



National Award for Excellence in Energy Management-2021

24 Aug-27 Aug 2021



Category: Automobile
Hero MotoCorp Ltd.
Dharuhera



Pawan
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DGM MAINT



RK
Bhardwaj
DGM MAINT.

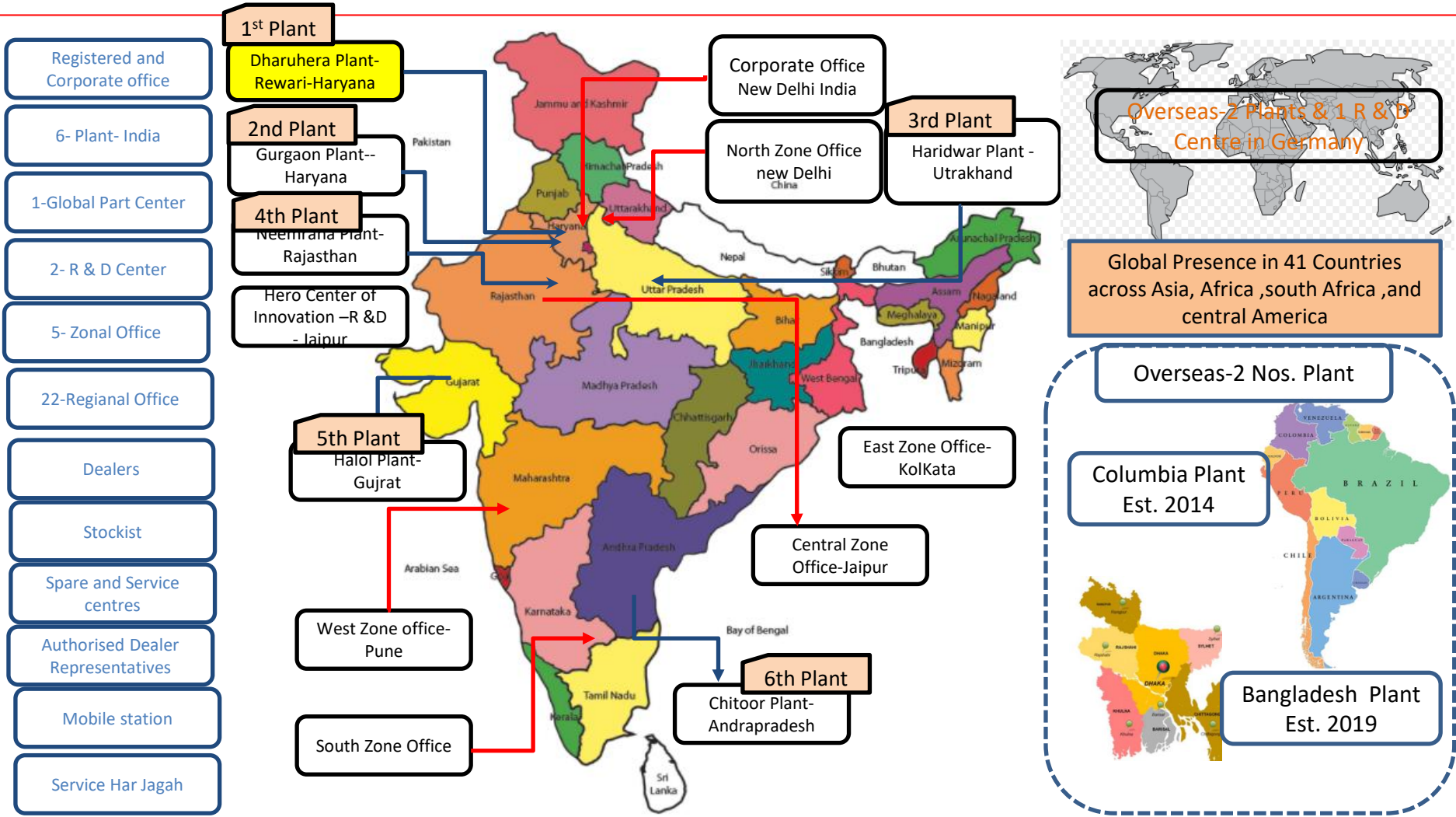


Mukesh
Tyagi
Manager

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1. Company Profile & Process: Hero MotoCorp Ltd. Dharuhera



6000+ touch points across India including plants, service centre, dealers, mobile service centres. Hero has 6 plants in India and 2 plants in overseas.



1. Company Profile & Process: Joint Ventures



❖ In Dec. 2013 HMCL & Magneto Marelli of Italy signed up New JV Company as **HMC-MM Auto Ltd.** HMCL 1st JV with 60% Majority Stake. This company will research develop & Manufacture next generation fueling systems.

❖ HMCL Joined Technical collaboration with Austrian Engineering company AVL. Developing new range of Engines. AVL has R&D and testing faculties across the world.



❖ Hero Tech center in Germany (HTCG)



❖ Hero MotoCorp will develop and sell a range of premium motorcycles under the Harley-Davidson brand name.



❖ Hero and Gogoro has announced strategic partnership to launch electric Veh. In 2022

Hero has the joint venture with Bengaluru based company Ather energy for future electric mobility



1. Company Profile & Process: Hero MotoCorp Ltd



Unit Name: Hero MotoCorp Ltd Dharuhera
Product : 2 Wheeler Manufacturer
Plant Started in 1985
Capacity : 7000 Veh. / day
Connected Load : 29.3 MW
Turnover : INR 5582.99 Cr
Model : 12
Self Gen. Capacity : 17.26 MW
Grid Contract Demand : 5 MW



Splendor+ 100CC



Splendor Pro 100CC



Splendor NXG 100CC



Passion Pro 100CC



HF-Deluxe 100CC



HF-Dawn 100CC



Splendor i Smart 100CC



Splendor Pro Classic 100CC



Splendor i Smart 110CC



Passion Xpro 110CC



Super Splendor 125CC



Glamour 125CC

Hero Motocorp. Dharuhera Plant is the Mother plant having production capacity 7000 Veh./Day.



1. Company Profile & Process: Hero MotoCorp Ltd



**MADE OF 100 MILLION STORIES
MADE OF TRUST.**

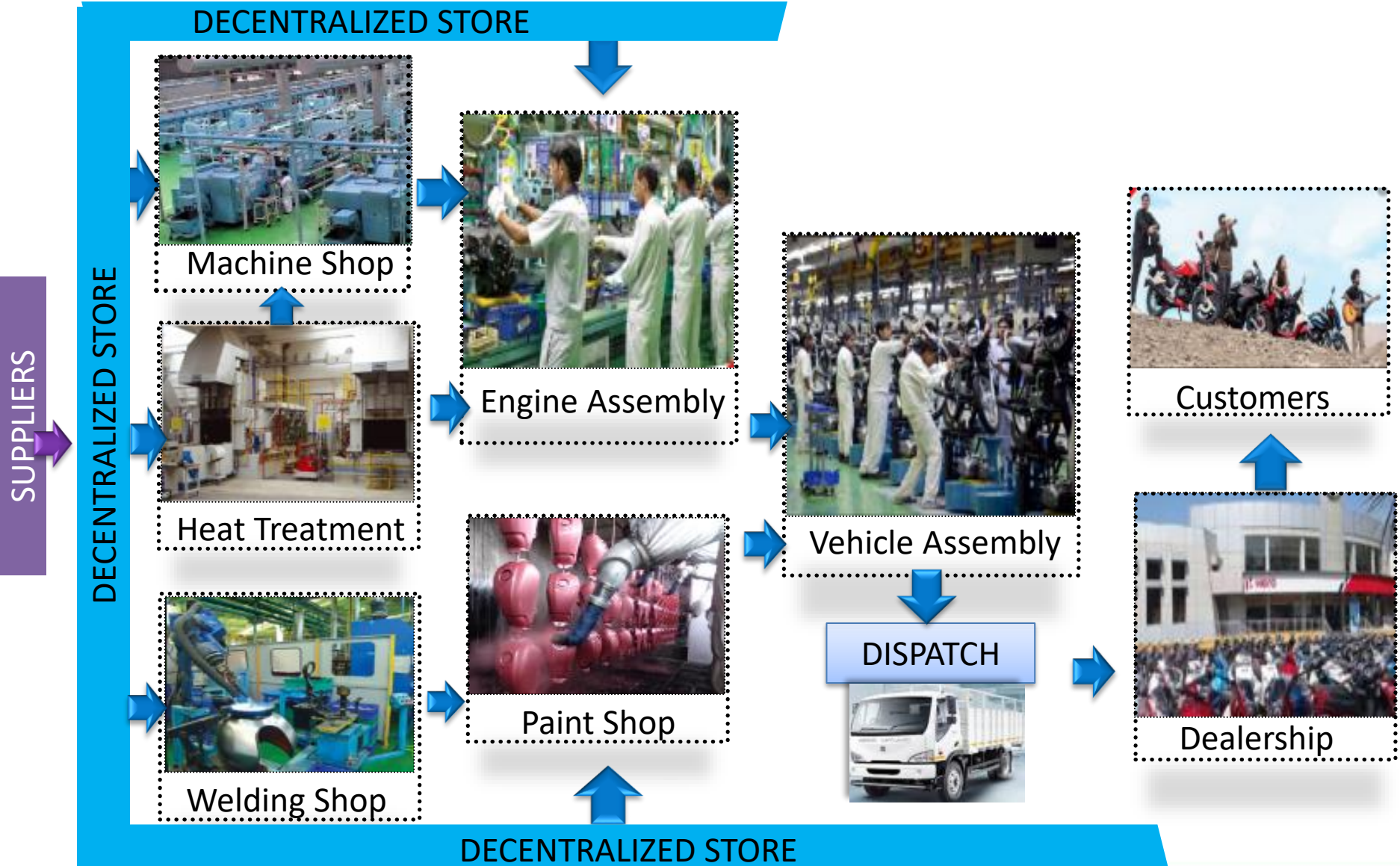
- ❖ 50 Million HERO in Next 5 years.
- ❖ 100 Million HERO in Current Decade.



100 millionth Bike rolled out by Hero Moto corp. Ltd. On 21 Jan.2021.



1. Company Profile & Process: Hero MotoCorp Ltd



1. Company Profile & Process: Energy Policy

Environment Policy

ENVIRONMENT POLICY

We at Hero MotoCorp are committed to demonstrate excellence in our Environmental Performance on continual basis, as an intrinsic element of our Corporate philosophy. To achieve this, we commit ourselves to:

- Integrate environmental attributes and cleaner production in all our business processes and practices with specific consideration to substitution of hazardous chemicals, where viable and strengthen the greening of value chain;
- Continual product innovation and life cycle analysis to minimize environmental impact of our products through its life cycle;
- Continual improvement in environmental management system;
- Comply with all applicable compliance obligations;
- Protection of environment through prevention of pollution and reducing environmental risk, climate change mitigation and adaptation, protection of biodiversity and ecosystems;
- Controlling our environmental discharges through the principles of "ALARA" (As Low As Reasonably Achievable), to enhance our environmental performance;
- Institutionalize resource conservation, in particular, in the areas of materials, oils, water, energy, paints and chemicals;
- Promoting environmental awareness & training amongst employees, workmen, dealers, suppliers and contractors through their participation and consultation in sound environmental management; We shall communicate this policy within the organization and would make it available to all interested parties.

Energy Conservation Policy

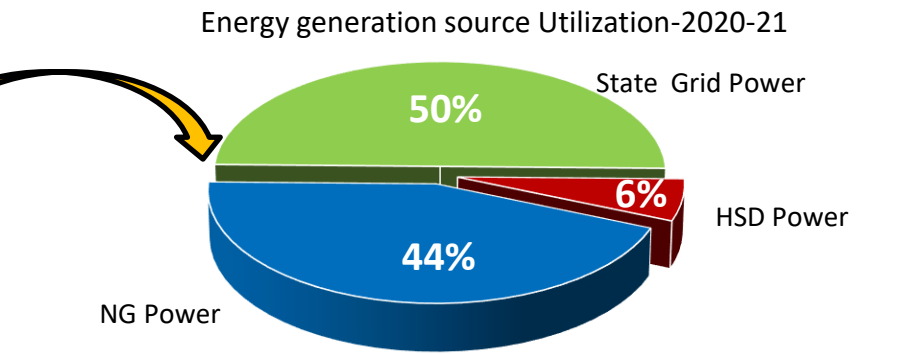
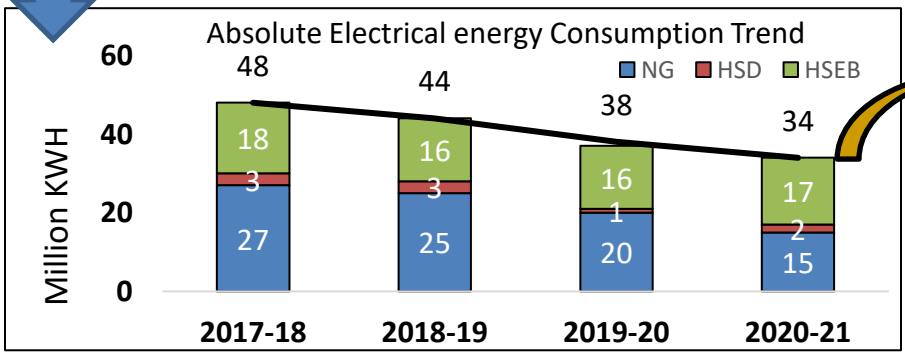
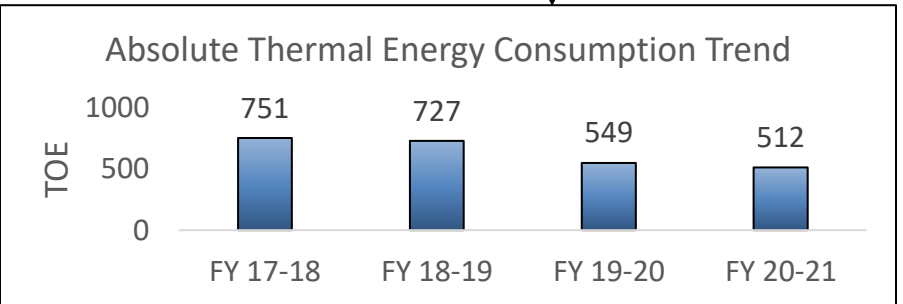
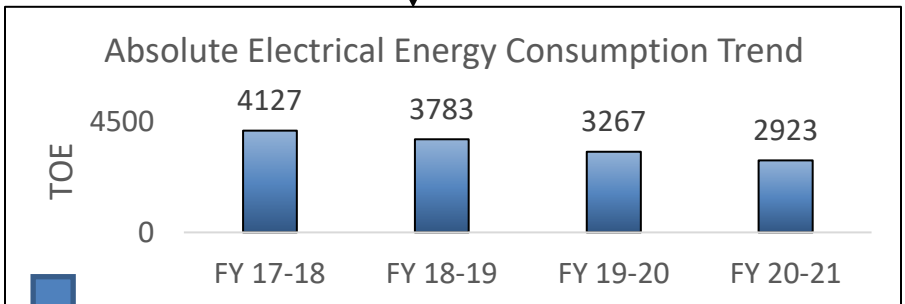
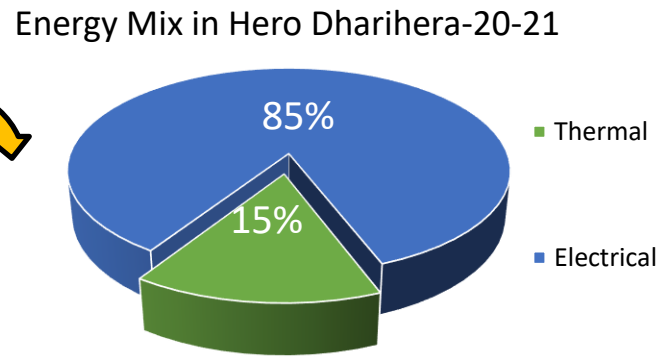
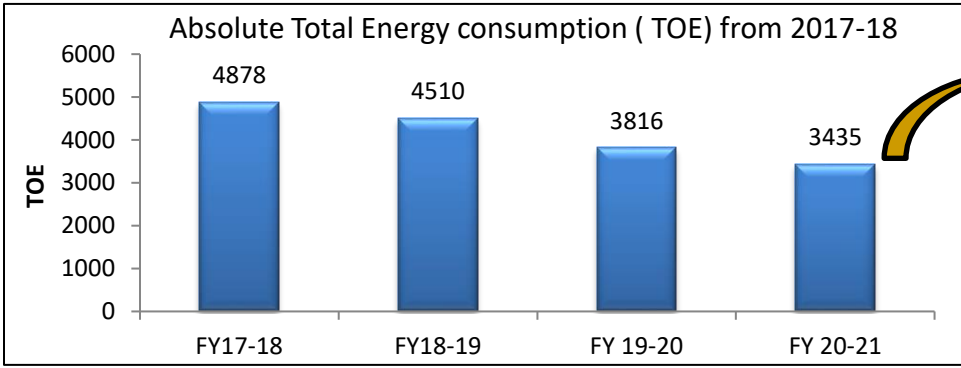
We at Hero MotoCorp Ltd are committed to demonstrate in our energy performance on continual basis as an intrinsic element of our corporate philosophy

- We work towards "Conserving energy both thermal and electrical" in all processes within our operations.
- We will adopt latest technology solutions to further reduce our consumption in energy.
- ON short term we will reach our target of "Modern Energy Operations factory in Hero MotoCorp Group companies"
- On Long term we target to set new benchmarks for being a "Industry leader in energy conservation"
- Integrate energy considerations and cleaner production in all our business processes and practices.
- Continue product innovations to improve energy efficiency.
- Comply with all applicable energy legislation and also controlling our conventional energy usage through the principles of ALARA (As low as reasonably achievable)
- Institutionalize energy conservation
- Enhance energy awareness of our employees and dealers / vendors, while promoting their involvement in ensuring sound energy management;
- We shall communicate this policy to all our employees and would make it available to interested parties.

Plant has framed its energy policy considering major focus on Energy Efficiency.



1. Energy Consumption Overview



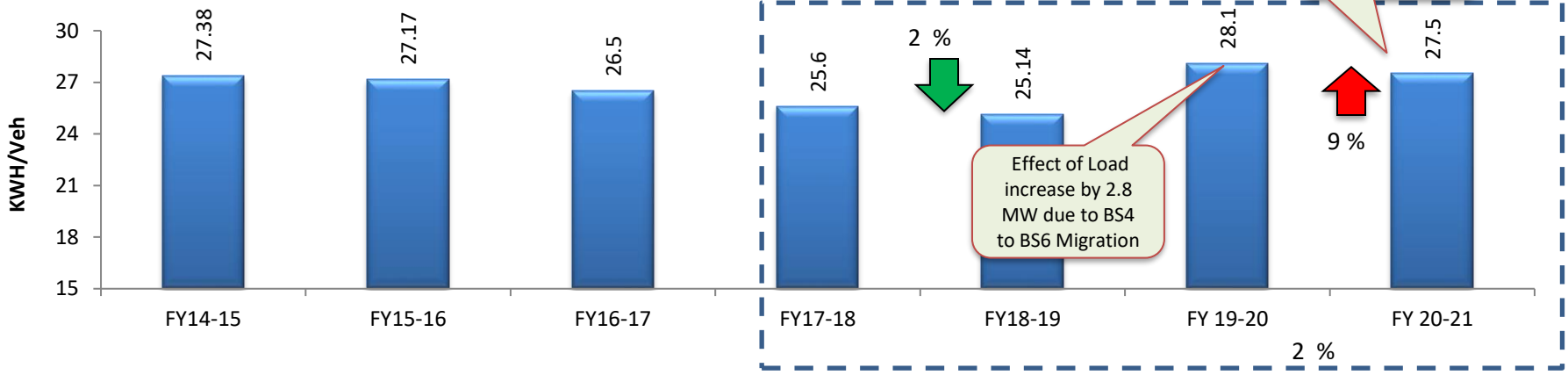
Absolute Energy is reducing and DG utilization is reducing by taking green initiatives.



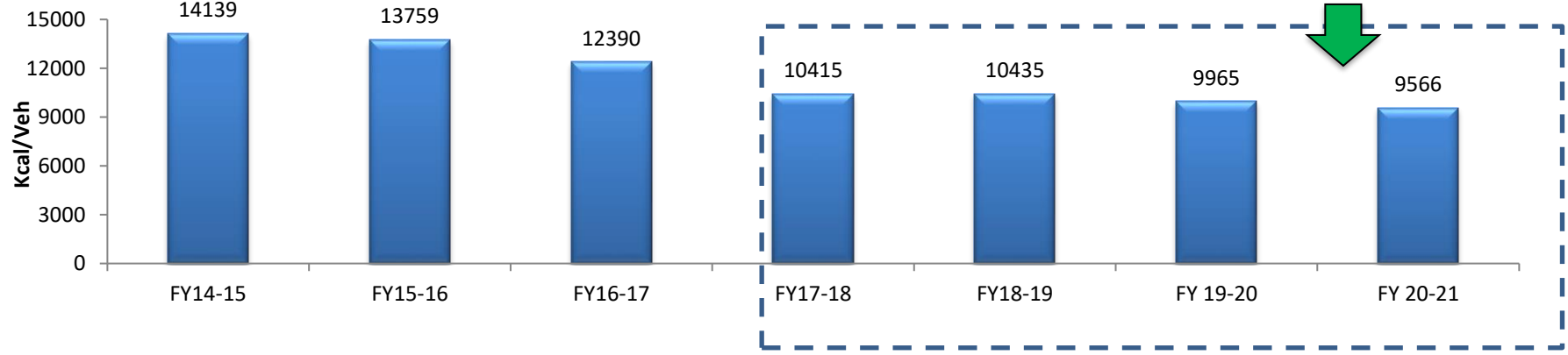
2. Specific Energy and Thermal Consumption Trend

Specific Energy Consumption Reduction in Kwh/Veh.

Specific Electrical Energy Kwh/Veh



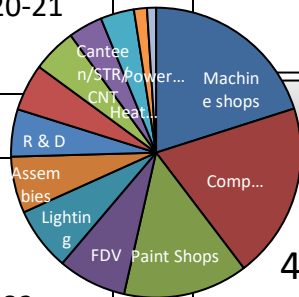
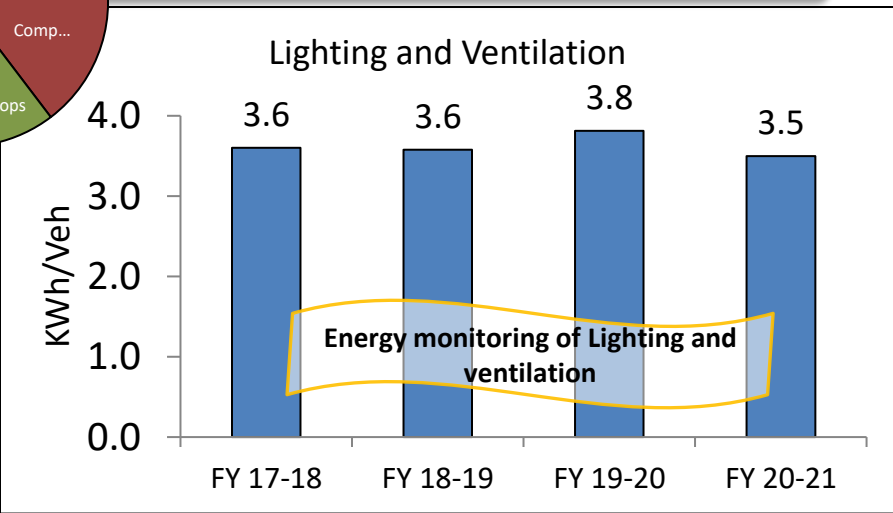
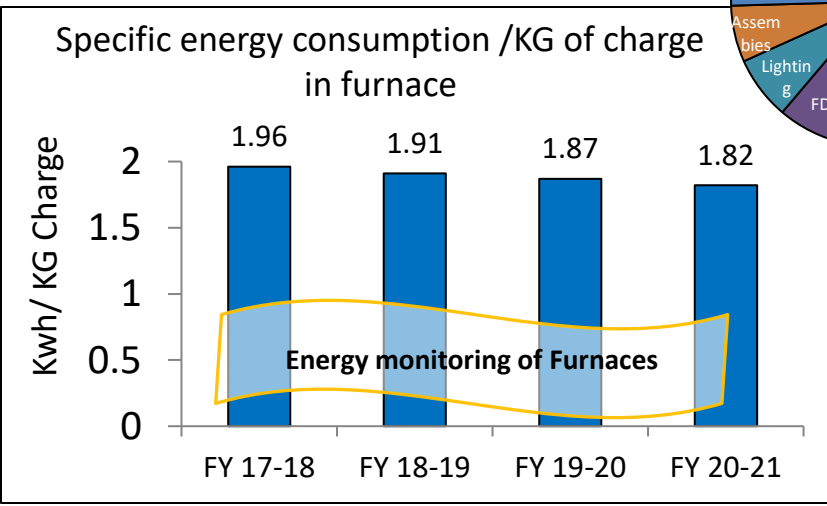
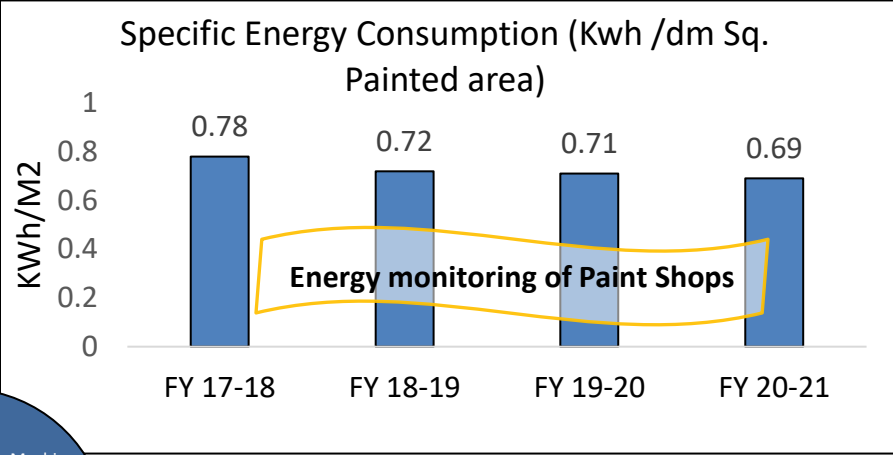
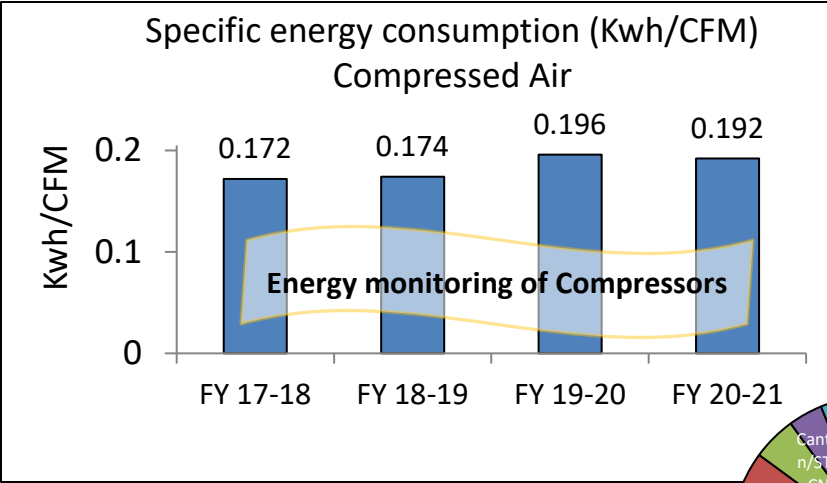
Specific Thermal Energy Kcal/Veh



SEC increased by 8.5% due to low production volumes and plant shut down due to Lockdown correspondingly STC is reduced by 8.15% since FY 17-18 by optimized utilization of processes.



2. Specific Energy Consumption Trend:- Process wise



Major energy Contributor in FY 2020-21

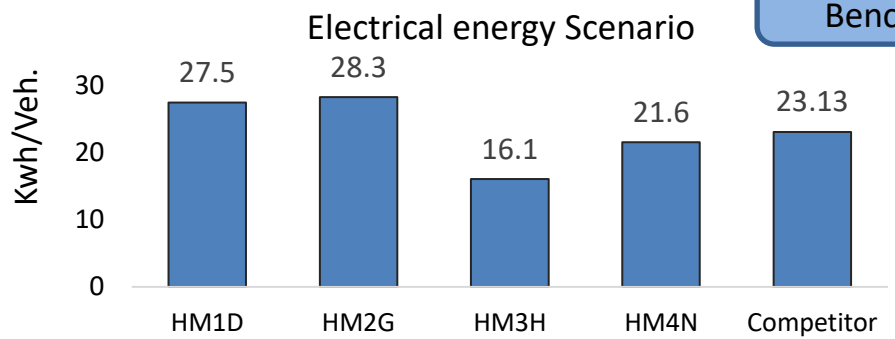
Specific energy consumption process wise is monitored on daily basis.



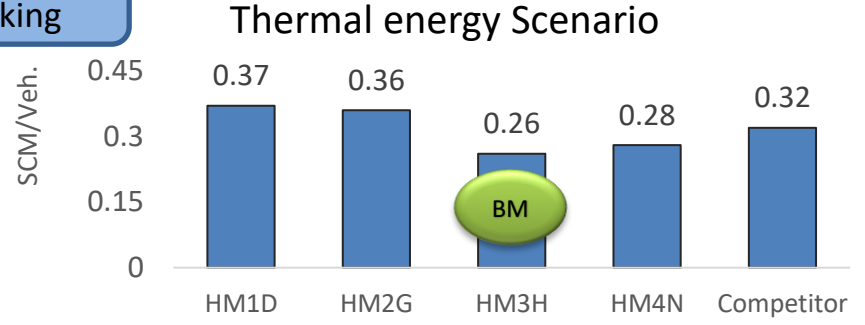
3. Energy Benchmarking

ENERGY

Electrical Energy FY 20-21

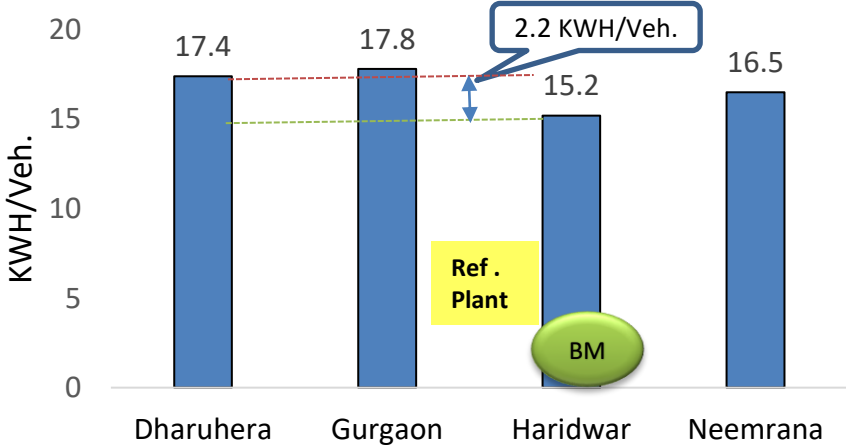


Thermal Energy FY 20-21



Internal Benchmarking

Internal bench Marking (Kwh/veh.)



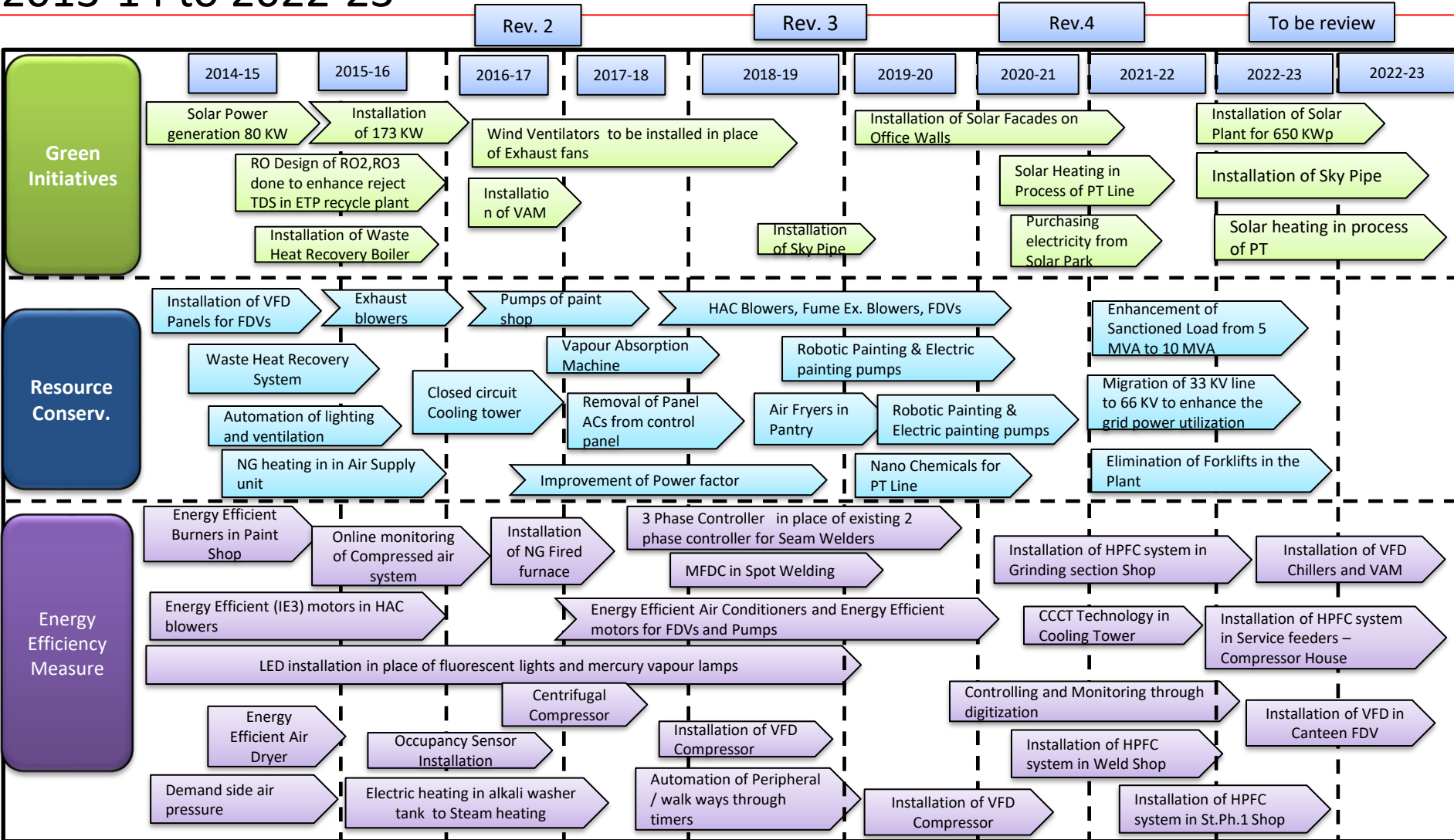
Thermal bench Marking : Done by considering gas consumption in SCM to generate steam or Hot water because of same process .The different processes not considered as they are varying plant wise operation.

Electrical Bench Marking : As the process and capacity of all plants varies ,so Bench marking is not possible in that manner.
 - Bench Marking is done the basis of similar processes And found the Gap of 2.2 KWh/Veh. W.r.t to reference plant.

Bench Marking comparison based on similar processes within HMCL.



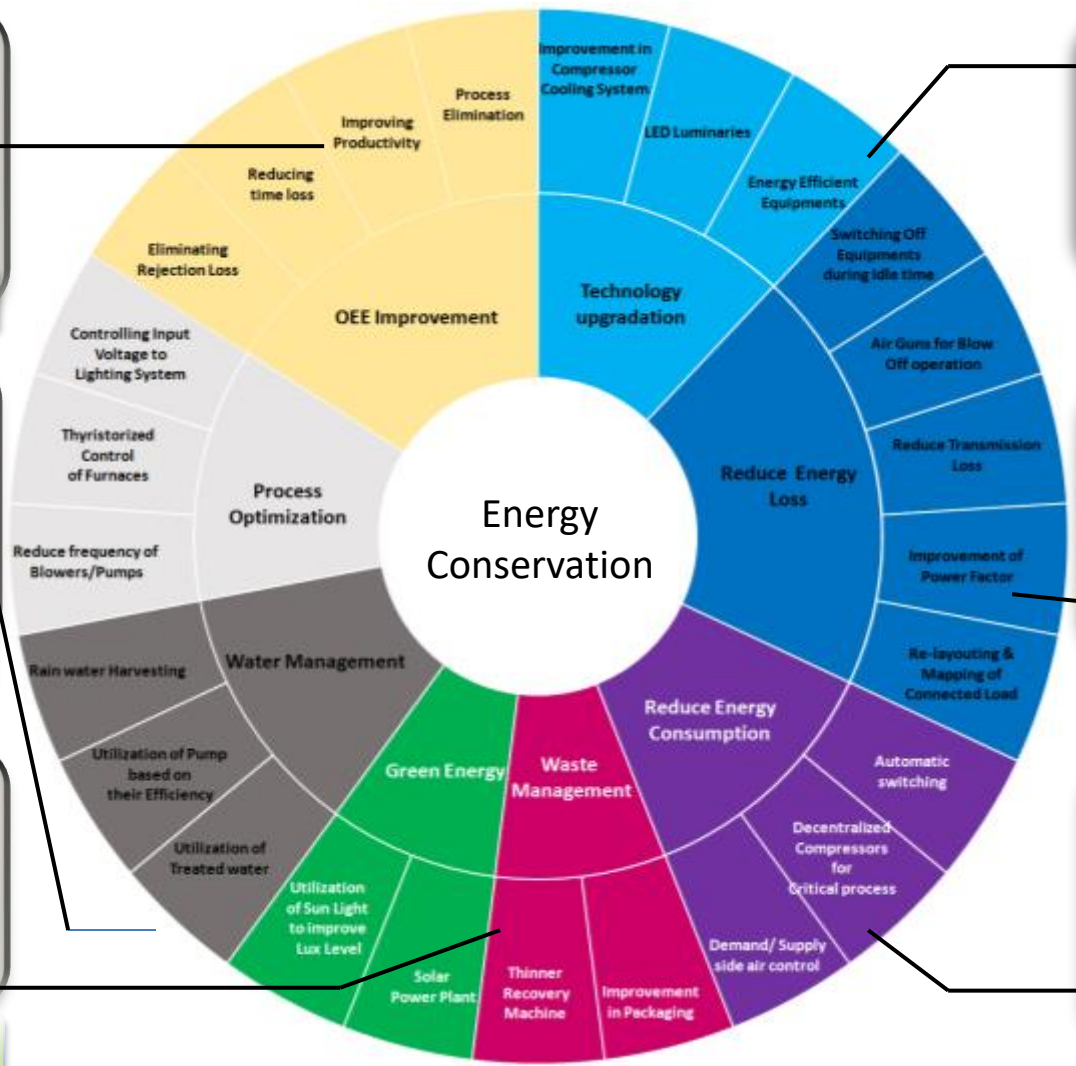
Strategy for technology absorption in energy Conservation from the Year 2013-14 to 2022-23



Strategy for Technological improvements in Energy Conservation for our plant and is reviewed every 2 years



3. Energy Benchmarking – Methodology adopted from Strategy



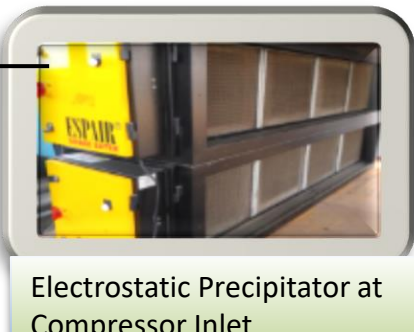
Robotic Painting



Treatment Plant



Thinner Recovery Machine



Electrostatic Precipitator at Compressor Inlet



Power Factor improvement through solid state controller at load end



De-centralized Compressor

Energy Conservation projects are implemented under the methodology shown above.

4. Energy Conservation Projects

Year	No. of Proposals	Investment in INR Million	Saving in M KWH	Payback Months
2018-19	124	31.9	2.6	17
2019-20	131	19.1	1.9	14
2020-21	147	33.4	1.8	25

5 Key projects in FY 2018-19

LIST OF ENCON PROJECTS IMPLEMENTED in FY 2018-19

No	Title of Project	Annual Electrical Saving (M kWh)	Investment (Rs.Million)	Payback (Months)
1	Replacement of compressors by VFD Compressor in place of old Compressor	0.34	7.5	29
2	Centralization of Hydraulic Power pack in Robo drill machine	0.50	1.6	4
3	Improving Utilization of Coolant Pump by modification of Coolant Tank and Using 1 Pump instead of 4 Pumps in Engine Machine Shop in 14 Machines	0.21	1.1	7
4	Installation of Automatic tube cleaning system for VAM absorber and condenser tubes	0.14	0.8	10
5	Installation of electrostatic precipitator for enhancing filtration of suction of air compressor	0.13	1.5	17

Year-wise projects implemented with saving in Lakh KWH is shown, saving in FY 18-19 is 26 Lakh KWH

4. Energy Conservation Projects

Percentage Investment in Green Initiatives over turnover is 0.85 %

5 Key projects in FY 2019-20

LIST OF ENCON PROJECTS IMPLEMENTED in FY 2019-20

No	Title of Project	Annual Electrical Saving (M kWh)	Investment Made (Rs million)	Payback (Months)
1	Reducing energy loss through installation of 3 nos. Hybrid A.P.F.C. Panel at Load End (Weld shop)at shops having Low Power factor	0.81	4	7
2	Reduction in Energy consumption by optimum utilization by providing VFD control panels on FDVs	0.32	2.7	12
3	Reducing Energy Loss by improving energy efficiency of Motors by replacing Existing running and rewind motors with energy efficient IE-3 motors :- 40 Nos.(850 KW load)	0.21	2.4	16
4	Eliminating Idle running loss of Energy by installing Occupancy sensor based control for fume exhaust system and dust collector in expn and old weld shop	0.11	0.5	6
5	Installation of new energy efficient compressor	0.2	5	33

5 Key projects in FY 2020-21

LIST OF ENCON PROJECTS IMPLEMENTED in FY 2020-21

No	Title of Project	Annual Electrical Saving (M kWh)	Investment (Rs. million)	Payback (Months)
1	FDV system with Novenco EC+ Blowers (Direct Coupled) instead of conventional system	0.6	15	34
2	Providing Decentralized compressed air system for new AL4 and NAP Section	0.45	3.5	12
3	Reducing energy loss through installation of 4 nos. Hybrid A.P.F.C. Panel at Load End (Weld shop)at shops having Low Power factor	0.6	7	15
4	Prioritization of VSD compressor for trim demand.	0.09	0.2	3
5	Reduction in Energy loss by FDV automation to run canteen FDV fan for 5 hours in place of 15 hours through RTC	0.10	0.5	8

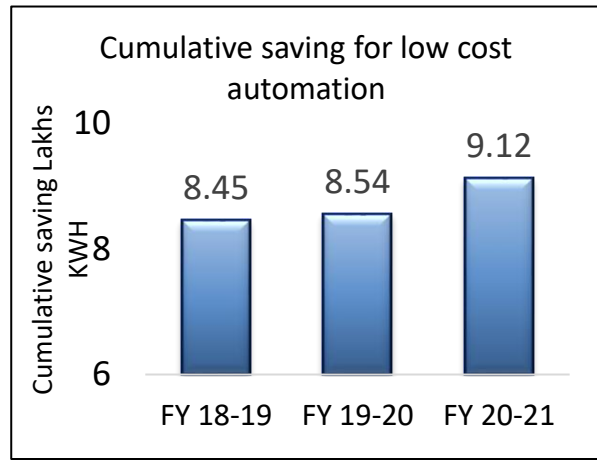
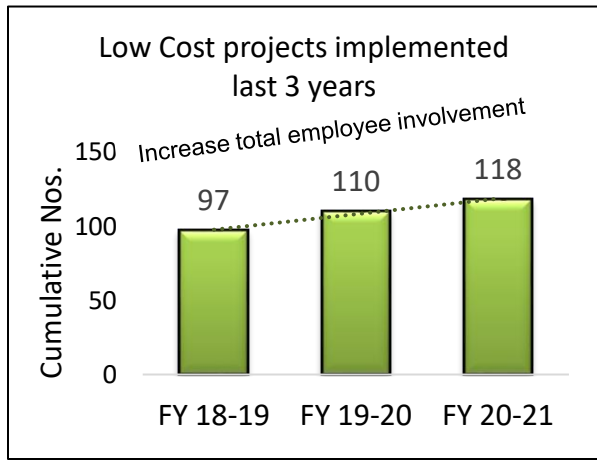
Annual saving in FY 19-20 and FY 20-21 is 1.9 M Kwh and 1.8 M Kwh respectively.

4. Energy Conservation Projects

- Summary of Elementary Projects

No. of Projects - 147

Annual Energy Saving – 17.91 Lakh KWH



- OEE Improvement Projects: Summary

1

Eliminating Rejection Loss
(21 Projects)
Kwh saved:
9780

2

Process Elimination
(18 Nos.)
Kwh saved:
12600

3

Reducing time Loss
(13 No.s)
Kwh saved:
14300

4

Reducing Set up time Loss (18 No.s)
Kwh saved:
21100

5

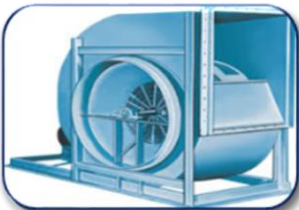
Improving Productivity
(19 Nos.)
Kwh saved:
126000

Low Investment projects and OEE improvement are key areas to reduce energy consumption.

4. Energy Conservation Projects - Elementary Projects: Highlights

Automatic Switching off the Equipment during Non productive time:

Elimination of Idle running of identified operations and recurring impact created.



- FDVs during breaks
- No. of FDVS -72
- KWH Saved – 2.4 Lakh KWH



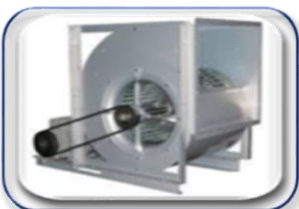
- Hydraulic motors during idle time
- No. of Motors - 125
- KWH saved – 0.86 Lakh KWH



- Compressed Air supply in Assembly lines in Idle time
- No. of Lines – 13
- KWH saved – 0.4 Lakh KWH



- Lighting control in Gangways and Rest Areas
- No. of Lights - 2500
- KWH saved – 0.25 Lakh KWH



- Paint Shop Blowers during Breaks
- No. of Blowers- 32
- KWH Saved – 1.10 Lakh KWH



- Man coolers & Wall Mounting Fans control in break time
- No. of Man cooler: 642
- KWH saved – 0.97 Lakh KWH



- Paint Shop screen water pump during Break time
- No. of Pumps - 6
- KWH saved – 0.4 Lakh KWH



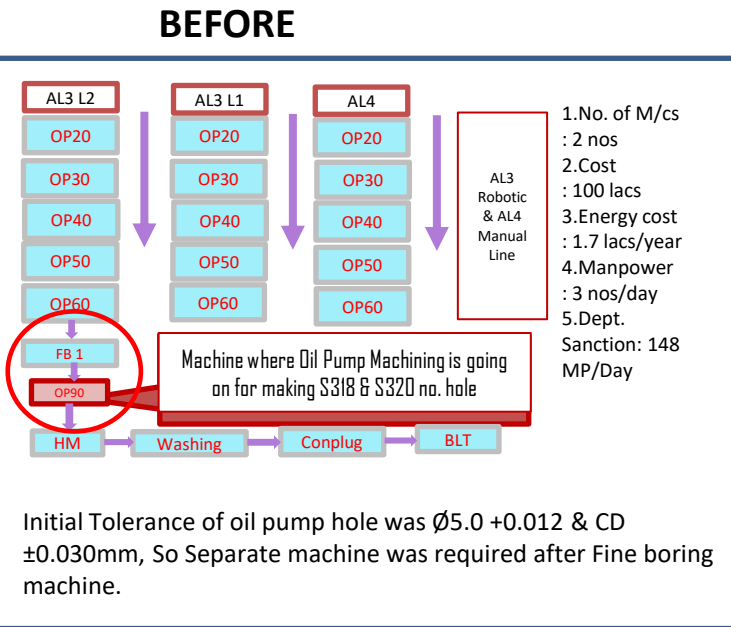
- Roof Exhaust fans control during idle time
- No. of Exhaust fans - 145
- KWH saved – 0.45 Lakh KWH

Annual Saving of 0.68 Million KWH through automatic switching off.

4. Energy Conservation Projects- Productivity Improvement

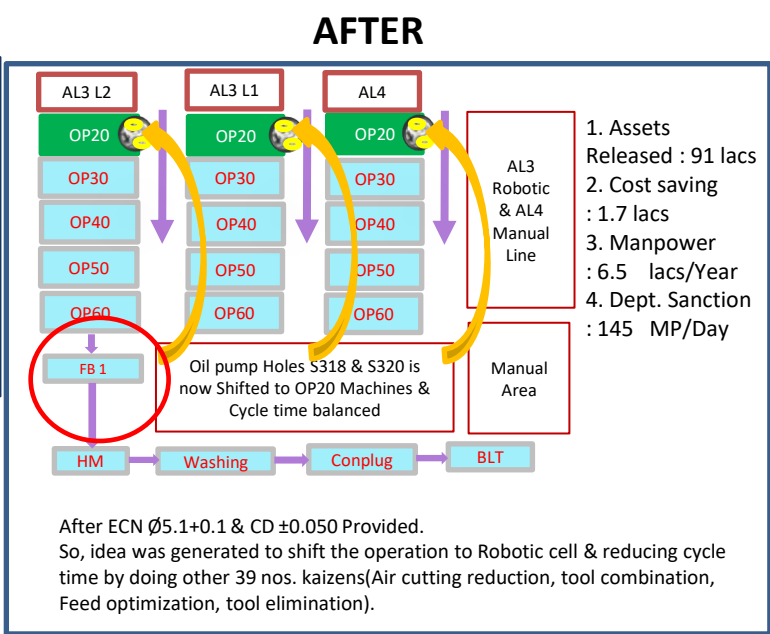
Problem: 2 nos Additional machine (OP90) installed after fine boring for oil pump operation.

Root cause: Because of close tolerance, probing and dia 56 location is required to do the process. So process can be done after fine boring.



Idea: ECN in 125cc CCR issued by CIT in Feb 2020. $\varnothing 5.0 +0/0.012$ changed to ECN $\varnothing 5.1 +0/+0.1$ So Need of additional machine with probe and $\varnothing 56$ location is not required. Operations can be combined in Robotic cell

Idea Initiator : AI. Phase Expansion Plant HM1D
Horizontally Deployed : New AI Phase,
Horizontally Deployment scope : HM2G, HM3H



Countermeasure: 39 kaizens done in robotic cells to reduce cycle time and add OP90 process to robotic cell.

Benefits : Assets released – 91 lacks, Energy cost saving 1.7 lakh, Manpower saving 3 nos /day & fixed cost saving of 6.5 lacs/ year

Energy saving of 0.11 Lakhs Kwh resulting cost saving of Rs.1.7 Lakh in terms of energy.

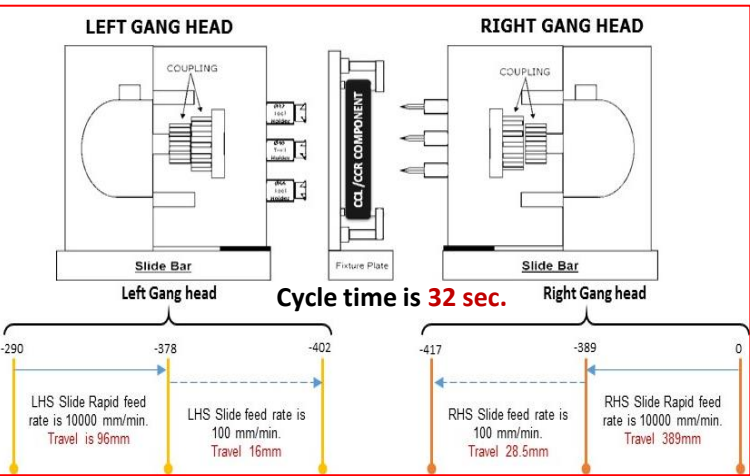


4. Energy Conservation Projects- Productivity Improvement

Problem: Fine boring 125cc BS6 is bottleneck because machining cycle time is 32 sec.(if operated on manufacturer recommended cutting parameters . Feed – 100mm/min, Rapid – 10000 mm/min) while required machining cycle time is 26 Sec.

Root cause: 125cc BS6 has higher feed traverse than 100 cc machine.

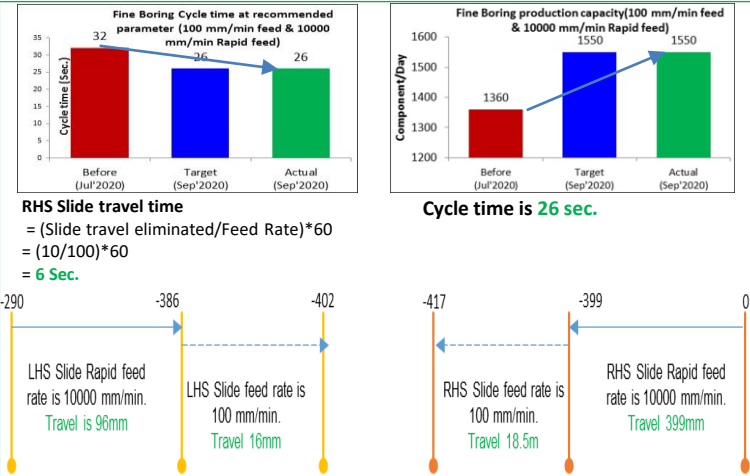
BEFORE



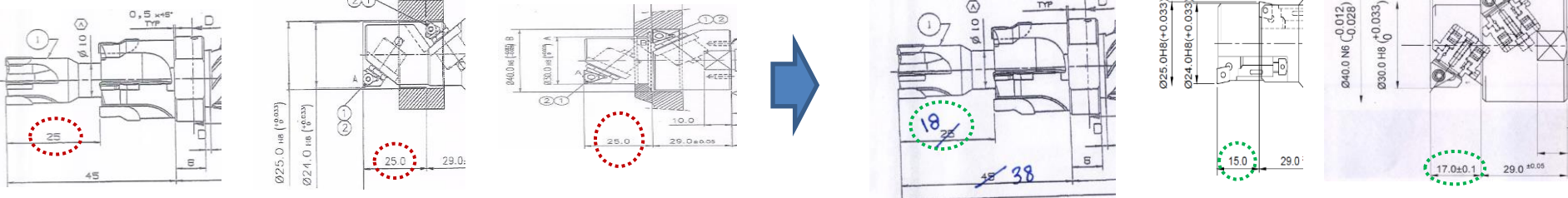
Idea:
 Air cutting time elimination thru boring bar & reamer step length reduction.

Idea Initiator : AI. Phase Expansion Plant HM1D
Horizontally Deployed : New AI Phase,
Horizontally Deployment scope : HM2G, HM3H

AFTER



Step length of Ø14 is more. Ø24 step length is 25m, which is more than required. Hole S14 is Ø40 & Ø30 boring bar step length more



Countermeasure: Boring bar for hole no S215 & reamer for hole no S217 redesigned to reduce the feed traverse from 28.5 mm to 18.5 mm in right gang head. Boring Bar S14 redesigned to reduce feed traverse in left gang head

Benefits : After above three kaizens ,125 cc bs6 fine boring cycle time reduced from 32 sec. to 26 sec and production capacity increased from 1360 to 1550 at recommended parameters.

Production increased by 14 % and saved 0.1 Lakh Kwh per annum

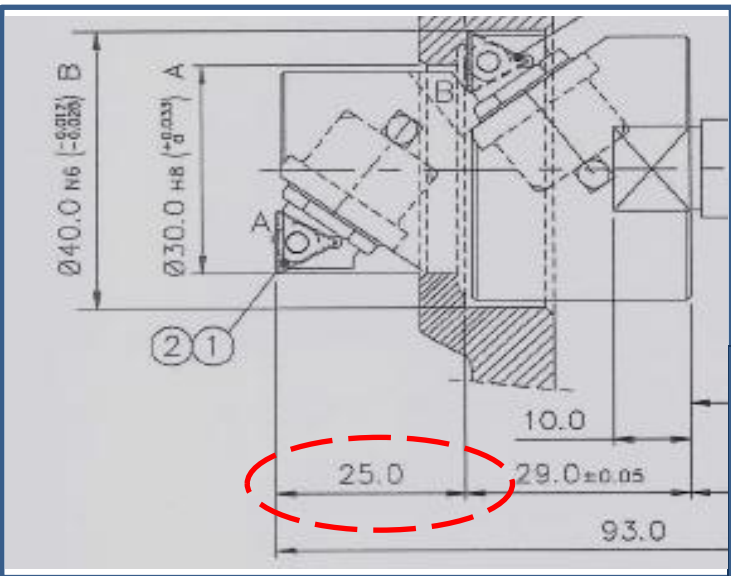


4. Energy Conservation Projects- Productivity Improvement

Problem: Fine boring 125cc BS6 bottleneck due to machine cycle time is 31 sec. while required 25 Sec.

Root cause: In fine boring 125cc BS6 step length between dia. 30 and dia. 40 is **25mm** so machine has to do 10mm air cutting which increases the cycle time of machine

BEFORE

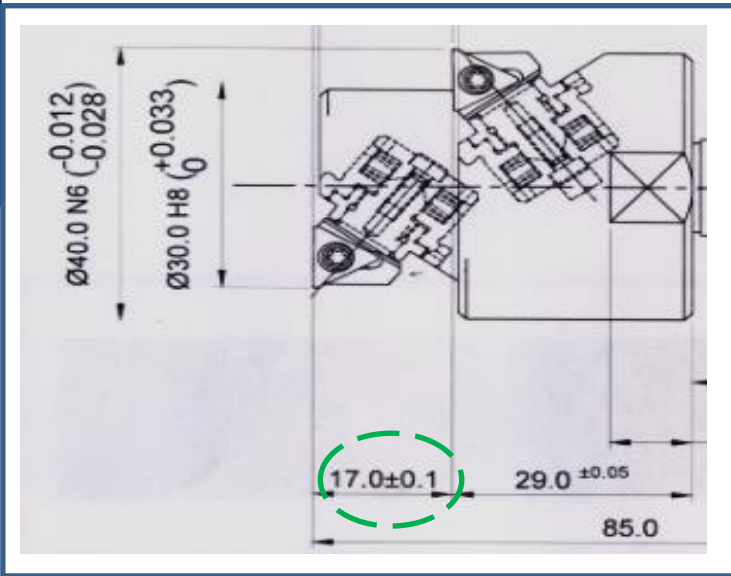


Idea:
Air cutting time elimination thru boring bar step length reduction.

Idea generated by :
Exp.AI.phase HM1D

Horizontally Deployed area:
NAP HM1D
HM2G
HM3H

AFTER



Countermeasure: Now in fine boring 125cc BS6 boring bar step length between dia. 30 and dia. 40 is reduced 25mm to 17mm as now there will reduce air cutting length by 8MM. This reduces the cycle time of machine by 6 sec. Cycle time will come 25 sec.

Benefits : This reduces the cycle time of machine by 6 sec. Cycle time is 25 sec. per shift output improve 500 set to 550 set.

Cycle time reduced 31 Sec. to 25 Sec. resulting productivity improvement by 10 %.



4. Energy Conservation Projects - Elementary Projects: Highlights

Loss Reduction

Installation of 400x3 KVAR Hybrid power factor controller in Weld shop



Investment: 7 Million
Annual Saving: 6 Lakh KWh
Annual Saving: Rs. 5.5 Million
Payback: 15 Months

Installation of Sandwich Bus Duct in place of Air insulated Bust Duct to reduce Voltage Drop.



Investment: Rs. 1.6 Million
Annual Saving: 1.12 Lakh KWh
Annual Saving: Rs. 1 Million
Payback: 18 Months

Hybrid power factor controller and sand witch bus duct installed resulting saving of Rs 6.5 Million /year.

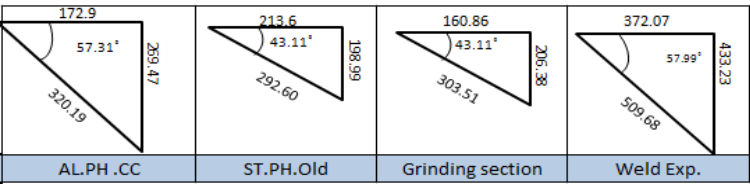


4. Energy Conservation Projects

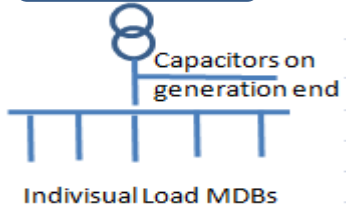
Loss Reduction : Installation of Hybrid Power factor panel at load end

Before

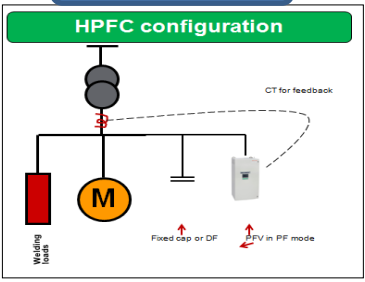
Sr. No.	MDB	Running Power (KW)	Running PF (Cos φ)	Running apparent Power (KVA)	Operating Time Hrs/day	Appear. Power (KVAH)
1	Al phase CC old1	172.9	0.54	320	16	5122
2	Steel phase old-1	213.6	0.73	292	16	4681
3	Grinding Section	160.86	0.53	303	16	4856
4	Weld shop Expansion	372.07	0.73	509	16	8154



Problem

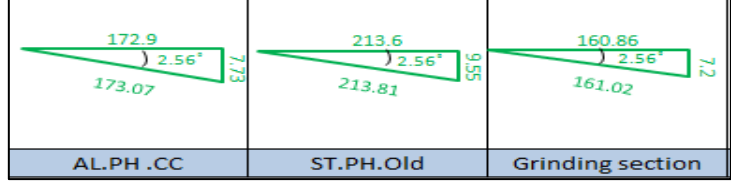


Solution



After

Sr. No.	MDB	Running Power (KW)	Actual PF (Cos φ)	Running apparent Power (KVA)	Operating Time Hrs/day	Total Appear. Power (KVAH)
1	Al phase CC old1	172.9	0.999	173	16	2769
2	Steel phase old-1	213.6	0.999	213	16	3421
3	Grinding Section	160.86	0.999	161	16	2576
4	Weld shop Expansion	372.07	Under commissioning			



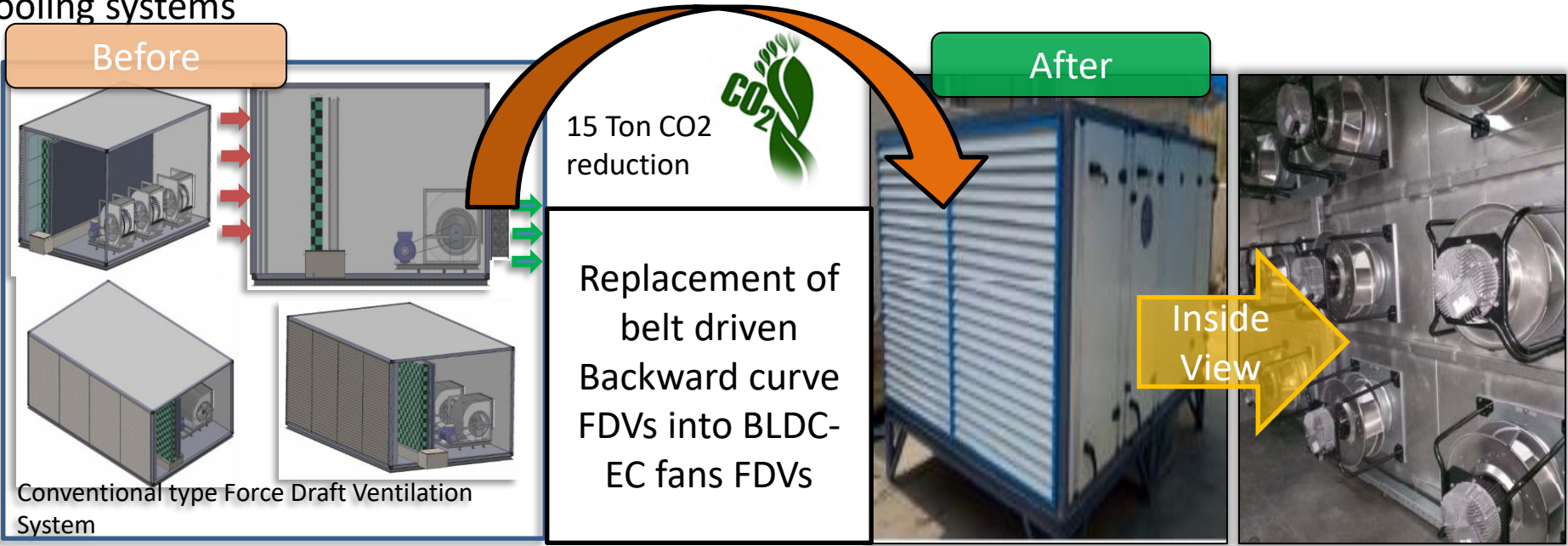
Sr. No.	MDB	Total Apparent Power (KVAH)-Before	Total Apparent Power (KVAH)-After	Saving KVAH	Saving after consideration of load factor@35%
1	Al phase CC old1	5123	2769	2354	824
2	Steel phase old-1	4682	3421	1261	441
3	Grinding Section	4856	2576	2280	798
Total Kvah Saving/Day					2063
Cost saving per year (Rs.)					4456039



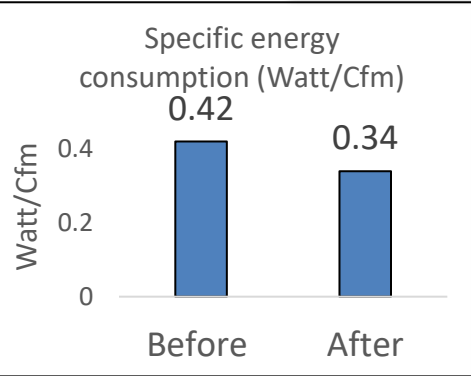
Saving of 0.62 M Kwh per year achieved through 0.54 to 0.99 by installation of Load end PF compensation.

4. Energy Conservation Projects- Evaporative cooling System

Technological Up-gradation : Replacement of convention fan into BLDC EC fan in evaporative cooling systems



Type Of Fan	Belt driven DIDW fan	EC Fan BLDC	EC+ fan
CFM	30000	30000	30000
Fan Nos.	1	3	1
VFD Hz	45	45	45
Total running Kw	13.19	10.11	9.13



- ✓ Investment: Rs. 3 Million
- ✓ Energy Saving: KWh 0.22 Lakh / Annum
- ✓ Cost Saving: Rs.2.02 Lakhs/ Annum

Reduction in SEC by 20% through installation of BLDC blowers in Evaporative cooling system.

4. Energy Conservation Projects- Forced Draft Ventilation System

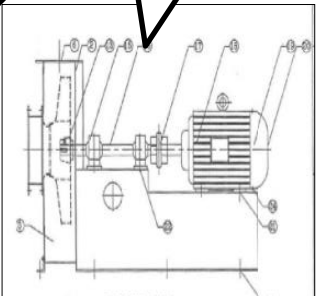
Technological Up gradation : Replacement of Conventional fan with EC+ (Electronic Commutator) Fan.

Before

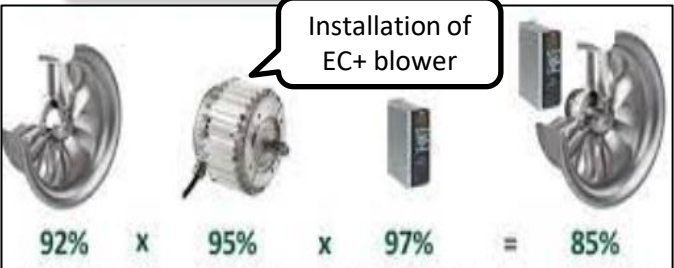


66 Ton annual CO₂ reduction

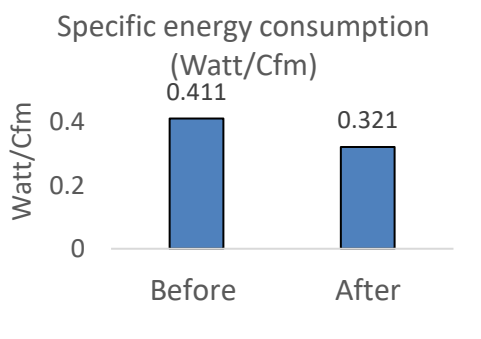
Direct coupled FDV Blower



After



Total 7 nos. of Evaporative cooling systems replaced with EC+ Fan in 2020-21 (60K CFM each)



- ✓ Investment: Rs. 16 Million
- ✓ Energy Saving: KWh 0.6 M Kwh/ Annum
- ✓ Cost Saving: Rs. 0.53 M/ Annum
- ✓ ROI : 3 years

Reduction in SEC by 25% through installation of EC+(Electronic Commutator) system in Evaporative cooling system.



4. Energy Conservation Projects- Forced Draft Ventilation System

Project: Reduction of energy consumption in canteen lighting and ventilation system to eliminate the idle running.

Description: Local control of the FDV blowers and pumps was resulting unwanted energy consumption during lean operation hours. Energy monitoring was not possible due to unavailability of energy meters in the MCC panels.



Idea:

- Centralized monitoring and control of plant ventilation systems.
- Pilot to be done in Canteen area

FEEDER NAME	BLOWER ON/OFF BUTTON	BLWR TRIP	PUMP ON/OFF BUTTON	PUMP TRIP	LOCAL REMOTE	CURRENT (A)	POWER (KW)
SCRUB-I (2F2/2F1)	ON	OFF	OK	ON	OFF	0.00	0.00
SCRUB-I (2F3/3F3)	ON	OFF	OK	ON	OFF	23.36	11.86
FDV-FF (3F2/3F1)	ON	OFF	OK	ON	OFF	5.32	1.68
FDV-GF (4F2/4F1)	ON	OFF	OK	ON	TRIP	26.54	14.83
FDV-FF (3F2/5F1)	ON	OFF	OK	ON	OFF	22.57	13.08
FDV-GF (6F2/6F1)	ON	OFF	OK	ON	OFF	0.00	0.00
FDV-GF (7F2/7F3)	ON	OFF	OK	ON	OFF	0.00	0.00
FDV-FF (8F3/7F1)	ON	OFF	OK	ON	OFF	20.38	7.43
FDV-FF (8F3/8F1)	ON	OFF	OK	ON	OFF	35.95	14.08
SCRUB-I (2F3/3F3)	ON	OFF	OK	ON	OFF	24.65	11.86

Countermeasure:

PLC based system installed for canteen MCC and necessary ward wiring done from existing panel to PLC panel. Multi function meters installed in each feeders of FDV blowers/pumps for energy monitoring.. ON/OFF control, status of operation, meter readings are made available in HMI along with programming done for **auto control as per lunch/dinner hours**

Benefits :1) Elimination of Idle running of FDV system.

2) Individual Energy Monitoring and control is made available on remote.

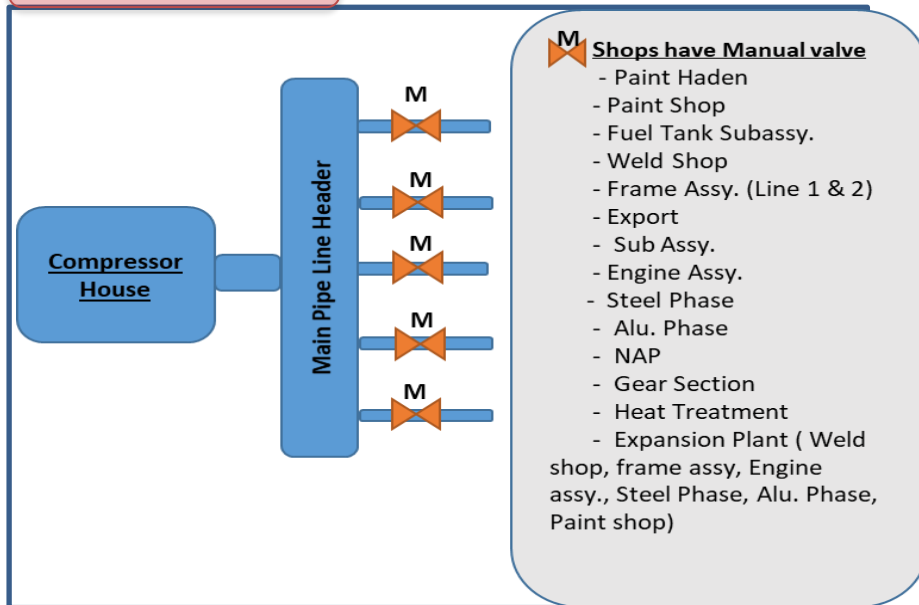
Energy consumption for canteen FDV blowers/pumps reduced 0.07 M Kwh/year. Cost saving of Rs. 0.63 Mn /Year with ROI in 9 Months.



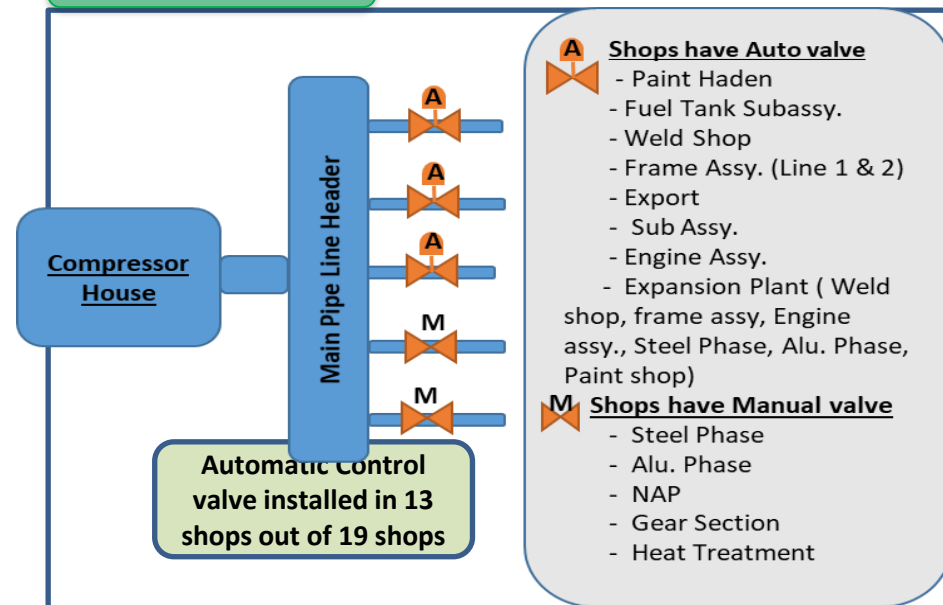
4. Energy Conservation Projects- Compressed air System

Interlocking of compressed air with production line operation

Before



After



- **Actions:** 13 nos. Automatic Control valve (Electro-Mechanical & Pneumatic) are installed in various shops and ON/OFF control is provided at their respective production office
- **Benefits :** Reduction in wastage of Compressed air (approx. 100 CFM) during Non-production hours. Saving in Energy units by 43,000 KWH/year.

Saving of 0.04 MKwh /Year achieved by provision of Automatic valves in 13 no. shops.

4. Energy Conservation Projects

Improvement in Compressed air system:



- Installation of ESP for air intake in place of oil bathed filtration.
- Kwh Saved – 0.21 Lakh Kwh



- Regulating demand pressure by Demand Side Management
- Kwh saved – 0.53 Lakh Kwh



- De-Centralized Compressed air system for process in Non- Production time
- Kwh saved – 2.3 Lakh Kwh



- Installation of Supply side Controller for consistent pressure cascading.
- Kwh saved – 0.02 Lakh Kwh



- Installation of VFD based compressor in compressed air train.
- Kwh Saved – 3.35 Lakh Kwh



- Air Saving Circuits in Pneumatic Gauges- 62 Nos
- Kwh saved – 1.2. Lakh Kwh

Saving of 0.05M KWH through improvement in compressed air system.

4. Energy Conservation Projects- Productivity Improvement


Energy Conservation in furnaces in Heat Treatment

Before



loading quantity of C4 & M3 component is 2880 Nos per lot

After



Fixture design changed. – New Designed Casting fixture introduced now total quantity of 3440 Nos per lot

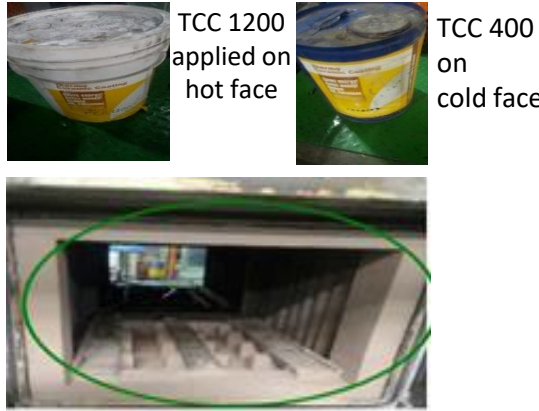
Before



Standard temp. Inside the furnace - 950 °C.
Temp. On outside surface of Furnace - 80 °C
Standard Outside Surface Temp. - + 30 °C on ambient Temp.

Problem : In SQF the skin temperature is about 75 to 90°C which is above the desired temp.

After



Thermo- Ceramic coating is applied after brick lining inside the Furnace

Result: 8 ° C Temp reduction on outside surface resulting less energy consumption

Energy saving measures taken in Heat treatment furnaces with a saving of 0.16 M Kwh/annum

4. Energy Conservation Projects

Reduction in Paint consumption and Energy saving through Robotic Painting

Before:

6 Reciprocators were installed in Paint Shop (2-axis)
Primer Coat, Base Coat, Top Coat



Drawbacks:

1. Less Paint transfer Efficiency(less than 50 %)
2. Less paint coverage (Due to single axis movement)
3. Quality concerns (Manual painting was also required)
4. High sludge generation due to excess paint consumption

Parameters	Reciprocators	Robots
Paint Transfer Efficiency	45-50 %	60-70 %
Coverage of Components	2-Axis	6-Axis
Shaping Air	Single Shaping Air	Dual Shaping Air
Turbine speed	25 K	60 K
Paint Consumption Reduction in Robot by 35 %		

After:

03 Robots installed in Paint Shop Booth (6-axis)



Advantages:

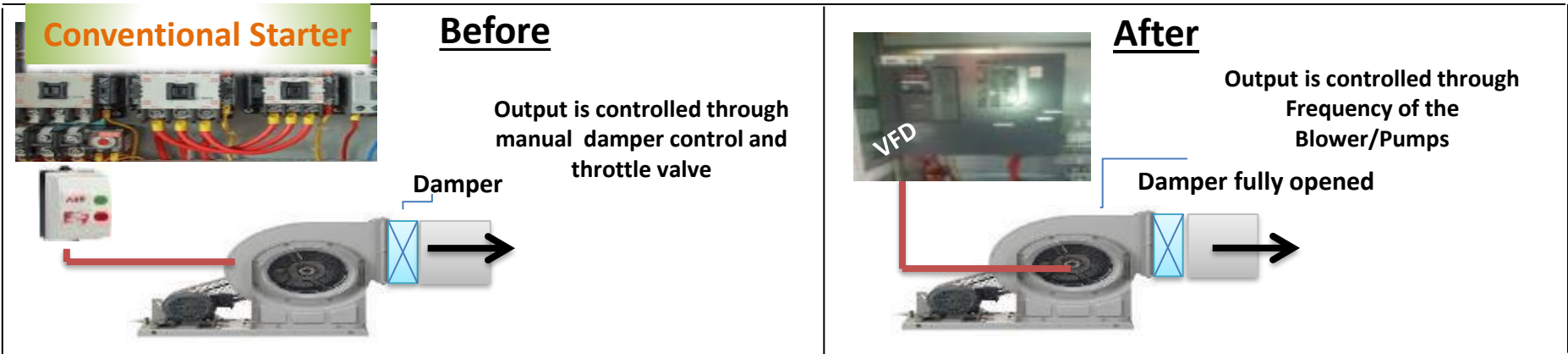
1. Improved Paint transfer Efficiency(more than 60 %)
2. Improved Quality
3. Low sludge generation due to reduced paint consumption

After installation of Robots for painting components which eliminated manual painting. Frequency of Blowers reduced from 40-45 Hz to 30-35 Hz for booth balancing.
Air velocity inside booth is reduced from 0.4 m/s to 0.3 m/s.

Total 0.15 Million KWh saving achieved annually with saving of INR 1.35 Million apart from Paint saving and Waste generation reduction by 24 %.

4. Energy Conservation Projects

Earlier flow was throttled, but now flow is controlled through VFD, thus saving of Energy by reducing Frequency of operation



- ✓ Energy Saving till date: 6.38 Lakh KWH
- ✓ Cost Saving till date: INR 58.1 Lakh

FY 16-17 :
 35 VFDs installed
 Saving : INR 30.7 Lakh
 Investment: INR 49 Lakh

FY 17-18 :
 19 VFDs installed
 Saving : INR 8.2Lakh
 Investment: INR 18 Lakh

FY 18-19 :
 10 VFDs installed
 Saving : INR 6.8 Lakh
 Investment: INR 14 Lakh

FY 19-20 :
 22 VFDs installed
 Saving : INR 7.8 Lakh
 Investment: INR 17 Lakh

FY 20-21 :
 14 VFDs installed
 Saving : INR 4.6 Lakh
 Investment: INR 11 Lakh

- ✓ Investment: INR 113 Lakh
- ✓ Payback Period: 2 Years

Energy saving by optimization through VFD resulted in saving of 0.64 M Kwh .



4. Energy Conservation Projects

Improvement in Lighting and Ventilation

Introducing LED Luminaries in place of conventional lights to maintain same LUX level by reducing 66 % Energy consumption in lighting and also having 5 times life as compared to fluorescent luminaries.

✓ Investment: INR 19.7 Million
 ✓ Payback Period : 11 Month

FY 17-18
 2100 LED (109 KW)
 Saving : INR 22 Lakh
 Inv.: INR 24 Lakh

FY 18-19
 1200 LED (56 KW)
 Saving : INR 14 Lakh
 Inv.: INR 15 Lakh

FY 19-20
 970 LED (49 KW)
 Saving : INR 11 Lakh
 Inv.: INR 9.1 Lakh

FY 20-21
 814 LED (45 KW)
 Saving : INR 9.7 Lakh
 Inv.: INR 11.2 Lakh



Reduction in Energy consumption of Low intensity man areas by Motion sensor (125 Nos. 180 KW Lighting).

Investment: INR 0.5 Million
 Saving: 0.1 Million KWH (INR 0.9 Million)
 Payback: 7 Months



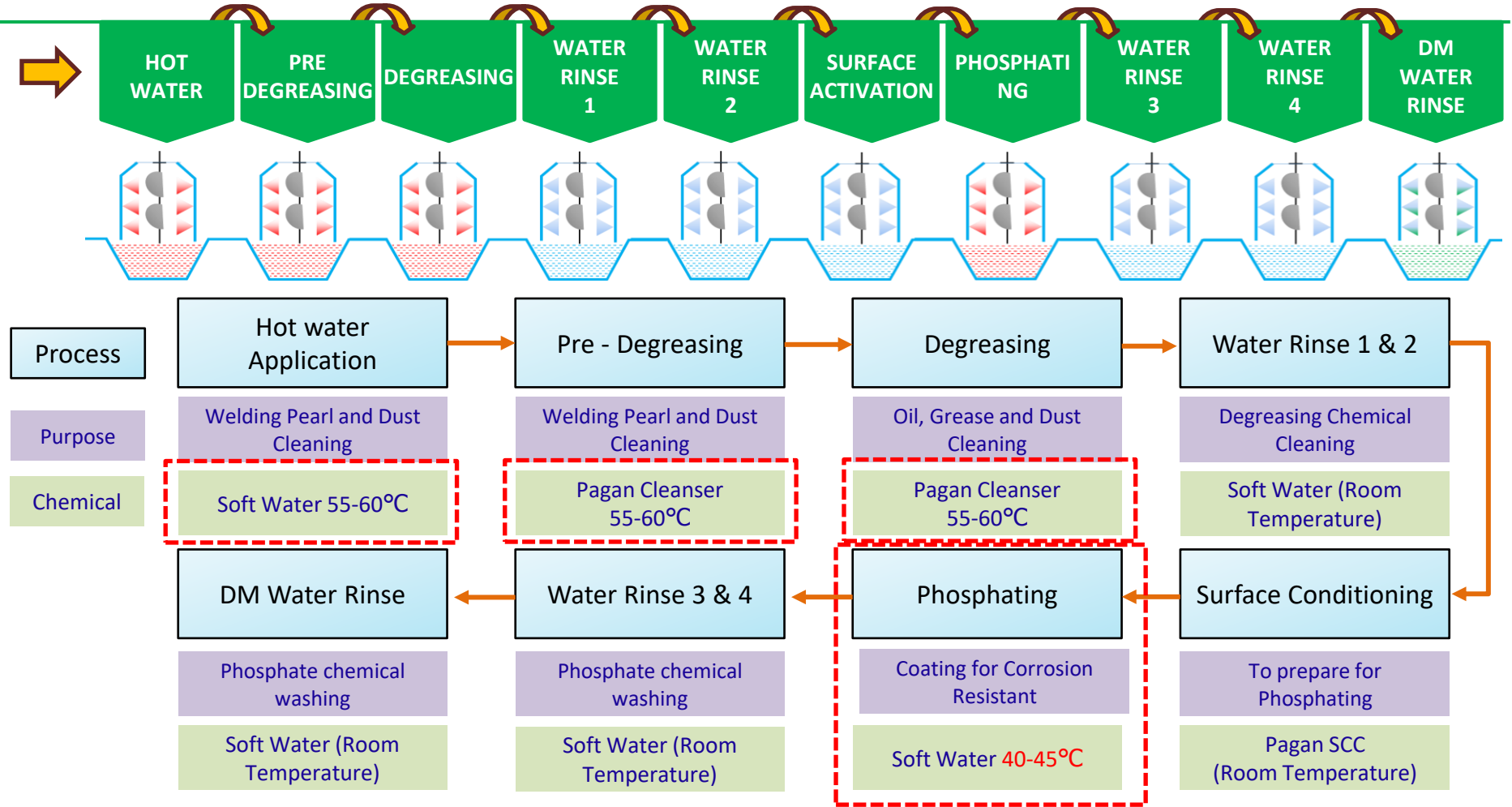
Using daylight by providing Polycarbonate Sheets On Roof Top to switch Off Lights(26 KW)

Investment: INR 1 Million
 Saving: 0.12 Million KWH (INR 1.05 Million)
 Payback: 12 Months

Energy saving is achieved with Increased usage of Natural light with automatic control of new technology in lighting

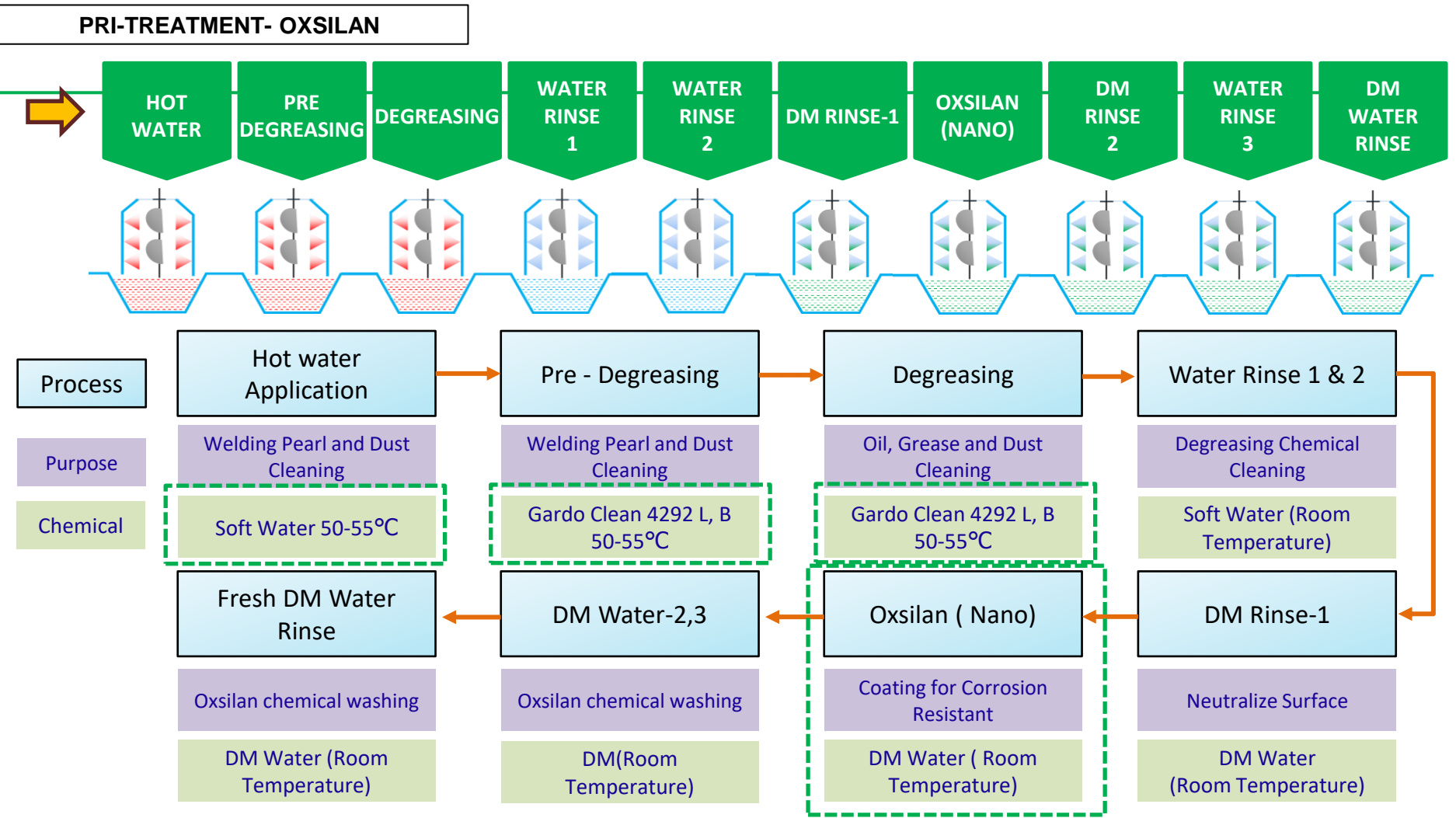
Innovative Projects no.1- Energy and Cost saving by replacing the phosphating process to Nano PT (Oxsilan process)

PRE-TREATMENT- ZINC PHOSPHATING



Earlier in Paint shop Pre-treatment process done by Zinc phosphating method

Innovative Projects no.1- Energy and Cost saving by replacing the phosphating process to Nano PT (Oxsilan process)



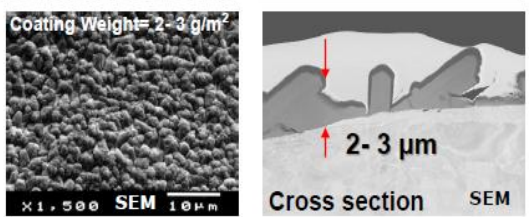
Technological migration form conventional Zn-Phosphating PT to new generation eco friendly Nano PT .



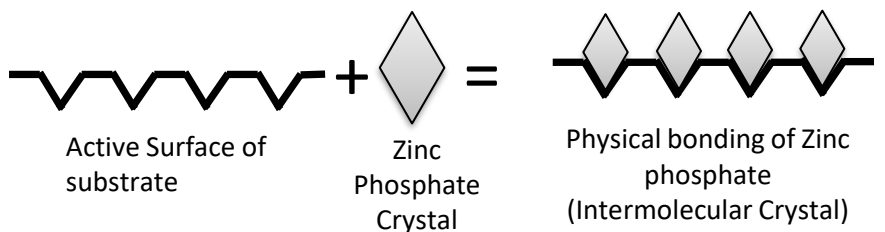
Innovative Projects no.1- Energy and Cost saving by replacing the phosphating process to Nano PT (Oxsilan process)-Technical Comparison

Phosphating

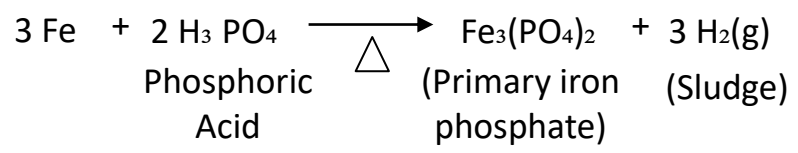
- Crystalline Coating**



These Zn Phosphate crystals are physically bonded with the substrate hence shorter duration of effectiveness



- Higher degree of etching**

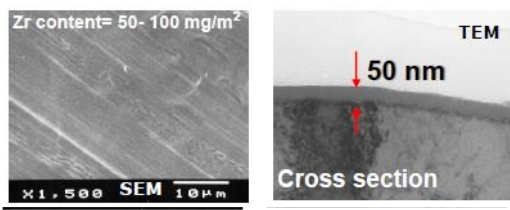


Chemical Reaction require heat to give phosphating coating

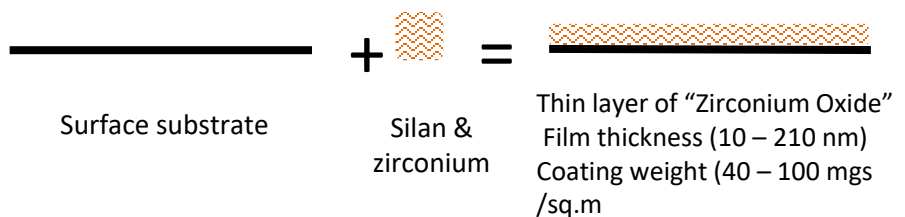
Temperature- 40~45 °C

Nano PT (Oxsilan)

- Amorphous coating**



A amorphous layer of silan polymer and zirconium which is more effective for long time duration



- Low degree of etching**

It has electrolysis reaction – loss of iron due to acidic nature of chemical (micro etching) & deposition of zirconium oxide on the vacant area.

Electrolysis reaction – No need of heat

Temperature- Ambient temp.

Nano Coating is carried out on Low degree of etching on ambient temp. so the energy consumption to maintain the temp. is now eliminated

Innovative Projects no.1- Energy and Cost saving by replacing the phosphating process to Nano PT (Oxsilan process)-Achievement

Technical Parameters	Zinc Phosphate (M/s pagan)	Nano PT (M/s Chemetall)	Remarks
Cleaning Stages	60°C	55°C	Temperature reduced by 5°C
PT bath temp	45~ 55 °C	Ambient temperature	NANO PT running at ambient temperature
Process tanks	Surface activation required	No need of surface activation	100 % reduction in surface activation chemical
Sludge reduction	190 Kg/ month	2-5 Kg/month	95 % sludge reduction
Soft Water Consumption	25KL/day	3~5 KL/day	80% reduction in soft water consumption
DM Water consumption	43 KL/day	32 KL/day	25% reduction in water consumption
Steam Consumption	437.5 KG/ hr	321 KG/ hr	25 % reduction in heat load
ETP discharge	54 KL/day	46 KL/day	15% reduction in input water discharge
Quality Results :-			
Salt Spray Test	120 hrs	240 hrs	Higher than Zn Phosphate
Water Resistance	48 hrs	120 hrs	Higher than Zn Phosphate
Humidity Resistance	120 hrs	192 hrs	Higher than Zn Phosphate

- ✓ Thermal cost saving- Rs. 1.2 M/annum
- ✓ Energy saving- 0.015 M Kwh
- ✓ Energy Cost saving Rs.-0.1 M kwh
- ✓ Investment: 0.4 MRs.
- ✓ ROI: 3 Months

Cost saving through thermal energy saving is achieved by INR 1.2 M/Annum



Innovative Projects no.2- Exports Capacity Ramp Up By Frame Assy. Line 3 Conversion

Problem : Sunday and C shift working in Export to mitigate the export demand.

Brief Description : We have a set up of export packaging separately in our export department With 500 bikes packaging in a day.

But due to export demand increase Holidays , Sundays and C shift are planned to operate to meet the requirement in export line.

Requirements for Independent export operation if rest plant is not working

1. Compressed air @ 5 KG pressure.
2. Lighting and Ventilation.
3. Manpower on Overtime.

Problem: Wastage of energy due to compressed air demand .

(Compressor of 250 KW to be run for export packaging line.)

2. Extra energy consumption in Lighting and Ventilation (9400 Kwh/Month).
3. 50 Nos. Manpower on overtime causing extra cost of 6.5 Lakhs/Month

To mitigate the export demand Holidays and Sundays are planned causing more energy consumption.

Innovative Projects no.2- Exports Capacity Ramp Up By Frame Assy. Line 3 Conversion

Countermeasure

The Frame Assy. Line no. 3 is modified as per the suit case packaging for export market. Production Started with flexibility of packing additional 0.2 Lakh Vehicles, taking advantage of Idle Line 3 due to Low Domestic volume.



Pre-Packing Area for Prepacking



Part Feed Hanger Modification for material filling



Special Jigs for Box Assembly



Box Filling on Conveyor



New Balancer for Box Unloading

Permanent Solution for future demand with 1000 Veh. export packaging per day

- Never done anywhere in HMCL ✓

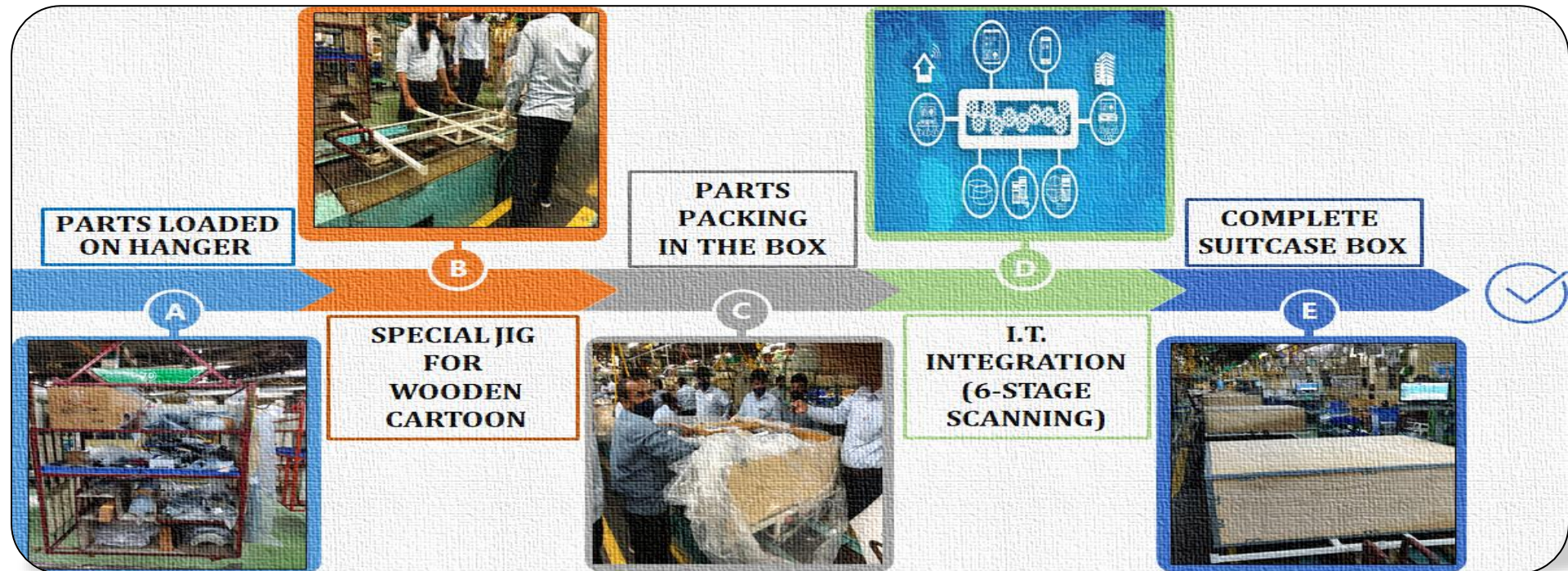
Capacity enhancement of export packaging increased by 250 % without adding any new manufacturing infrastructure

Innovative Projects no.2- Exports Capacity Ramp Up By Frame Assy. Line 3 Conversion

Before - Line 3 Conveyor used for only Motorcycle Assy.

After - Line 3 Conveyor converted to export Packaging on same Assy. Conveyor.

Benefit - Additional export Packing Capacity flexibility **500 / Shift** successfully executed

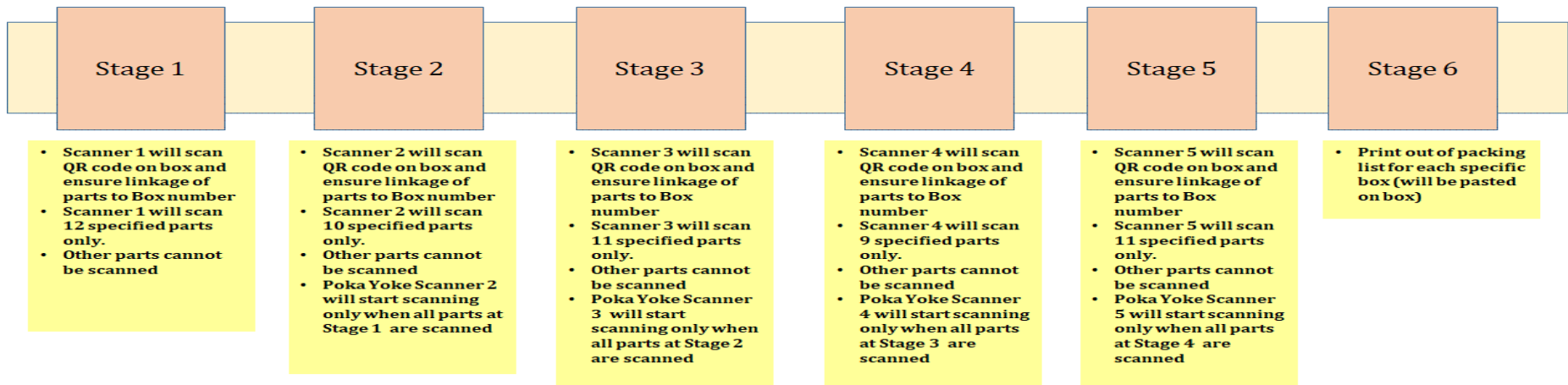


Flexi plant utilization for Export package /domestic vehicle assembly.

Innovative Projects no.2- Exports Capacity Ramp Up By Frame Assy. Line 3

Conversion

Benefits of Exports Capacity Ramp Up By Frame Assy. Line 3 Conversion



I.T.integration enhanced to ensure

- **Zero KD complaints** because of missing components
- Linkage between Box number and the parts scanned (Parts **Traceability** with specific box number)
- **Traceability** of Engine Number and Frame Number to specific Box Number (started QR Code on each box)
- Expandable to 10 stages or 20 stages (depending on length of conveyor) to enhance **capacity / productivity with quality**

Cost Saving :

Savings through optimized compressed air system : 0.05 M Kwh/Month

Saving through Ventilation and Lighting : 9500 Kwh /Month

Total Saving of energy : 60500 Kwh/Month

Total cost saving in energy : 0.55 M Rs./Month

Investment in Jig Fixture Modification and IT infra structure: 0.05 M Rs.

ROI : 1 Months

Permanent Facility has been developed for future to cater the sudden increase in Export Demand

Innovative Projects no.3- Development of Green building for BS6 Exp. area

Green Initiative 1:- Heat Resistant solar reflective Paint on roof-sheet and side wall to minimise Heat Load inside the building

Benefits

- Roof Temperature Reduction of 10-22 Deg (Considering ambient temperature 45 Deg)
- Internal Temperature Reduction of 4-8 Deg (Considering ambient temperature 45 Deg)
- Reflection of 97% of Solar IR rays thus reducing the building envelope temperature
- Higher SRI value of 130
- Excellent Weather Stability, Water Resistant, Self Cleaning Nature



Green Initiative 2 : Green wall and Plantation

- Cleans outside air of pollutants and dust. Offsets the carbon footprint of people and fuel emissions
- Insulates and cools the building envelope, as well as protecting it from the elements
- Pot plantation and Green wall of oxy-rich plants for enhancement of oxygen level.



Reduction in heat load by 10-22 Deg. helps to minimize the cooling and Ventilation Load by 20 %.

Innovative Projects no.3- Development of Green building for BS6 Exp. area

Energy saving initiative-1: Compressor distribution system from centralized to decentralized for energy efficiency

Benefits:

- Reduction in energy cost by INR 3.72 Lakhs/year
- Air cooled machine in place of water cooled machine to save cooling tower and water requirement
- Minimisation of Line Loss



**Conventional
(Centralised)**



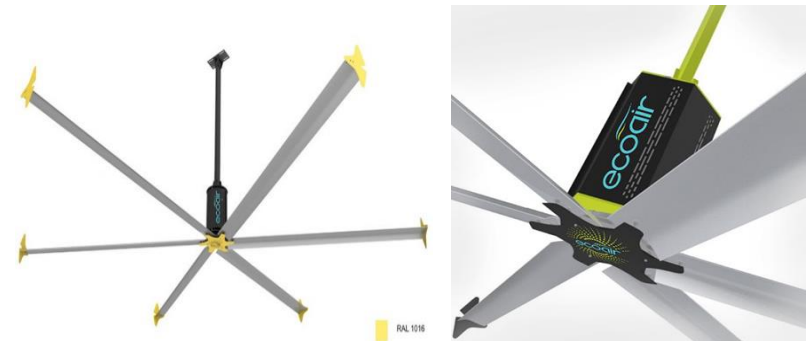
**New Compressor for AL4
(De-centralised)**

Energy saving Saving Initiative -2 :

Installation of HVLS Fans

Benefits:

- Reduced Cooling cost and over all energy cost
- Provides high volume of Air 1,28,700 CFM at lower power consumption 1.1 KW
- Low speed operation 86 RPM
- Low Noise level 45 dba
- Maximum area coverage 6800 Sq.ft.



Saving of 0.2 M Kwh/annum by applying smart and energy saving VFD IE4 compressor and HVLS fans

5. Utilization of Renewable Energy

On grid solar Power Synchronization with existing Double Bus bar Panel to utilize the solar power



PV System Overview | 80 kWp HMC-Dharuhera Plant

PV System Data

- Current Power:** 36.78 kW (Energy and Power)
- Energy:** 106.32 kWh Today (Total: 376,570 kWh)
- CO2 avoided:** 74 kg Today (Total: 263 t)
- Temperature measurement:** 36 °C (Slightly cloudy)

CLX Portal by SOL Connect

List

Plant name	Plant Inaug	Date	Total yield (kWh)	Yield yesterday (kWh)	kWh/kWp yesterday	Inc errors yesterday
172 HMC	HMC	14/08/2017	203,521.8	407.9	1.4	0

Technology	Type of Energy	Onsite / Offsite	Installed Capacity	Generation (Million KWH)	% of overall electrical Energy
Solar PV	Electrical	Onsite	272 KWp	0.20	0.6

Solar Power Plant of 272 KWp is installed and 630 KWp is in pipeline



6. Utilization of Waste as a fuel

Waste to wealth: Installed Vapour Absorption Machine (utilizing waste heat of Gas Genset) of 300 Tons of Refrigeration for Engine Assemblies by eliminating Chillers and Waste heat recovery Boiler of 3 Ton of Steam / Hour.



1 Utilization of Waste Heat by Installing VAM of 300 TR for Engine Assembly



2 Utilization of Gas Genset Exhaust Gas for Waste heat recovery Boiler



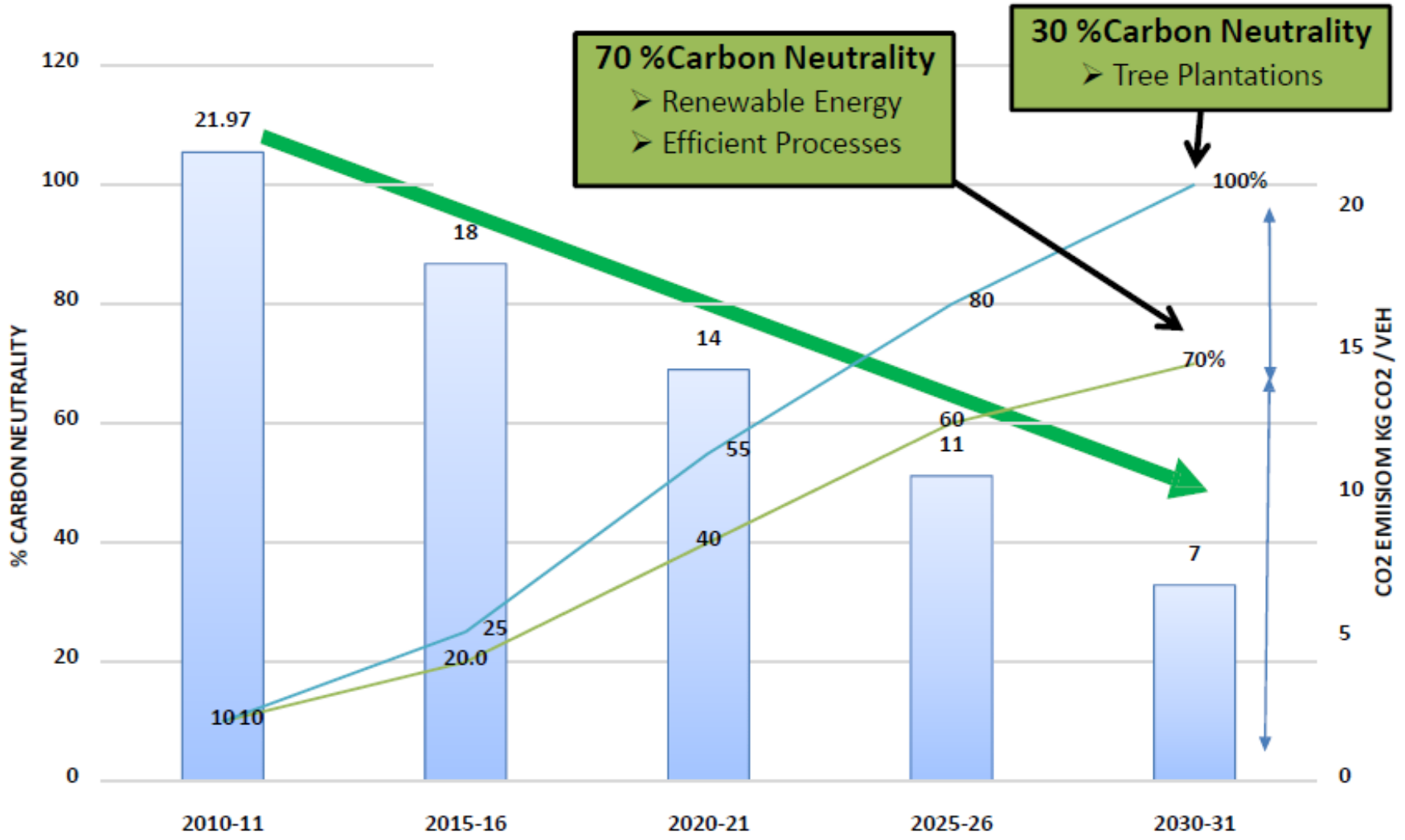
Waste used as fuel	Utilization in FY18-19	Utilization in FY 19-20	Utilization in FY 20-21
Qty. in MT	476.365	386.19	265.08

Type of Fuel Used	Utilization in FY18-19	Utilization in FY 19-20	Utilization in FY 20-21
Flue gas from Waste heat recovery boiler	463 M Kcal	441 M Kcal	415 M Kcal
Cooling water for Engine Jacket Cooling	1020 M Kcal	1280 M Cal	1320 M Kcal

Waste heat is recovered and approx. 1735 Million Kcal heat is utilized from the waste.



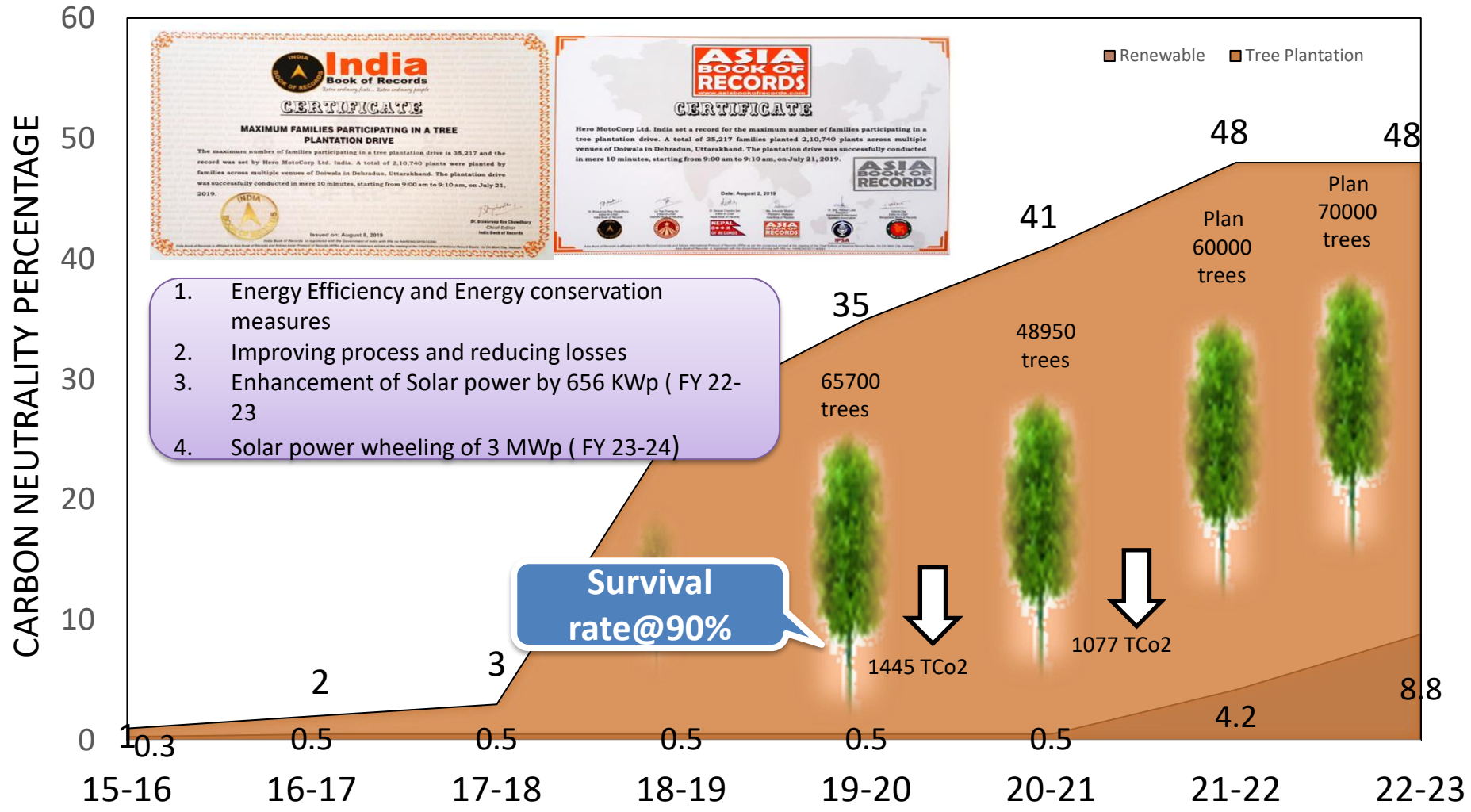
7. Green House Gas Inventorisation: Future Strategy



Target is to achieve 50 % carbon neutrality by FY 21-22 and 100% by FY 30-31



7. Green House Gas Inventorisation: CO2 reduction through renewable energy and Plantation

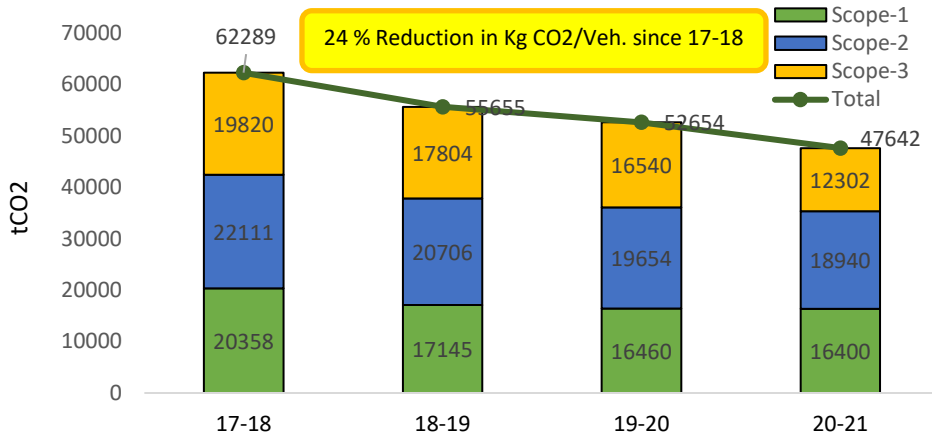


Target is to achieve 50 % carbon neutrality by FY 21-22 and 100% by FY 30-31

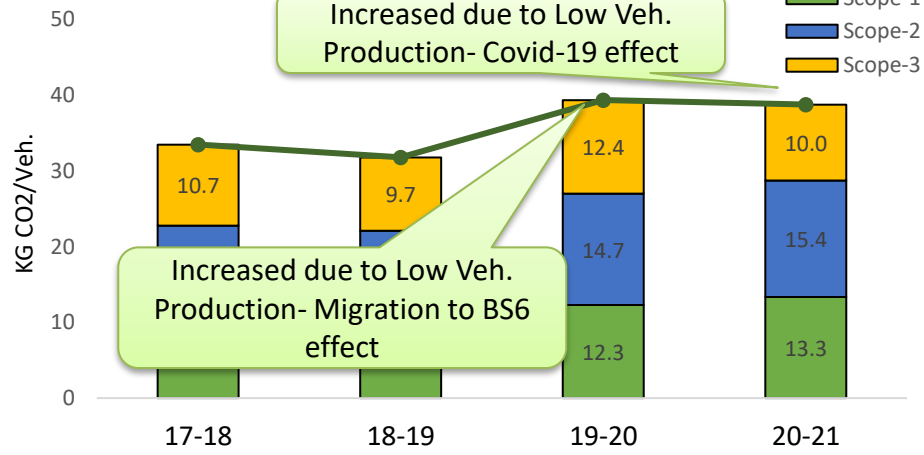


7. Green House Gas Inventorisation

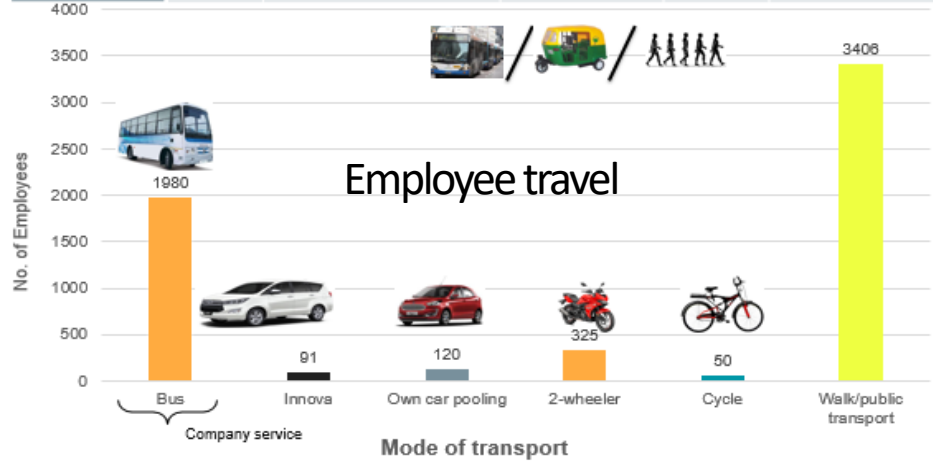
Year wise Carbon Emission T CO2 Trend



Year wise Carbon Emission (Kg Co2/veh)Trend



No. of employees	Staff	Worker(Regular)	Contractor	Casual	Total employees
	610	1733	3200	429	5972



Logistics

CO2 Emitted: 11450 TONS

Business travels


CO2 Emitted: 23 TONS

Green House gas emission is reduced by 28 % over last 3 years due to various initiatives taken



8. Green Supply Chain


GVDP-An initiative by Hero for protecting and preservation of environment



Green Vendor Development Programme

METHODOLOGY

Green Supply Chain Cell/Team Approach

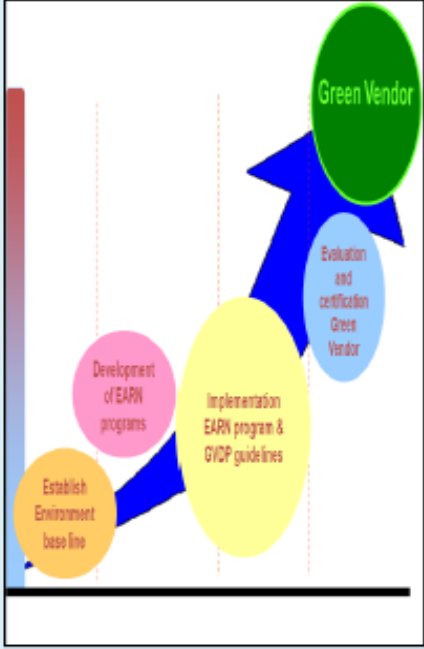


Hero's initiative for Green Vendor development program.

We at Hero MotoCorp are continuously striving for synergy between technology, system and human resources, to provide products and services, to meet the aspiration of our valued customers that too, demonstrating our "WE CARE" philosophy. We believe that our vendors and dealers are key stakeholders and partners to work towards the goal of sustainable development.

Green Vendor Development Programme (GVDP) encourages a effort between Hero MotoCorp and its suppliers to achieve Hero MotoCorp's overall corporate environmental goal. GVDP calls for partner companies to demonstrate their commitment towards improved environmental performance and striving for continual improvement.

Buyers Gain	Sellers Gain	Mutual Gains
Multiplier effect of supplier gains	Reduced production cost-resource optimization	Market competitiveness
Reduced purchase costs	Assured client commitment/ potential for more clients	Public image
Improved image	Reduced liability	Improved relations-secured ties
Improved market reach	Improved relations with regulatory agencies	Reduced production costs greater margins
Reduced liability	Competitive advantage over others	
Greater assurance of consistent & reliable supply	Improved management systems at marginal costs	



APPROACH

1 ST YEAR	2 ND YEAR	3 RD YEAR
<ul style="list-style-type: none"> Enrollment under GVDP Education & Training for GVDP Techniques One to One Monitoring Base line Establishment Identification of areas for improvement Draw up earn programs for binding the gaps. Evaluation of Earn program at Gemba 	<ul style="list-style-type: none"> Continuous improvement in Earn Program Management Enhanced business efficiency through Earn Programs Improved resource planning and compliance Management Inculcate GVDP approach in over all work culture Measuring & Monitoring results 	<ul style="list-style-type: none"> Extending GVDP techniques to their other manufacturing units and Supply Partners Demonstrate continual improvement in their Environmental performance Generate MIS & Submit to HMCL

HAND HOLDING & MENTORING BY HMCL

JOURNEY CONTINUES FOR NEXT GENERATION

Program approach has been knocked down into year-wise approach.

8. Green Supply Chain

Target Under GVDP @ SCP's End

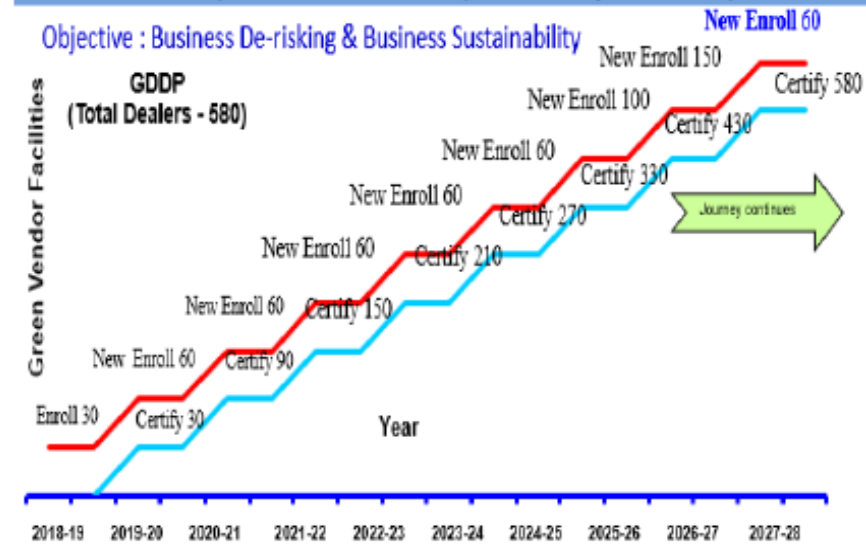
Total Suppliers for HMC L	Supplier Enrollment in GVDP				
	Enrolled till 2018	Enrolled in 2018-19	Enrolled in 2018-19	Target for 2020-21	Target for Next 3 Years
281	178	20	22	20	Enroll all Suppliers I.e. 261

Category	Short Term Target
Water Management	Reduction in Water Consumption by 10% YOY (GVDP)
Energy Management	Reduction in Energy Consumption by 10% YOY (GVDP)
Waste Management	Waste Management reduction by 10% YOY (GVDP)
Logistics Improvement	Reduction in Vehicle Trips by 20% for Volumetric parts.
Packaging Improvement (Plastic/Wooden/Polythene / Carton)	Elimination of Non Recyclable/ Non Reusable Packaging Material-100% by Fy20.

Future Action Plan

S. N. O.	Themes	Action Plan
1	Business Partner Up gradation	Strengthening of GDDP Program.

GDDP (Green Dealer Development Plan) : Road Map

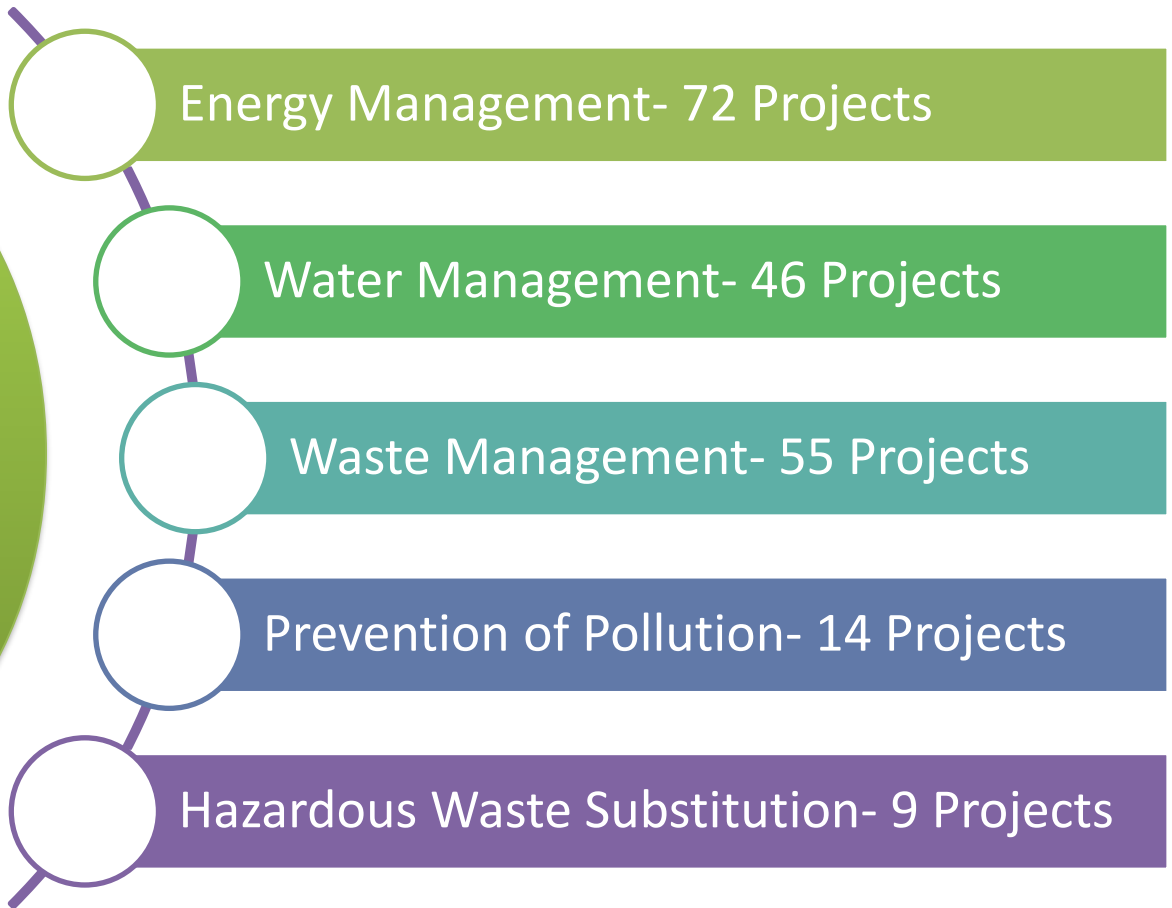


GVDP programme is planned for Green dealership in Phase -1 ,30 dealers are identified .



8. Green Supply Chain

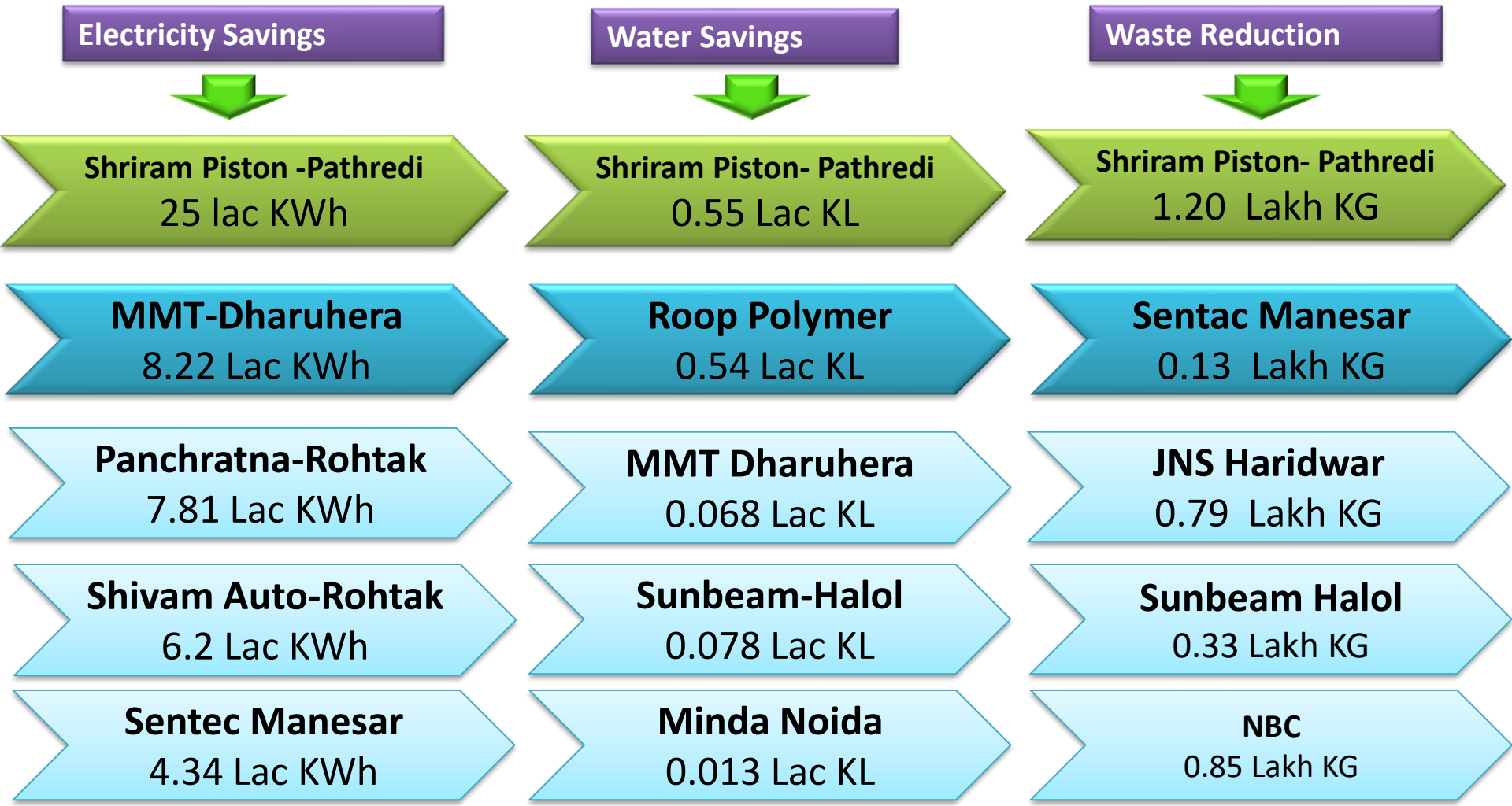
The Green Vendor Development Program of Hero MotoCorp is the supply chain initiative drive taken to extend the corporate environment responsibility down the supply chain.



At Hero MotoCorp, environmental protection and preservation is one of the core business values. Total 196 Projects implemented under GVDP.



8. Green Supply Chain



Total 77.50 Lakh Kwh , 1.45Lakh KL,2.1 Lakh KG of Energy, water and waste Reduction in FY20-21 through GVDP program.



8. Green Supply Chain

Major Programs Initiated for Awareness of SCP's During FY : 20-21



Annual GVDP Meet



GreenCo-World Bank Meet for SME



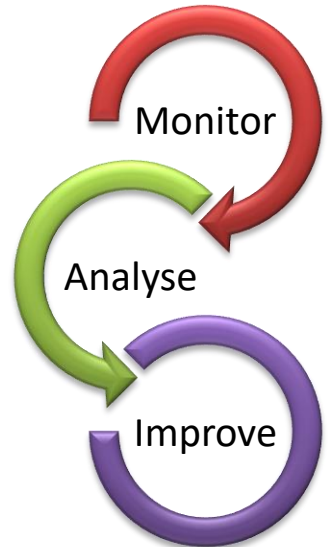
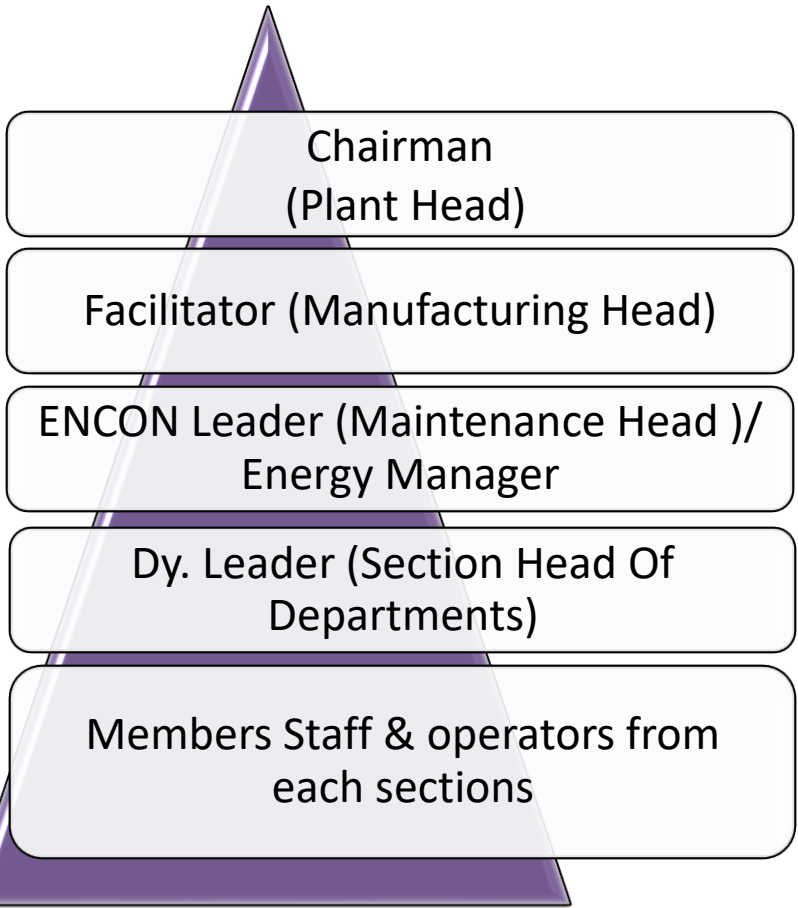
Joint Guidance Co-Sharing : GreenCo Cluster Learning

Various programs are carried out for awareness of supply chain partners



9. Team work, Employee Involvement & Monitoring

Organization chart of Energy Conservation Team



Review Mechanism

- Daily Energy MIS
- Morning Production Meeting
- Weekly review of Energy Conservation Team
- Monthly Management Review of Performance (Manufacturing Head)
- Monthly Reporting of Status of Projects and its sustenance. (Plant Head)

PDCA approach is followed in reviewing mechanism

9. Team work, Employee Involvement & Monitoring

Employee involvement Activities



Tree Plantation Drive



Earth Hour Celebration(27/3/2021)



Some of the Glimpse of team Work, Employee Involvement are shown

9. Team work, Employee Involvement & Monitoring

Power Consumption - Feeders Kwh Cons. data logging

Date-Time	Gurukul	Canteen 1st	SERVICE-1	SERVICE-2	WELD-1+3	EXPORT	MAN AUX.-2	STEEL PH- 1	AL. PH. CC	R & D	PAINT-OMT	AL. PH- CH	N.E.P.-1
	Kwh	Kwh	Kwh	Kwh	Kwh	Kwh	Kwh	Kwh	Kwh	Kwh	Kwh	Kwh	Kwh
06:00	23108	3183	102925	257009	469293	19627	319879	24556	929786	535740	1299259	37432	369434
06:30	23125	3185	102997	257269	469293	19638	319887	24567	929812	535745	1299259	37454	369438
07:00	23144	3190	103100	257540	469295	19656	319901	24607	929854	535759	1299260	37489	369446
07:30	23165	3195	103207	257814	469325	19674	319919	24669	929932	535778	1299261	37535	369458
08:00	23183	3200	103311	258075	469379	19694	319936	24737	930009	535795	1299262	37589	369472
08:30	23199	3207	103392	258345	469429	19714	319953	24796	930067	535816	1299263	37636	369486
09:00	23213	3216	103526	258601	469482	19734	319970	24855	930125	535838	1299264	37697	369504
09:30	23226	3223	103642	258863	469538	19758	319982	24943	930223	535859	1299264	37758	369522
10:00	23230	3227	103758	259122	469617	19781	319998	25018	930289	535883	1299265	37808	369536
10:30	23233	3231	103844	259383	469663	19802	320015	25085	930338	535906	1299266	37854	369544
11:00	23237	3238	103899	259646	469689	19819	320029	25123	930371	535925	1299268	37890	369549
11:30	23243	3245	103951	259908	469726	19837	320045	25163	930422	535941	1299270	37936	369556
12:00	23251	3251	104046	260166	469797	19856	320061	25222	930483	535960	1299271	37989	369569
12:30	23260	3256	104137	260423	469866	19874	320076	25272	930535	535979	1299271	38032	369577
13:00	23267	3261	104191	260681	469886	19893	320093	25322	930586	535998	1299272	38075	369586
05:30	24053	3362	106702	269390	470705	20337	320482	26893	932095	536320	1299288	39373	369950
06:00	24071	3363	106796	269659	470705	20348	320490	26921	932123	536325	1299288	39401	369958
Total	964	180	3871	12650	1412	721	611	2365	2337	585	29	1969	524

P & F COST Analysis -Jul-2021-22

HEADS	Plan	Actual	Variance
Veh. Prod.	1,24,200	92,048	-32,152
Cost (Rs./Veh.)			
Captive	318.94	349.44	-30.5
Steam	15.36	19.22	-3.9
F/L	1.73	1.80	-0.1
Total	336.03	370.47	-34.4
Kwh./ Veh.	29.64	37.48	-7.8
Avg. Prod. Level	4,600	3,409	-1,191

Veh. Prod.

Days

KWH. Gen.	Plan	Actual	Variance
HSEB	14,75,071	18,00,669	3,25,598
HSD	4,46,534	91,207	3,55,327
GAS	17,59,631	15,57,920	-2,01,711
Total	36,81,236	34,49,796	2,31,440

Power Unit (KWH) :-

Kwh./ Veh.

% USE	Plan	Actual	Variance
HSEB	40.07	52.20	12.13
HSD	12.13	2.64	9.49
GAS	47.80	45.16	-2.64

HSD

N.G.

Power and Fuel analysis report

Unit Rate - Rs / Kwh

HSD (Rs./Kwh) 8.15 vs 7.64 (0.51)
 HSD (Rs./Ltr.) 72.37 vs 74.21 (-1.84)
 N.G. (Rs./SCM) 35.40 vs 37.96 (-2.56)
 HSD 21.93 vs 20.11 (1.82)
 GAS 10.11 vs 10.64 (-0.52)

Rate / Tariff	Plan	Actual	Variance
HSEB (Rs./Kwh)	8.15	7.64	0.51
HSD (Rs./Ltr.)	72.37	74.21	-1.84
N.G. (Rs./SCM)	35.40	37.96	-2.56
HSD	21.93	20.11	1.82
GAS	10.11	10.64	-0.52
HSEB	8.15	7.64	0.51
Gen.	12.51	11.16	1.34
Cumu.	10.76	9.32	1.44

Gen. Cost (Rs./Kwh.)

Tariff Impact

Power & Fuel Cost Impact -Variance Analysis

Category	Plan	Actual	Variance
H.S.D. - Kwh / Ltr.	3.30	3.69	0.39
N.G.as- Kwh / SCM.	3.50	3.57	0.07
HSEB	1,20,21,831	1,37,57,111	-17,35,280
HSD - Captive	97,92,625	18,34,471	79,58,153
Captive Power	1,77,97,409	1,65,74,019	12,23,390
Steam	19,07,555	17,68,936	1,38,619
F/L	2,14,939	1,66,082	48,857
Total	4,17,34,359	3,41,00,619	76,33,740

Plan

Low Veh. Prod.

Tariff

HSD Reservat on Loading/ SFC

% Use

Actual

NOTE: (i) Due to low vehical production cost increased significantly. (ii) HSD/HSD Tariff increased continuously in the month of Jul-21 resulting in higher unit generation cost in each month. (iii) Loading of the genset improved in both type of source, resulting the cost reduction by 0.78 Rs./veh. (iv) Startegy of genset utilization of source reduced the cost by Rs. 42.54/Veh. (v) Absolute energy consumption reduced by 6% by taking energy saving initiatives.

UTILITY REPORT FOR 10.08.2021

NO. MTR	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
Daily Utility Report																											

Energy monitoring and review is done daily as well as monthly with regular review on status of projects.



9. Team work, Employee Involvement & Monitoring

All Employees



Induction Program for new joinees

- Emphasis on Resource Conservation at Gurukul
- Plant Visit & sharing of resource conservation projects

Continual Awareness Sessions

- Training by internal & external Teams
- Discussion of recent improvements

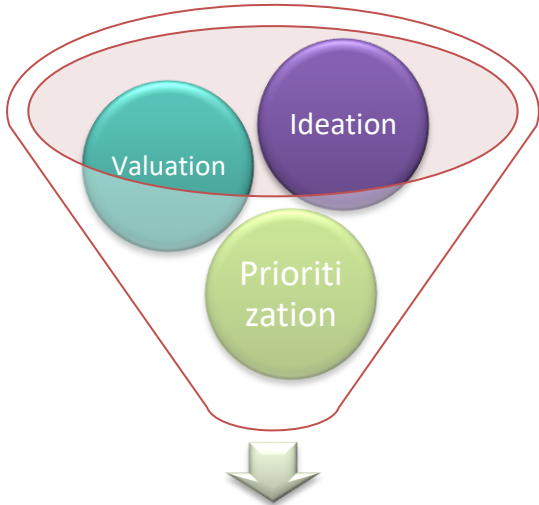


Employee Involvement

- Poster, Slogan and Suggestion Contest
- CFT, SIT, QCC for different mgmt levels

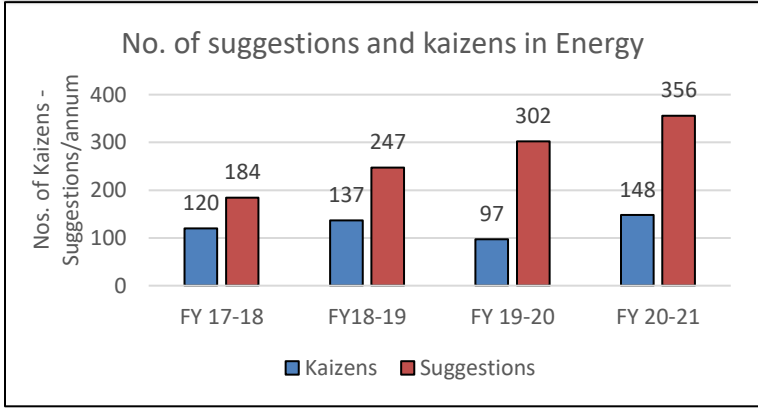
Idea Implementation

- Kaizen awards to implemented Ideas
- Kaizens are horizontally deployed in other areas.



Implementation of Ideas

Horizontal Deployment of Ideas



100 % employee involvement in energy conservation



9. Team work, Employee Involvement & Monitoring

List of Top 10 Kaizens implemented by Supervisors

1. Leakage Reduction and Measurement of Compressed Air in High Consumption Area
2. Eliminating manual control for maintaining flow of Pump and blowers by installing VFD Control system in Frame Plant and Engine Plant for 5 Locations (74 KW)
3. Energy saving circuit in Engine plant machines
4. Energy saving circuit in Frame plant machines (Hyd. Motors)
5. Improve the process of Drain pipe and breather pipe and replace the manual brazing to induction brazing
6. Installation of Automatic packaging machine in out bound logistics area
7. Modification of Toilet water pipe lines (1'' to ½'') in Frame plant
8. Using STP recycled water in Paint shop PT lines & de-sludge pit in place of Raw water
9. Using of DM water in Leak testing Machines in place of soft water
10. Enhancing Heating Cycles of Heat Treatment Fixtures by 38% for Various Components (GPDN, M2, Con Rod, M3 & C4 Gears)

List of Top 10 Kaizens implemented by Workmen

1. Energy consumption reduction by controlling the Cooling Closed Circuit
2. Change conventional taps to mist type taps in admin block toilets for hand wash.
3. Reduction in Frequency of Blower s during non production time.
4. Productivity improvement by developing system for multi models machining in Cylinder head sections manual machines
5. Reduction in frequency of Gas fired oven's HAC fan motor to save fuel in ABS Exp. Bake Oven
6. Water saving by installation of orifice in water taps in wash rooms.
7. Reduction in water consumption by using treated water in Cooling tower.
8. Provision of Occupancy sensor for Dust collector and Fume blowers.
9. Saving of Energy by installing Tool Coolant Flow Control Valve in Robo-drills.
10. Provision of Occupancy sensor for lighting in Store area.

Projects implemented through Kaizens are shown in above list

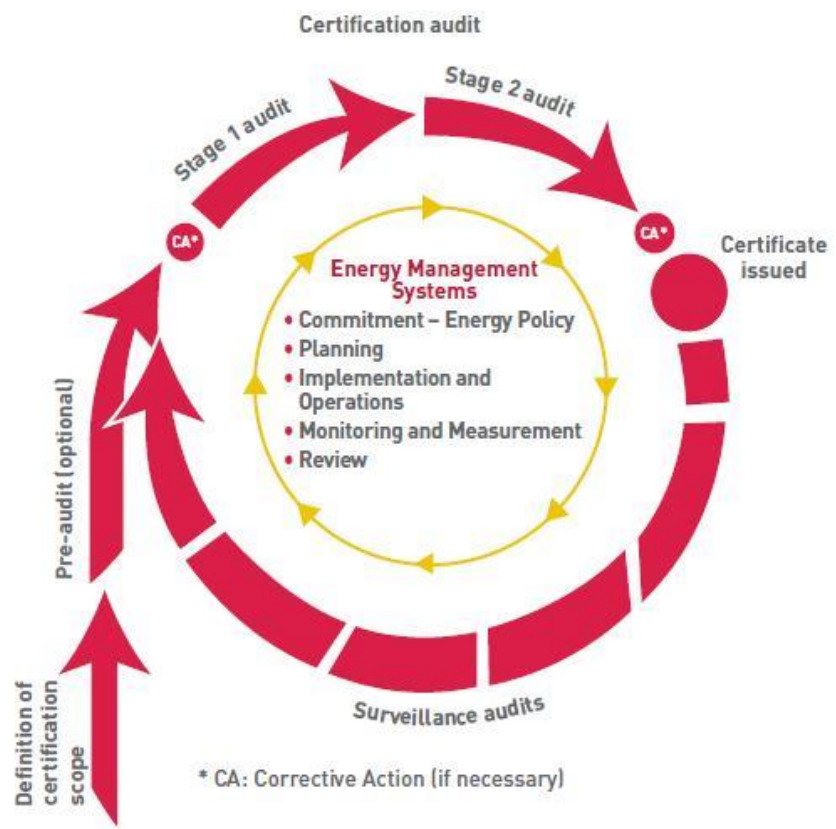
10. Implementation of ISO 50001/ Green Co



HM1D is awarded with Green Company Rating System Gold Award in 2019.

Percentage investment in Green Initiatives of turnover is 0.85 %.

We are also working for certification of ISO 50001



We are Green CO certified company and ISO 50001 certification is under process.



11. Other Innovative projects:- Digitization - Sensor Lab

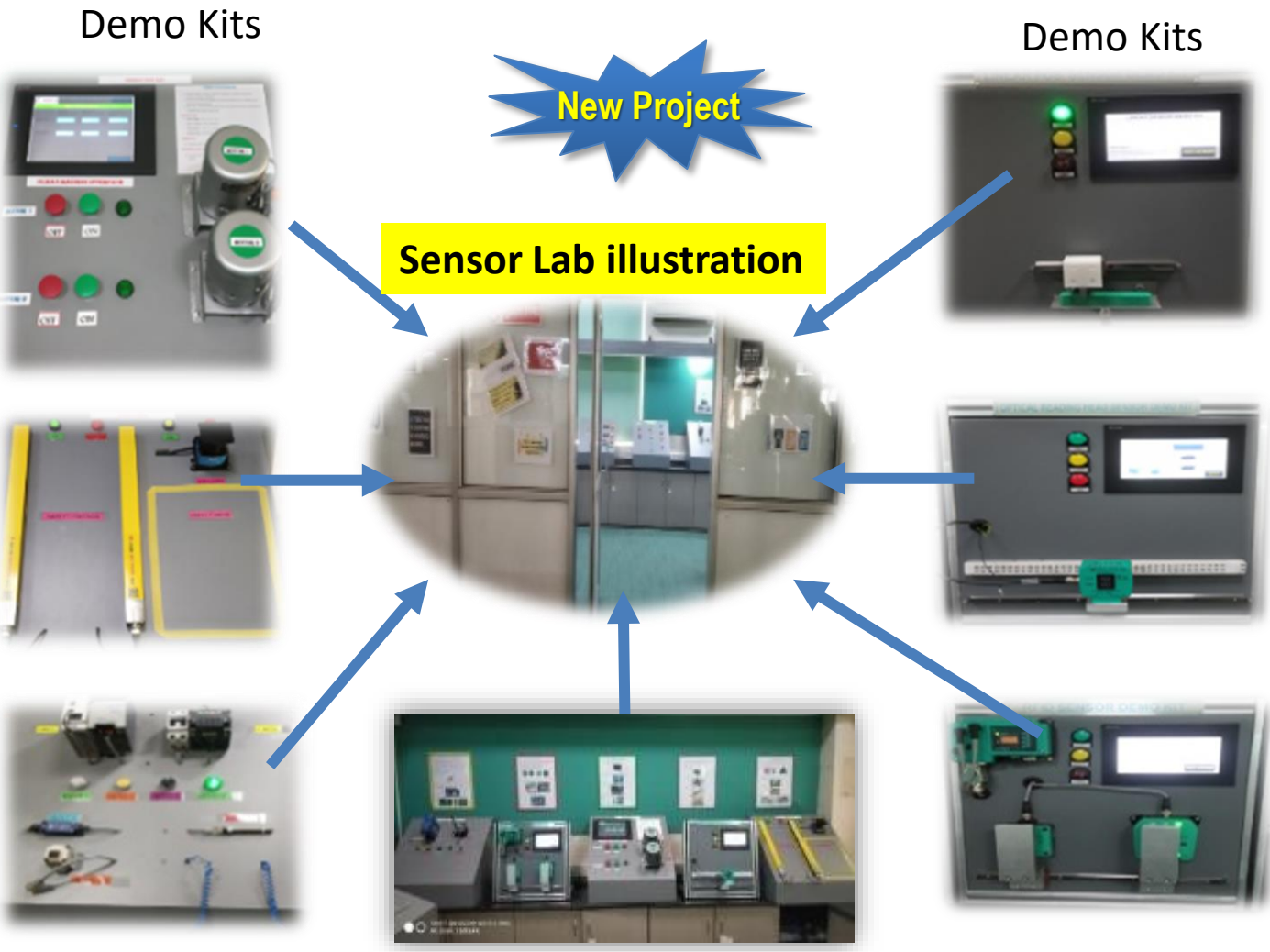
Demo Kits made for

1. Digitization
2. Industrial automation
3. I/O Link Sensor

- Nos. of sensors type – 16
- No. of equipment covered – 400
- QM points covered – 144

Benefits:-

1. Traceability of Component in final product
2. Improved condition based maintenance
3. Safety improvement
4. Mass awareness about latest technologies

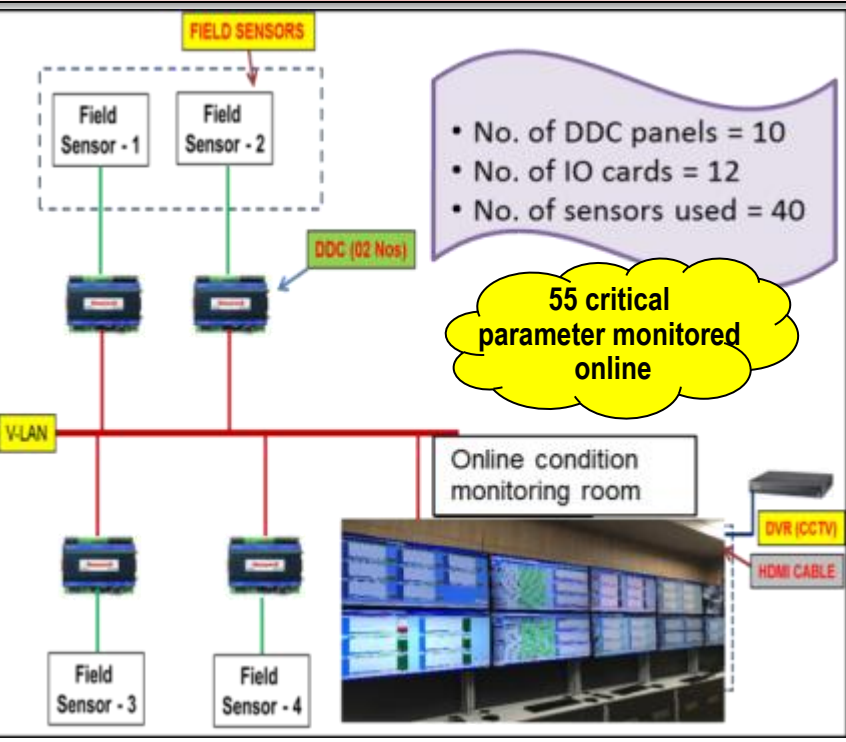


Sensor Lab is created in the Plant as a step forward to digitization



11. Other Innovative projects:- Digitization - Condition monitoring Room

Online Condition Monitoring System



List of Parameters being monitored

Paint Shop -	Vibration of air supply motors & blowers
Utility -	Water level of overhead tanks, Compressed air pressure
UPS -	All Parameters, Voltage, Load, Battery charging status & Temperature
Heat treatment -	Temperature & Vibration

Optimum utilization of assets increase the OEE and leads to energy saving and data for analysis by digitization

Conversion of MDO type breakers into EDO for remote operation

Manual Operation

➔

Remote Operation

Power Change over time reduced from 4 minutes to 2 minutes.

Upgradation of power house ACBs

Smart Control Panel Installation




- IMPROVED SITUATION**
- Availability of Drawings and Manuals
 - Proper Fault identification
 - Easy access to software Logic in case of Major fault
 - History of Breakdowns and maintenance activities
 - List of Spares with SAP Codes
 - Various Maintenance Plans (TBM, CBM, IR).
- Reduction in MTRR by implementing 25 smart panels**

11. Other Innovative projects:- Online Lubrication Management

Digitization – Lubrication management

Online monitoring of Oil Management

Concept



- Real Time Live Recording/Data Feeding on server
- Machine-wise / Area Wise Consumption data.
- Robust Reporting System
- Trend Analysis of consumption
- Filter/ Tank Cleaning/ Leakage/ Testing Report from anywhere as soon as loaded

Process



Checking the Level of Oil through Level gauge.

Oil topping up with color coded Can/Jar for each lubricants used here if required.

QR Code on the back side of the Tag.

The data stored into server

Window for the feeding the data

Scanning the QR Code to feed the Daily work accordingly.

Operational examples



S.S Storage Tank



Color Coded Tags and Leak Tags on Hydraulic System with painting on the Tank

Lubricant Lists	COLOR	Colour Name
Servo Spin-2	Tan	Tan
Servo Spin-32	orange	orange
8 Axis Oil	purple	purple
Servo System 32	Blue	Blue
Servo System 48	Red	Red
Servo System 68	Green	Green
Servo Way 68	black	black
Servo Spin-5	yellow	yellow
Lands Oil	Grey	Grey



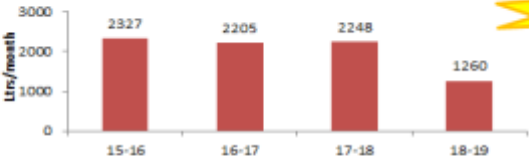
Color Coded Tags with QR Code



3 & 9 Oil Cans and Jars with color coded spouts

Result

Monthly Average Consumption Hydraulic Oils



Year	Consumption (Liters/month)
15-16	2327
16-17	2205
17-18	2248
18-19	1260

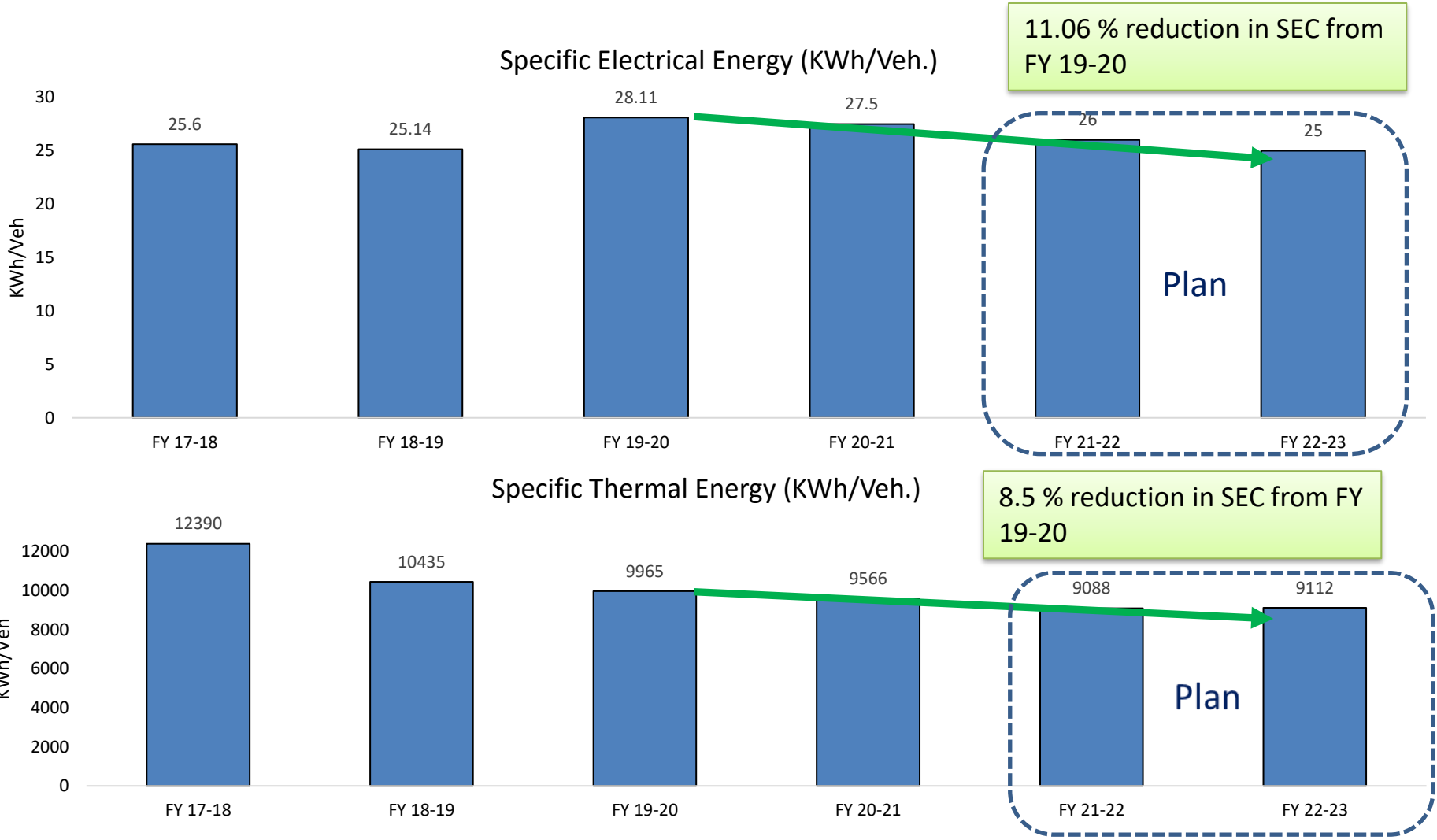
43% Reduction in 2 years

Benefits of TLM Services:

- Documentation System developed for robust reporting and monitoring of lubrication services
- Reservoir Level Checking and Maintaining
- Prepare and Maintain Hydraulic Tank Cleaning Schedule
- Set up an Onsite Testing Laboratory
- Condition based oil filtration
- Condition based disposal of oil

Conclusion: On line monitoring of oil management system reduced the oil consumption by 43% .

12. Long term vision on Energy Efficiency



Target for Specific Energy Consumption is planned upto FY 21-22 as per policy



12. Long term vision on Energy Efficiency:- Future Projects

Category	2021-22	2022-23	2023-24
Technology up gradation	<ul style="list-style-type: none"> Reduction in SEC of Compressor by installation of VFD Compressor Installation of EC+ Fans in Air washers Installation of BLDC ceiling fans for canteen 	<ul style="list-style-type: none"> Installation of pre-cooler(evaporative cooling) before & after air dryer Installation of Energy Efficient Gas fired burners in paint shop Installation of Thermic fluid based cooling system in place of cooling tower in Machine shop 	<ul style="list-style-type: none"> Installation of Heat Pumps in place of heaters of Washing machines Heat recovery from Compressor
Reduce Energy Loss	<ul style="list-style-type: none"> Steam elimination from point and providing alternate source of heating Power Factor improvement at load End <p>Saving potential of 23 Lakh KWH annually with Inv. of INR3.6 Cr. in FY 2021-22</p>	<ul style="list-style-type: none"> Controlling Lighting through SCADA Control Installation of Hybrid power factor at load end. Migration to 66KV state power in place of 33 KV. 	<ul style="list-style-type: none"> Installation of Hybrid power factor at Load End at shops having Low Power factor Aluminium Pipeline for Compressed Air system
Reduce Energy Consumption	<ul style="list-style-type: none"> 5.2 kgf/cm2 and 4.6 kgf/cm2 Improvement in Lighting/Ventilation management system 	<ul style="list-style-type: none"> Centralized compressors for <p>Saving potential of 22 Lakh KWH annually with Investment of INR 4.1 Cr in FY 2022-23</p>	<ul style="list-style-type: none"> Off Grid Purchase of Renewable Energy Installation of VAM Heat recovery from Compressor <p>Saving potential of 25 Lakh KWH annually with investment of INR 3.2 Cr in FY 2023-24</p>
Process Optimization	<ul style="list-style-type: none"> Optimization of process parameter in paint and machine shops. OEE Improvement 	<ul style="list-style-type: none"> Control system * OEE Improvement 	
Operational Control	<ul style="list-style-type: none"> Establishment of Energy Management System Development of Energy saving Culture 	<ul style="list-style-type: none"> Strengthening of Energy Auditing system Establishment of ISO 50001 	<ul style="list-style-type: none"> improvement

List of the Projects to be implemented till FY 23-24 to achieve the target for SEC reduction.



13. Awards and Recognition



HM1D has been awarded National Award for Excellence in Energy Management 2 times in a row, in 2017 and 2018.



HM1D is awarded with Green Company Rating System Gold Award in 2019.

The Certification Agency DNV has awarded our Dharuhera Plant with the Certificates of QUALITY MANAGEMENT SYSTEM (ISO 9001 2015)



The Certification Agency DNV has awarded our Dharuhera Plant with the Certificates of ENVIRONMENT MANAGEMENT SYSTEM (ISO 9001 2015)

Recognition of HM1D in Energy Efficiency, EMS and QMS.



Thank You!

Journey Continues...