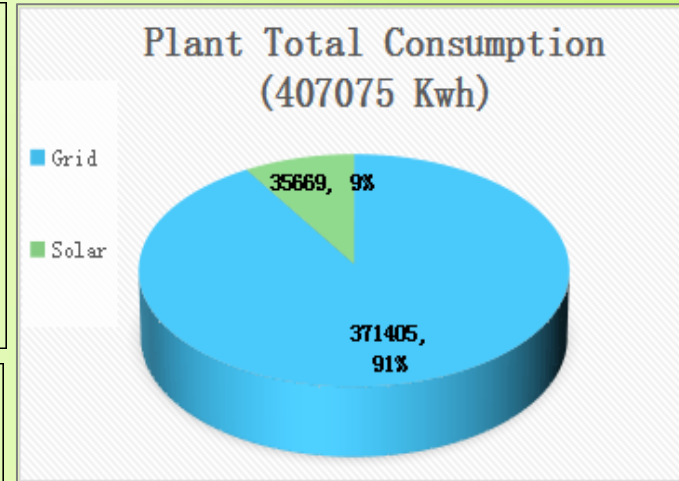
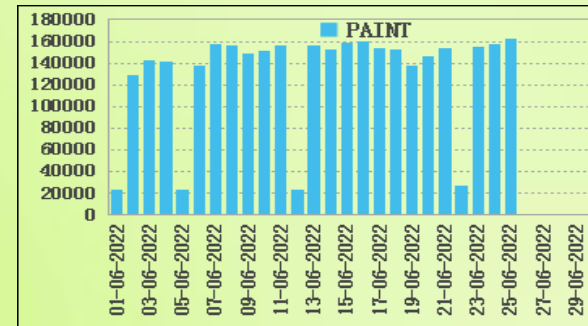
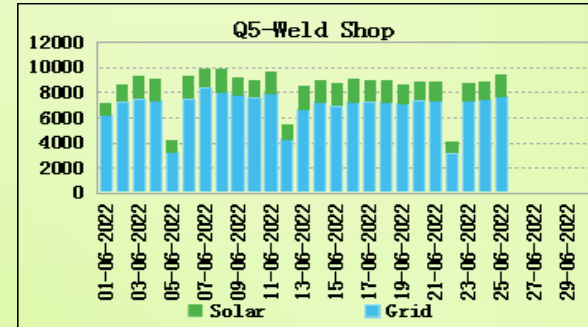
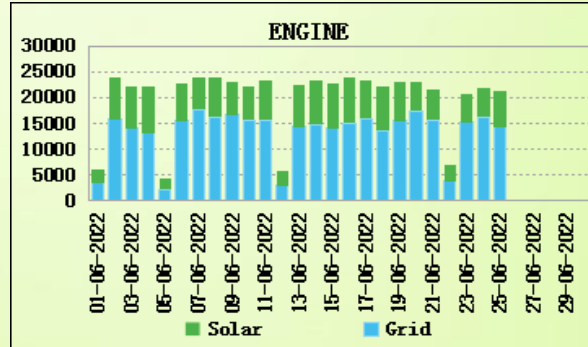


### Projects Completed

- ✓ High Volume Low Speed (HVLS) Fans
- ✓ New CED Coating Oven
- ✓ Air Supply Unit Variable Frequency Drives
- ✓ Compressed Air Leak Reduction
- ✓ LED lights

### Projects Under Progress

- Advanced Air Compressor installation
- Electrical Pump at Paint Kitchen
- VFD installations at Paint Shop
- ASU Electronic Commutated (EC) Motor
- Office Remote control fan
- Adiabatic chiller at JLR Engine



Electrical Energy Monitoring System established on Green and Black Energy Consumption

# People Involvement



**Plant Level Winner**



**QCFI Pune Chapter- Gold Award**



**Appreciation by MD**



**Annual Innopex Award**



**Excellence Award at National Level QCFI Competition**



**Capability Building through Fundamental Skill Training**

Driving Sustainable Culture through People Involvement



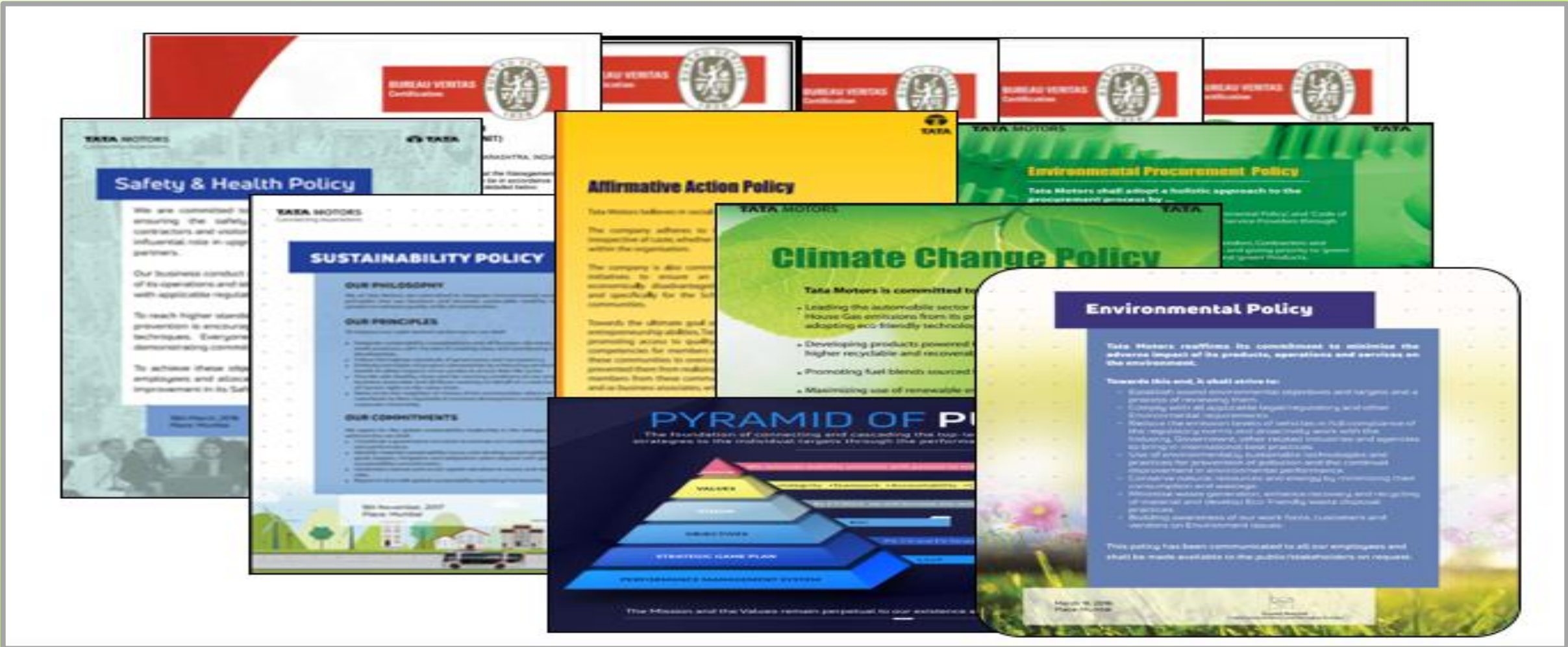
## PV Pune bagged highest ever external awards in FY 22 (Total – 33 Awards)

- ❖ **CII National Award** - 'Excellent Energy Efficient Unit' award for making significant progress in energy efficiency in the 22<sup>nd</sup> edition of the CII National Award for Excellence in Energy Management 2021
- ❖ **National Awards for Excellence in Manufacturing 2021** - Best In Class Award in Excellence in Productivity and Green Manufacturing in 7<sup>th</sup> edition of 'National Awards for Excellence in Manufacturing 2021' organized by World Manufacturing Congress & Awards, India Chapter
- ❖ **NCQC 2021 – 10 Awards (2 Par Excellence and 8 Excellence) awards @ National Convention on Quality Concepts (NCQC) competition**
- ❖ **CCQC, QCFI Quality Circle** - 10 Gold and 5 Silver Awards in QCFI's Pune Chapter Quality Circle competition
- ❖ **CII Poka Yoke Competition** - Won award in 3<sup>rd</sup> Edition of CII WR Poka Yoke Competition 2021
- ❖ **IIIE Productivity Case Study Contest** - Kaizen Teams (EV, X1 BIW & X4 BIW) bagged 3 Awards @ Productivity Case Study Contest organized by Indian Institution of Industrial Engineering (IIIE) Pune
- ❖ **CII National Maintenance Circle Competition** - Paint Shop TPM Team bagged Runner Up Award for the Best Case on Breakdown time reduction.



**PV Pune excelled at CII, QCFI, NCQC, IIIE and World Manufacturing Congress Awards. Bagged 33 awards so far**

# Policies



**TMPVL Leadership has committed to integrate environmental, social and ethical principles in its business and innovate sustainable mobility solutions with passion to enhance quality of life of communities.**

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# Learning from CII Energy Award 2021 or other award program in **TMPVL**



Learning from CII incorporated in ENCON Journey



**Q & A**  
**Any Questions ?**



Thank You