Emission Solutions

CII National Award for Environmental Best Practices - 2023

PCP 2 HSE Team

9th May 2023

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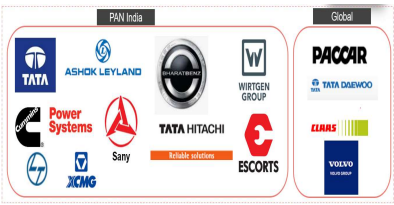
Cummins Emission Solution India PCP2 Plant

Customers



People

- Total Strength : 800
- Contract and 3PL : 400

SME

- SME : Welding (6)
- SME : Controls (8)
- SME : Robotics (4)

Process

- SOT audits
- HSEMS Certification
- IATF Certification
- Skill Development and Evaluation
- TBWS – Team Development
- VST Workshops and OE Assessment
- Process Qualifying GMSW
- Talent Development
- Outbound 90% returnable, Inbound 45% Returnable packaging

Manufacturing Technology

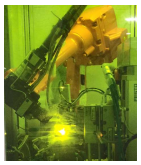
Final Assembly Line	: 3
Mixer Lines	: 2
LV Line	: 1
Service Line	: 1
Total Annual Capacity	: 300K EGP


Cobot


Robot


Vacuum Manipulator


3D Scanner Carl Zeiss

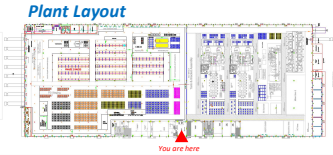

MIG, TIG & Laser Weld


ASRS

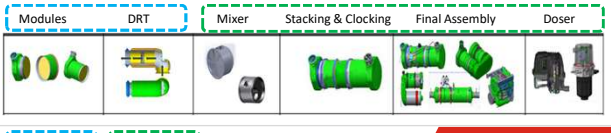
Area Statement

Total	: 240K sq.ft.
Warehouse	: 130K sq.ft.
Manufacturing	: 110K sq.ft.

Plant Layout



Manufacturing Strategy



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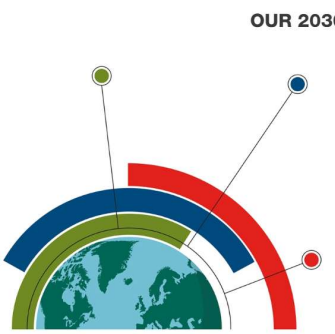
PCP2's journey towards destination zero

Cummins' next generation environmental sustainability strategy looks out to 2050, setting quantifiable goals for 2030 along with visionary longer-term aspirations to 2050. The audacious and exciting strategy affects Cummins and our stakeholders positively.

In 2021, PCP 2 was completing the first full year of operation. As production process ramped up. HSEMS certification process was about to start, and as HSE procedure were being studied by all of the plant team members. Environmental strategy was being finalized. Failure to streamline the system would have resulted into failure to achieve environmental objectives in line with PLANET 2050 targets.

To resolve all these issues ,plant leadership team under the guidance of BU leadership derived the action plan strategy called as "PCP 2's (6+1) Destination Zero Strategy". The action plans were derived based on Environmental statistical analysis and were made in line of plant yearly goal tree.



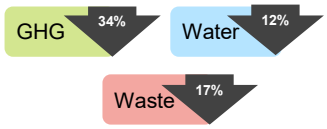
OUR 2030 GOALS

- Reduce absolute greenhouse gas (GHG) emissions from facilities and operations by **50%**.
- Reduce scope 3 absolute lifetime GHG emissions from newly sold products by **25%**.
- Partner with customers to reduce scope 3 GHG emissions from products in the field by **55 million metric tons**.
- Reduce volatile organic compounds emissions from paint and coating operations by **50%**.
- Create a circular lifecycle plan for every part to use less, use better, use again.
- Generate **25% less waste** in facilities and operations as percent of revenue.
- Reuse or responsibly recycle **100% of packaging plastics** and **eliminate single-use plastics** in dining facilities, employee amenities and events.
- Reduce absolute water consumption in facilities and operations by **30%**.

PLANET 2050

HSE 6+1 Strategy — Environment — Environment Management improvement (One year one theme)

Percentage reduction achieved in GHG, Water & Waste (Against 2021 baseline)



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PCP2's journey towards destination zero

Project Name : Cummins PCP2's journey towards destination zero: Environmental KPI improvement through production optimisation and dedicated environmental projects.

Theme based year wise calendar

2021	Year of Waste	▪ Reductiong by focussed approch on reducing returnable packaging waste ▪ Process waste reduction by implementing multiple kaizens suggested by employees ▪ Environmental projects by implementing Engineering design changes
2022	Year of GHG	▪ Increasing reliability on solar source of energy ▪ Solar tube installed to eliminate LED light requirement during daytime ▪ Adopting process improvement resulting increased production capacity /shift ▪ Continuos leakage monitoring for compressed air ▪ Additional HVLS fan installation for better ventilation
2023	Year of Water	▪ Reduction in water consumption by reusing rainwater ▪ Implementing tab sensors to reduce water consumption ▪ Reusing treated wastewater for flushing purpose ▪ Implementing digital water meters to track water losses
2021-23	Years of optimization	▪ Reduction in Shift operations and losses/rework reduction ▪ Engineering team involvement for material conservation/reduction

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PCP2's journey towards destination zero: Results till now

Year	Production Numbers	Manhours	GHG Emissions	Water Consumption	Waste Generation
2021	111773	1776533	1712	6187	1053589
2022	136664	1833928	1129	5387	873954
% Difference	18% ↑	3% ↑	34% ↓	12% ↓	17% ↓
Per EGP % Reduction			**53% ↓**	**34% ↓**	**40% ↓**

Benefits of the project:

- 34% GHG reduction, 12% reduction in water consumption and 17% waste reduction inspite of 18% increase in production numbers
- 53% decrease in GHG emissions per EGP (Product – Exhaust gas processor), 34% water consumption reduction per EGP, Waste generaton was reduced to 40% per EGP inspite of 18% increase in production numbers

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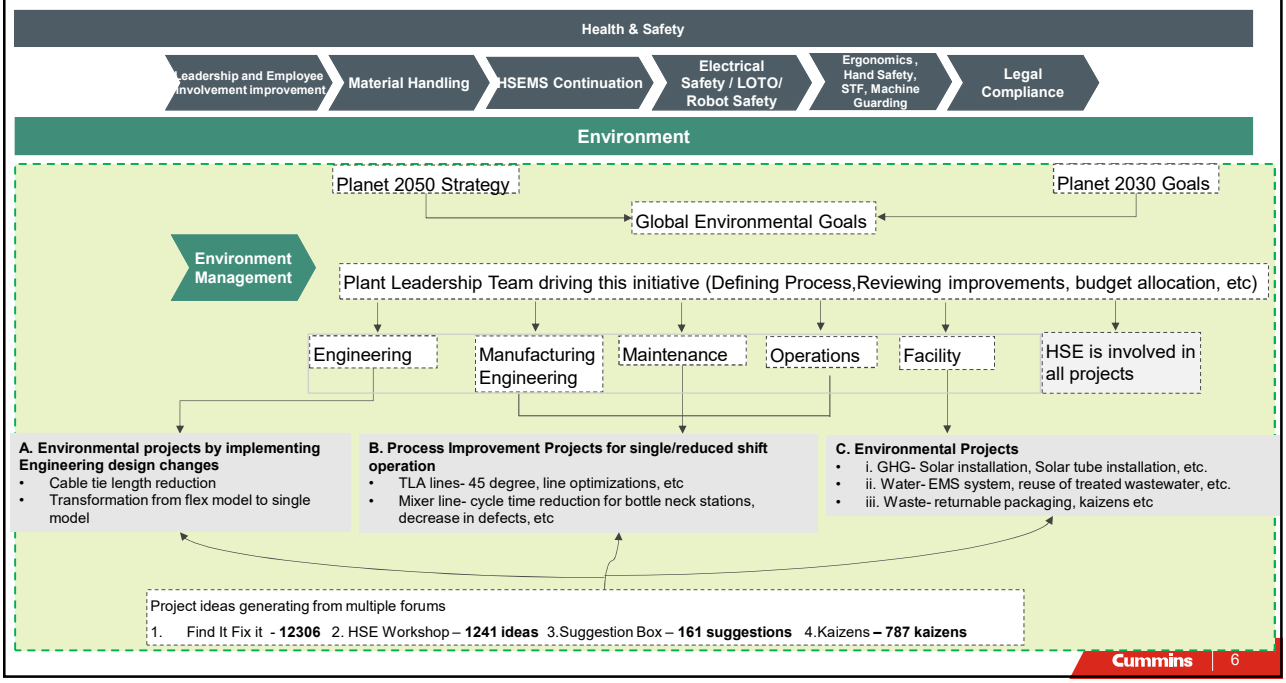
PCP2's journey towards destination zero: Overall HSE 6+1 Initiative



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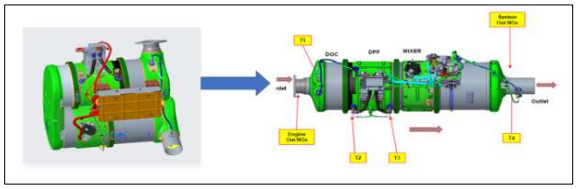
A. Environmental projects by implementing Engineering design changes

Use of Single Module EGP in place of Flex EGP for twin steer vehicle



Project Description:

- To design new Aftertreatment system which shall meet in existing space claim and meet same Emission legislative limit for BS6 OBD1 Norms

Project Benefit:

- Ease of Manufacturing & reduce Product proliferation
- Improved SCM Leadtime for child parts availability from global locations
- Improved fuel economy at vehicle
- 21% reduction in Material uses from baseline design
- Cummins Profitability margin improved by 3%(1.39M $ saving YOY basis)
- Weight reduced by 21%

Few projects contributing environmental impact by engineering design changes

Sr No.	Project Title
1.	9" Hybrid ATS
2	UL 2.2 SU Motor Localization from Maxon to Lucas
3	SCR Outlet insulation removal
4	Weld reduction for CDV Mixer

Scrap Reduction by Engineering Improvement

Before: Tie cable actual length 200 mm

Length scrapped: 45 mm (apx)

After: Tie cable length reduced to 170 mm

Length scrapped: 23 mm (apx)

Benefits:

1. Reduction in scrapped length (per tie cable) = 50% (apx) >> Material scrapped reduced
2. Reduction in tie cable length = 15% >> Cost reduced

B. Process improvement projects for reduced/single shift operations : Innovation

Gap Identification

- Downtime per shift was observed to be more
- Every line had few bottleneck stations
- Quality rejections led to more rework
- Two shifts were operated inspite of same production capacity in a single shift

Strategy

- CFT team worked on multiple possibilities to reduce time of operation
- 45-degree project (Robot modification) was implemented to stack two assessmblies at a single time
- Torque gun and angle meter automation were added to reduce angle rework
- Cycle time was reduced for bottleneck stations

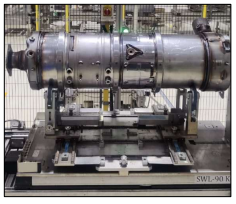
Benefits

- Single/ reduced shift operational
- Reduction in waste generation due to less rework
- Less energy consumption due to less operational time
- Reduced water comsumption as plant operated only in general shift
- Less energy consumption as plant operational during high visibility time zone

Examples of Projects implemented

45-degree project – Stacking clocking cycle time reduced by 37%

Cycle time reduction of bottleneck stations



Torque gun and angle meter automation added to reduce angle rework

B. Process improvement projects for reduced/single shift operations : Innovation

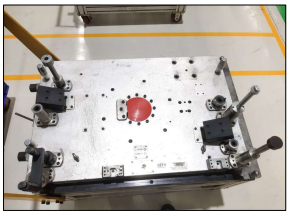
Few projects contributing environmental impact

Sr. No.	Project Details	Benefits
1	Switch back line output ramp up	▪ Cycle time reduced by 34% ▪ Weld defect decreased ▪ Energy consumption reduction ▪ Increase in per shift production ▪ Overall operational cost reduction
2	TLA 3 line bus ramp up	▪ Scrap generation reduced by 80% ▪ 40% reduction in cycle time ▪ Energy consumption reduction ▪ Increase in per shift production ▪ Overall operational cost reduction
3	OEE Improvement of Mixer line	▪ Per shift output increased by 40% ▪ Energy consumption reduction ▪ Fuel for transportation reduced ▪ 50% process waste reduction ▪ Increase in per shift production ▪ Overall operational cost reduction
4	45 degree project implementation on TLA 2 line	▪ 37% cycle time reduction ▪ Energy consumption reduction ▪ Fuel for transportation reduced ▪ Increase in per shift production ▪ Overall operational cost reduction

Few projects pictures

Online leak rework instead of offline station

Welding time optimisation



Pallet modification and increase in pallet usage

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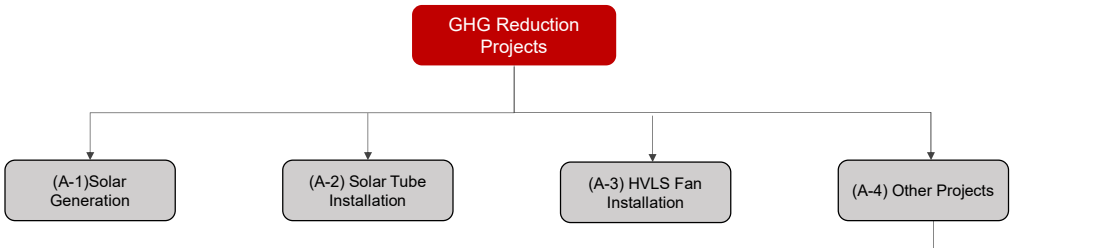
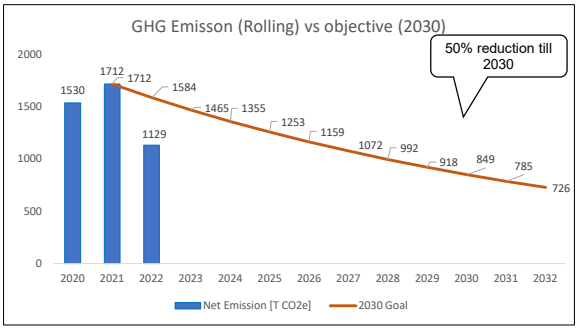
C.i Environmental Projects for GHG Reduction



KWH /EGP		
Year	2021	2022
Month	KWh/EGP 2021	KWh/EGP 2022
Jan	13	12
Feb	15	12
Mar	19	15
Apr	21	22
May	49	26
Jun	30	25
Jul	22	20
Aug	24	20
Sep	25	18
Oct	18	13
Nov	20	15
Dec	23	15
KWH/EGP AVG	23.271	17.826
%reduction in KWH /EGP		23%



- Operational control sensor for admin AC
- UV filming for all windows at south & east sides
- Installation of Motion sensors and Pull Cord
- Compressed gas leakage prevention

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C.i Environmental Projects for GHG Reduction

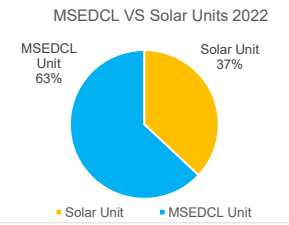
(A-1) PCP-2 1000 kwp Grid Connected Solar PV Rooftop Project

Roof Top solar panel installation

Remote monitoring system dashboard

Project Summary :

- Capacity 1000kWp / 850kW (AC), - Roof Top
- Grid Connected : Net Metering Scheme with MSEDCL
- PV Modules : Jakson Make Polycrystalline Technology, 335Wp X 2986 Nos.
- Remote Monitoring : Real time monitoring with data storage on cloud.
- String Inverters : Delta Make 50kW X 17 Nos.
- Estimated Annual Generation : 14,00,000kWh
- Annual Cost saving 1.2 Cr
- Annual GHG Reduction : 1,183 MT Co2e
- Project timeline : 4 months
- Commissioned in November-2021
- Payback Period - 4 Years
- Current Generation is Approx.. 3500 - 4000 units per day.



37% energy requirement cater by solar power

(A-2) Solar Tube installed to eliminate LED lights during daytime

Roof Solar tube dome

After installation of solar tube LUX level

Project Summary –

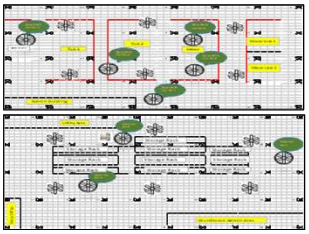
- We have installed 40 Nos of solar tube light in between warehouse storage racks at PCP2 plant.
- Earlier during daytime, we needed to use LED light i.e., for 8 to 10 hrs. now we have installed solar tube light to cater our daytime requirement & reduce power consumption .
- Benefits

✓ Utilization of green energy to achieve GHG reduction target
✓ Annual Energy consumption saving - 24,600 KWH units
✓ Annual Cost saving - 2.25 Lac Rs.

C.i Environmental Projects for GHG Reduction

(A-3) Additional HVLS Fan Installation

HVLS Fan Installed



HVLS Fans Layout

Project Background –

- We have installed 8 nos. of additional HVLS fans at PCP2
- Initial employees were facing slight issue during summers, this project has helped us to provide more comfort to employees.
- Benefits

✓ Uniform distribution of air will improve shop floor ventilation
✓ With additional fans, AHU's can be made OFF in winter and saving in HVAC running cost.

(A-4) Other Project Implemented for GHG Reduction

Sr No	List of Projects	Environmental saving(Approx)	Remarks
1	Shift operation optimization & saving in power consumption	Electricity Saving of 1274116 KWH units and 925 MTCO2 GHG reduction.	Completed
2	Admin Indoor AC units ON OFF control thorugh sensor	Electricity Saving of 36000 KWH units and 26.1 MTCO2 GHG reduction.	Completed
3	UV filming for all windows at south & east sides	Electricity Saving of 24000 KWH units and 17.4 MTCO2 GHG reduction.	Completed
4	Installation of Motion sensors and Pull Cord (Admin Building Ground Floor & First Floor)	Electricity Saving of 36000 KWH units and 26.1 MTCO2 GHG reduction.	Completed

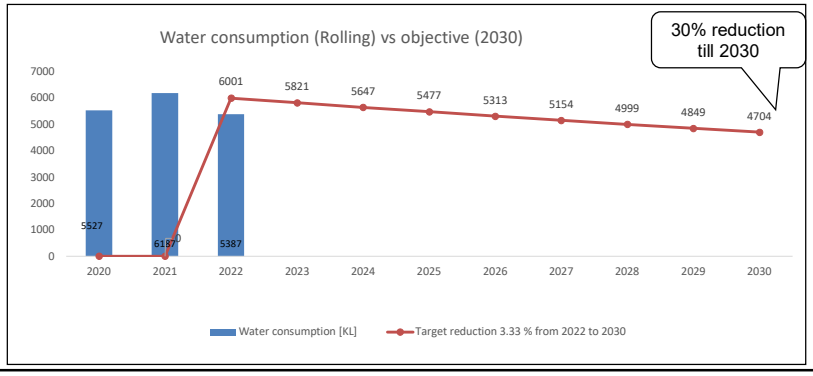
KWH /EGP		
Year	2021	2022
Month	KWh/EGP 2021	KWh/EGP 2022
Jan	13	12
Feb	15	12
Mar	19	15
Apr	21	22
May	49	26
Jun	30	25
Jul	22	20
Aug	24	20
Sep	25	18
Oct	18	13
Nov	20	15
Dec	23	15
KWH/EGP AVG	23.271	17.826
%reduction in KWH/EGP		23%

Reduction in consumption KWH per EGP compared to last year is 23%

C.ii Environmental Projects for Water consumption Reduction

Water Consumption Reduction Projects

- (A-1) Digital water meter installation
- (A-2) Sensor operated tap use for basin
- (A-3) Treated wastewater used for flushing
- (A-4) Other Projects



- Sensors for all canteen wash basins implemented
- Flushing tab setting changed for less water use
- Canteen - Dish washer for utensil cleaning
- Sensor operated tap use for basin

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C.ii Environmental Projects for Water consumption Reduction

(A-1) Water management system through EMS

Digital water meter installation

Project Background :

In current scenario all domestic water line meters are analog type so need to take on site reading on daily basis & having accuracy related issues with meter reading so to improve the accuracy & to get remote monitoring of all meter lines we are going to replace all meters with digital water meters & same will be integrate with existing EMS system.

- Start date : May 2022
- Status: Installation completed .
- Investment : 16 Lac
- Benefits :

✓ Accuracy in Water consumption reading
✓ Able to monitor readings from remote location i.e., from EMS system

(A-2) Water Saving Project details

Sensor based water tap system installation

Project Background :

- Canteen and washroom wash basin's water tabe changed to sensor-based water tap .
- Around 16 number of water tap sensor installed
- All area hand wash tab converted into sensor operated (Covid impact)
- Total Impact - Monthly 4KL water consumption reduction

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C.ii Environmental Projects for Water consumption Reduction

(A-3) STP Treated Water management Project

Flushing storage tank

Project Background :

- In Previous scenario we are using STP treated water only for the gardening purpose now as per CTO requirement to meet daily water consumption target i.e. within 25 KL/day, Now we are using STP treated water for toilet flushing purpose.
- Fresh Water saving Per day :- 6 to 7 KL
- Annual Actual Savings in INR :- 51504/-
- Compliance for uses of treated water as per the CTO requirement

(A-4) Other Water reduction projects

Sr. no.	Project title	Estimated water saving (KL)	Investment (K$)	Year 2022
1	Flushing tab setting changed for less water use	50	4	Completed
2	STP treated water use for Ground floor admin, Security gate toilet	1200	22	Completed
3	Canteen - Dish washer for utensil cleaning	300	10	Completed
	Total	2020	64	

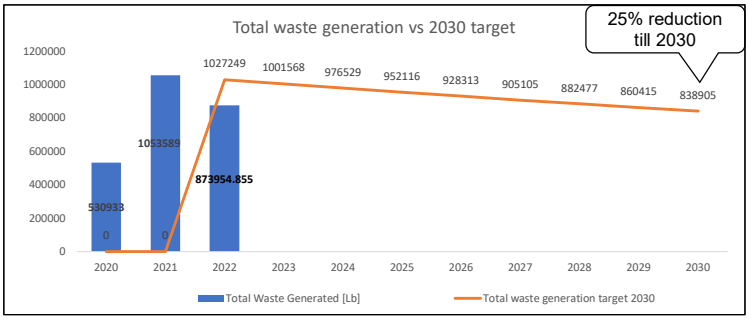
C.iii Environmental Projects for reduction in waste generation

Waste generation Reduction Projects

(A-1) Returnable Packaging project

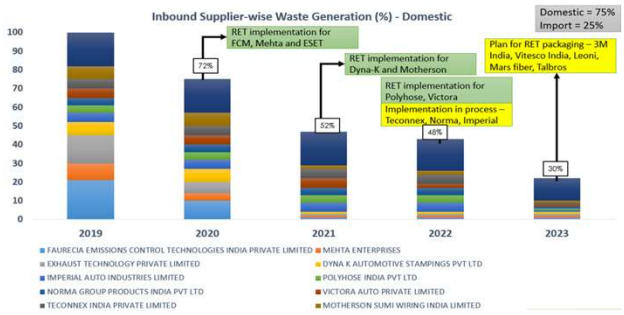
(A-2) Other Projects

- Paint brush modification for waste reduction



C. iii Environmental Projects for reduction in waste generation

(A-1) Returnable Packaging Risk Reduction Project

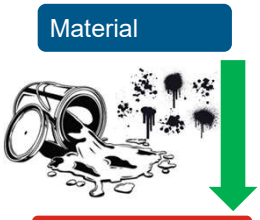


(A-2) Paint brush modification

Before project implementation

After paint brush modification

- In antirust booth, operator need to dip the brush in the paint continuosly while doing anti rust coating. Employees started using small container with brush attached to the container itself



75% Reduction

Before- **20** ml/EGP
,*After-* **5**ml/EGP

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Way Ahead

Environmental Projects scheduled for the year 2023

Year	Location	Media	Environmental Theme	Project Description
2023	PCP 2	Water	Water	Additional Strom water storage tank for 400KL for reuse (30% replacement of yearly water requirement)
2023	PCP 2	Water	Water	ZLD implementation for ETP and STP
2023	PCP 2	Water	Water	Xeriscaping garden development (10% reduction in water requirement
2023	PCP 2	Energy	Lighting	Shop lighting circuit modification and operation through LDR circuit
2023	PCP 2	Energy	Power Management	Air meters installation
2023	PCP 2	Energy	Renewable Energy	Solar panels installation for external indusial lights

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