25th National Award for "Excellence in Energy Management – 2024"

Kirloskar Oil Engines Ltd., Kagal-Kolhapur

Presented by-

VM Deshpande-Sr. GM Maintenance and Utilities

SP Parab-Sr. Manager-Utilities

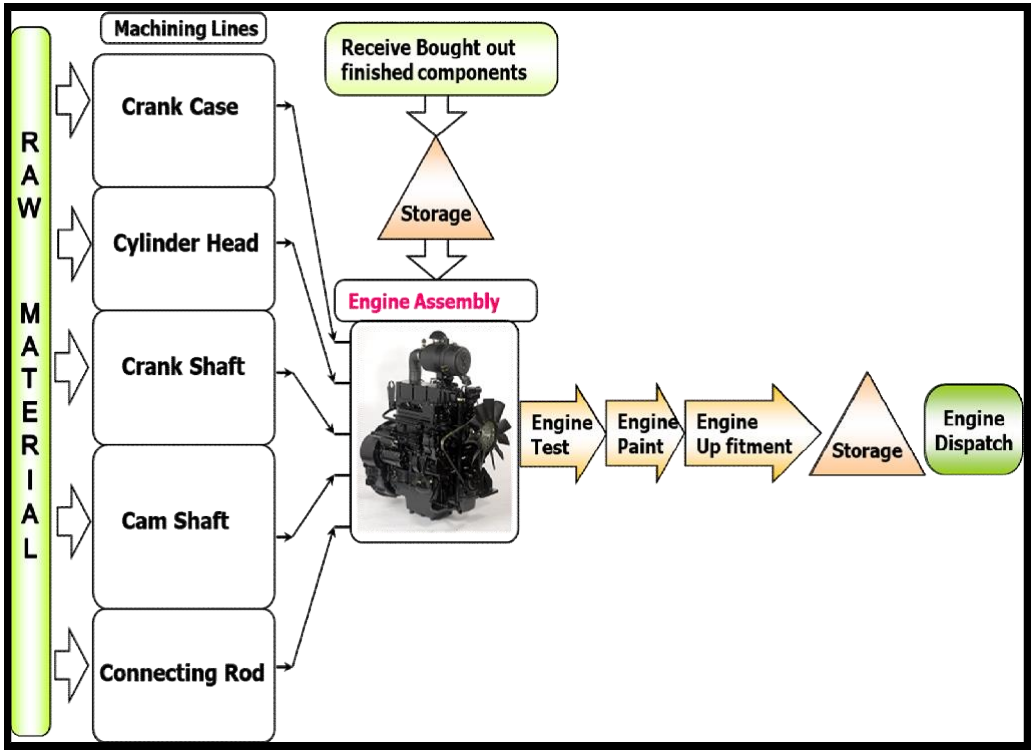
NN Kulkarni-Corporate Energy Manager

Content of the presentation

Kirloskar Oil Engines

- Company profile
- Specific Energy Consumption (Last 3 years FY 21-22 to FY 23-24)
- Information of Competitors, National and Global Benchmarks
- Energy Saving Projects implemented in last 3 years
- Innovative projects implemented 2022-23
- Utilization of Renewable energy sources
- Waste utilization and Management
- GHG Inventorisation
- Green Supply Chain Management
- EMS system and other requirements
- Net zero commitment
- Learning from CII Energy Award or any other award program

Company profile



Product	Product Name	Capacities (2 Shifts Basis)	Range	Application
	Generating Sets with air cooled and liquid cooled engines	1650 / month	5 KVA to 1010 KVA	Power Generation
	DV Engine with 8, 10 and 12 Cylinders	200 / Month	400 HP to 750 HP	
	Liquid Cooled with 1,2,3,4 and 6 Cylinder Engines	4000 / month	14 HP to 330 HP	
	Air Cooled with 1,2,3,4,5 and 6 Cylinder Engines	4000 / month	10 HP to 120 HP	
	Varsha Pump sets	8000 / month	3.2 HP to 5 HP @ 1500, 1800 & 2600 rpm	Agriculture

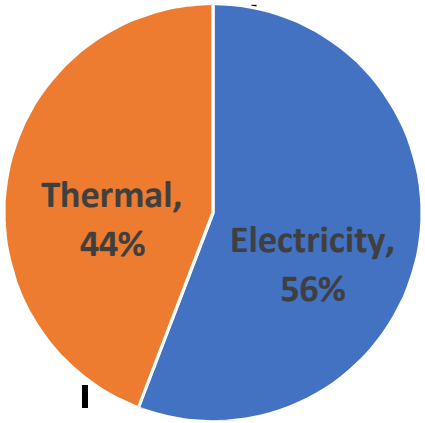
Incorporated in 1946 as a part of the Kirloskar Group of Companies, Kirloskar Oil Engines Ltd. is an engineering conglomerate, founded by the late Mr. Laxmanrao Kirloskar.

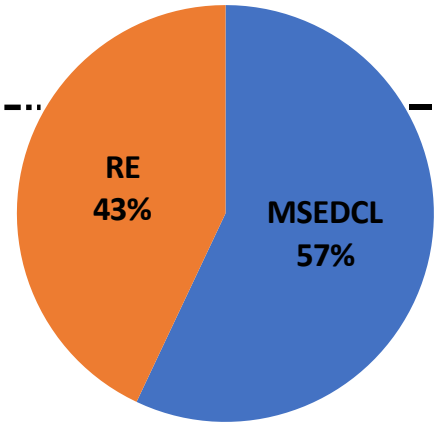
1. **Kagal**
2. **Khadki**
3. **Nashik**
4. **Bhare**

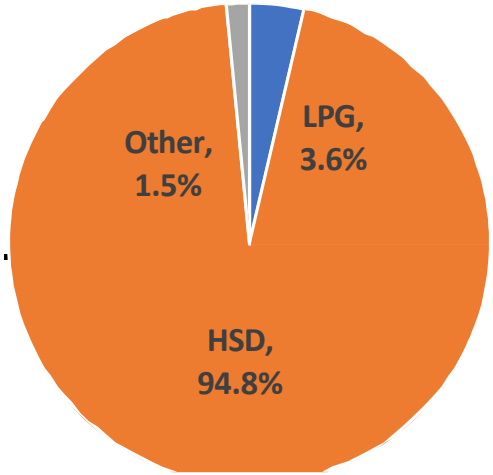
Company profile

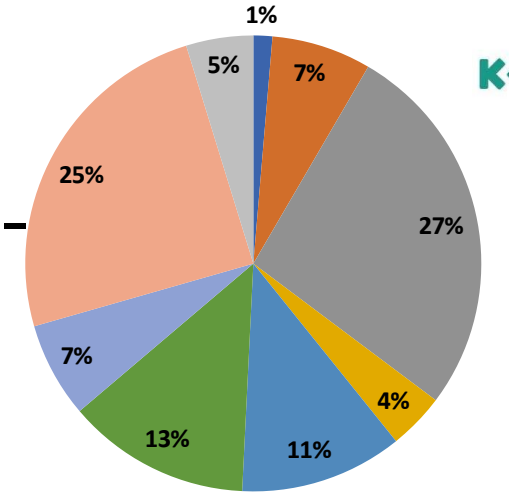
kirloskar Oil Engines

Energy consumption overview



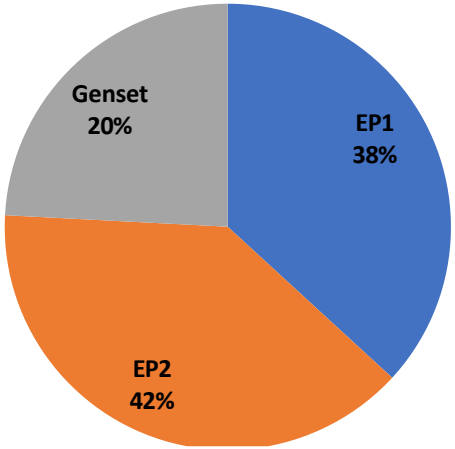






kirloskar Oil Engines

- SE-ATPP
- ME-ATPP
- EP-1 Machine Shop
- Genset
- EP-2 Engine ATPP
- EP-2 Machine Shop
- Fixed Consumption
- Compressor
- Shop Floor Lighting



- EP1
- EP2
- Genset

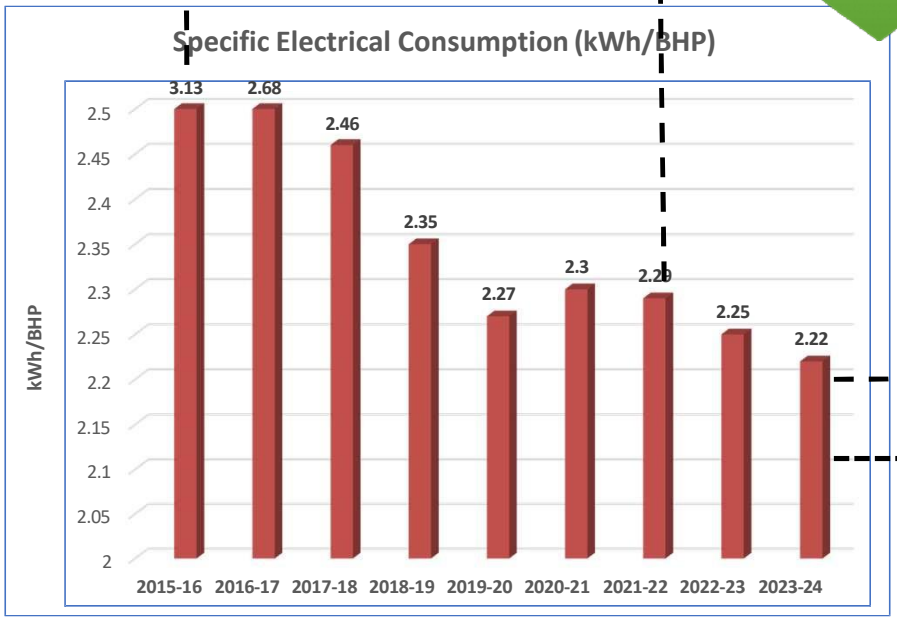
Sp. Energy consumption-Performance

kirloskar Oil Engines

ELECTRICAL

29%

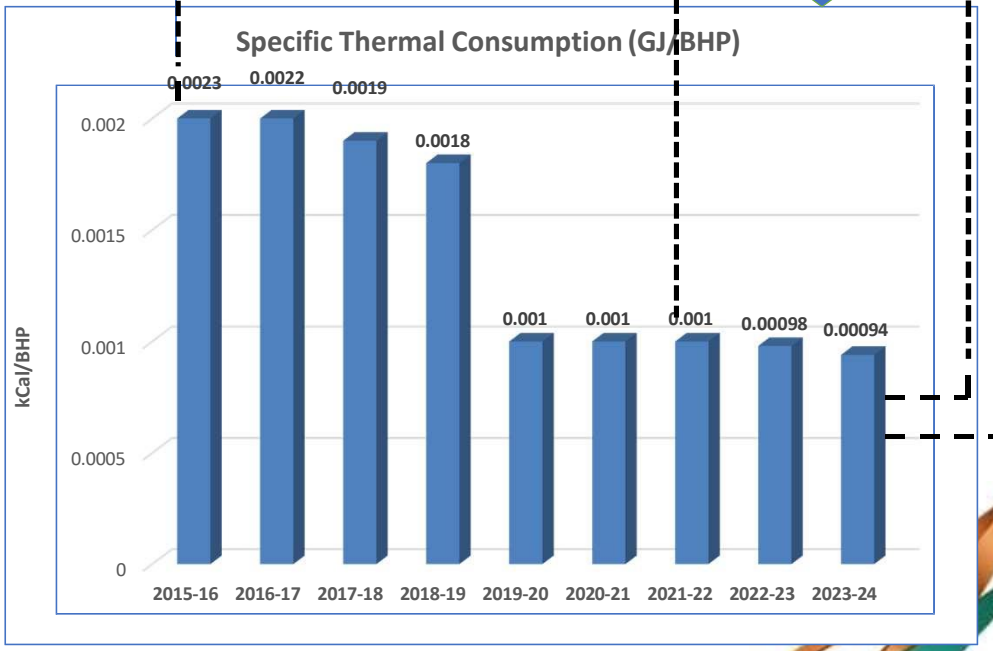
3%



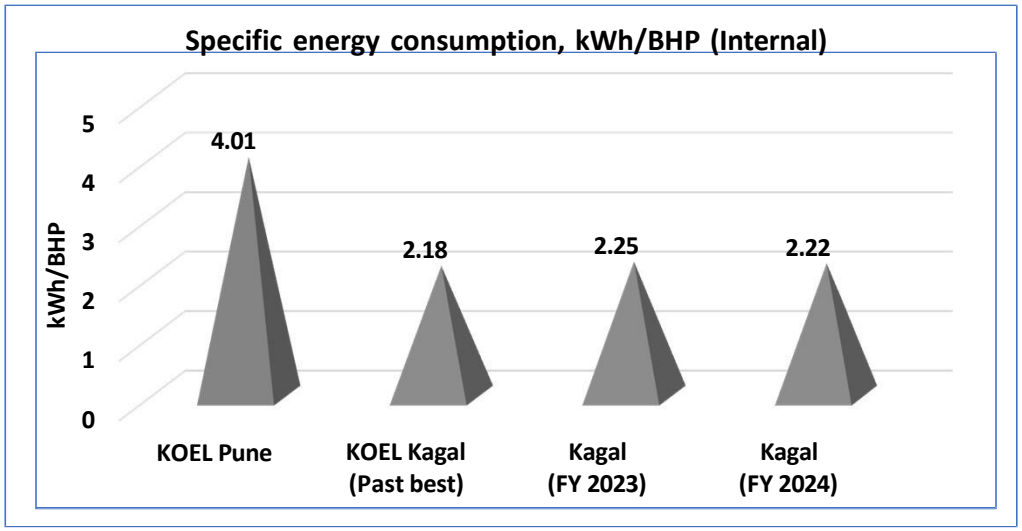
THERMAL

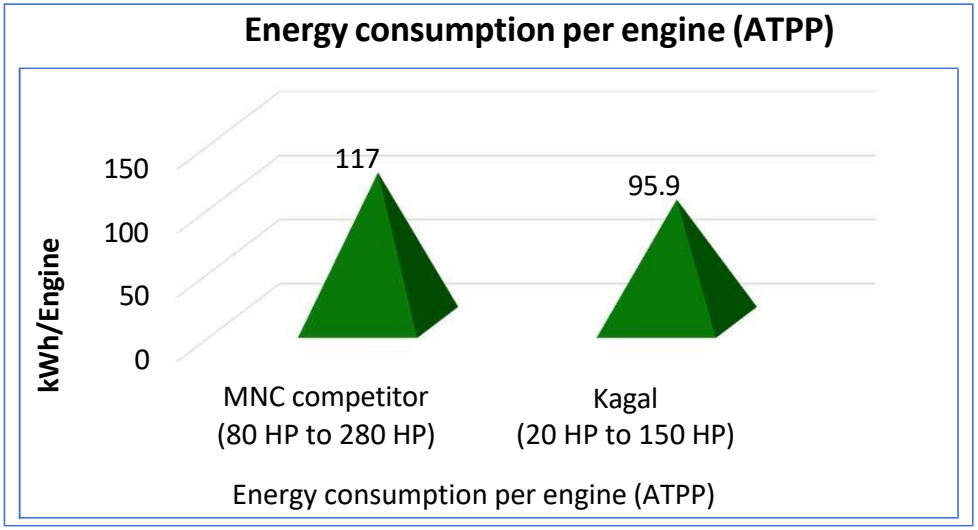
59%

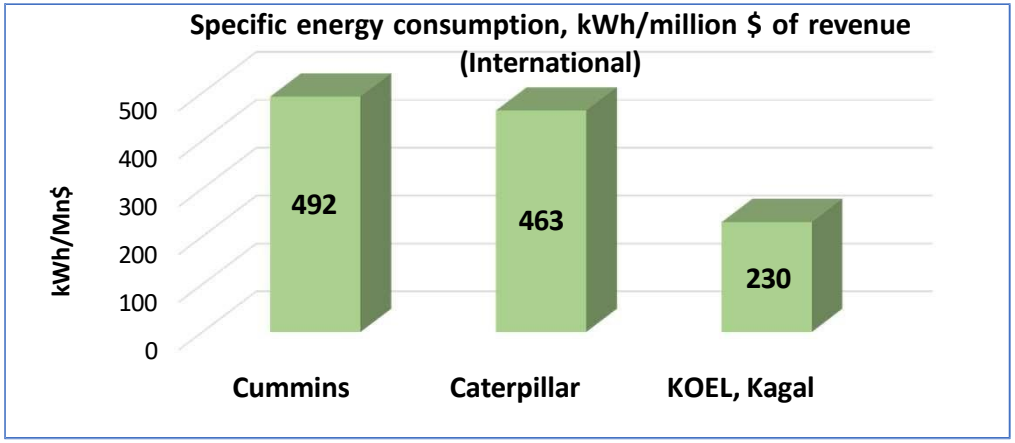
6%



Information of Competitors, National and Global Benchmarks







Energy Saving projects implemented in last three years

Kirloskar Oil Engines

Category of projects implemented	No. of projects	Units saving In lakh kWh	Fuel saving lakh Kcal	Cost saving in Rs. lakhs	Investment in Rs. Lakhs
Low Investment	141	21.7	535.5	212.1	0
Moderate Investment	19	2.1	0.6	59.9	16.6
High Investment	8	75.82	0	738.9	3064.4
Total	168	99.62	536.1	1010.9	3081

Innovative projects

1. Elimination of usage of compressed air through Karakuri kaizen

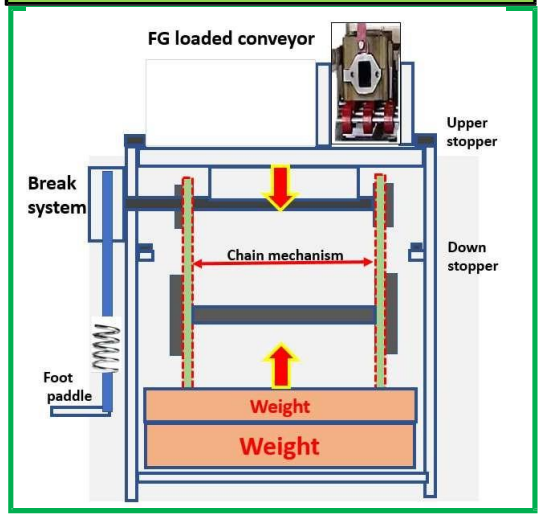
SBU: Kagal Plant	Department: EP-2 Machine shop	Plant / Office Location: (WHERE) R810 Cylinder head line	Name of Contact Person & Contact Details: (WHO) Mr. Umesh D Kumbhar (9011017617)

Name / Title of the Practices: (WHAT)	Purpose of the Practices: (WHY)	Completion Date: (WHEN)
Powerless out put components handling conveyor	ZERO Energy management system for handing of FG cylinder heads	15 July 2023

Description of Initiative's/Practices: (HOW) Process Flow / Schematic Diagram / Before & After Photos :- Elimination of pneumatic cylinder by providing POWERLESS concept with Gravity-Weight-Break mechanism through KARAKURI kaizen under the ZERO energy management system

BEFORE - Operator use pneumatic system to lift down FG cyl heads on out put conveyer & lift up the empty FG try to align with output conveyer for handling of FG cyl heads

AFTER - Powerless easily hand operated Gravity –weight – break mechanism conveyer established for handling FG cylinder heads



Results Achievement: -Total Rs 4.17 Lakhs Power cost saved per annum	Scope for Horizontal Deployment: - NA (Due to it's unique location)

Innovative projects

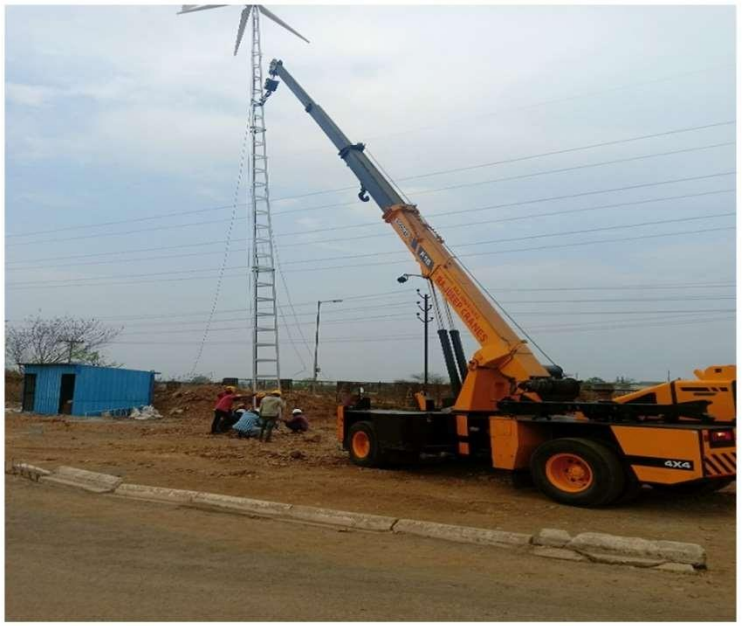
2. Solar operated battery charging station

Results:

- ✓ System designed capacity 15 kWp@ 64 kWh per day
- ✓ Inverter capacity 15 kVA.
- ✓ Two forklift charge at a time
- ✓ Carbon offset -15 tons/annum

Innovative projects

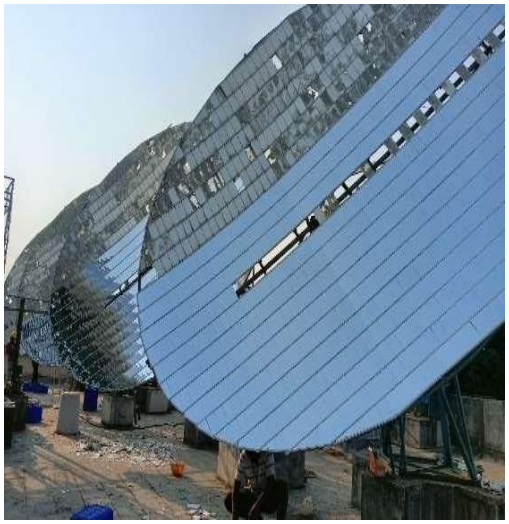
3. Installation of 30 kW Windmills



Results:

- ✓ Capacity- 5.1kW
- ✓ Qty- 6 Nos.
- ✓ Approx. unit generation average 43200kWh/ Year
- ✓ Annual cost benefit Rs- 432000/year
- ✓ Carbon offset -40 tons/year

Utilization of Renewable energy resources



- Captive Solar Power Plant-8.18 MWp
- Micro wind turbines- 30kWp
- Solar Battery Charging station-15kWp
- Solar Steam generator (Parabola)- 350 kgs/day
- Biogas and generator- 300kgs/day and 12 KVA
- Solar Pumping system-15kW
- Solar street lights-400 nos.
- Solar hot water generator-1500 ltrs/day
- E- buggy & E- bike for internal movement
- Installation of organic waste converter

Utilization of Renewable energy resources

Source	Mechanism	2021-22	2022-23	2023-24
Captive solar Plant (8.2MWp)	On-site	5805352	6925381	9024083
Third party OA	Off-site	0	0	403646
% Share of RE	WRT baseline consumption	32%	38%	52%

Even after stringent Government norms, KOEL managed to avail third party energy purchase under open access mechanism.

This has resulted into saving of Rs.6.87 Cr.

Waste utilization and Management

Type of waste	Source of generation	Destination of disposal
Paint Sludge (MT/Yr.)	Paint Booths	CHWTSDF/Authorised recycler
ETP sludge (MT/Y)	ETP/STP	CHWTSDF
Phosphate Sludge (MT/Yr.)	Genset pretreatment	CHWTSDF
Waste Powder, Rockwool, Waste Glass tissue paper	Genset	CHWTSDF
Waste and Used oils (KL/Y)	Engine Testing, Coolant Preparation, Maintenance, Material Handling	CHWTSDF/Authorised recycler
Used/ Scrap Batteries (Kg/Y)	Material Handling Equipment's	Authorised Recycler
Kitchen/food waste	Factory	Biogas plant, Bio-methanation, Biogas generator
Wooden Scrap (MT)	Engine packing	Authorised Vendor
Rubber /Plastic (MT)	Engine packing	Authorised Vendor, Waste plastic to fuel plant
Grinding Dust (MT)	Grinding Operations machine shop	Authorised Vendor

Kirloskar Oil Engines

S.No	Type of Hazardous Waste	Quantity FY 2021-22	Quantity FY 2022-23	Quantity FY 2023-24	Units
1	Used/ Spent Oil, Waste Oil	201.18	243.575	280.35	KL/A
2	Oil Soaked cotton waste	31.54	43.89	55.24	MTA
3	Wastes or residues containing oil	12.24	0.00	0.00	MTA
4	Phosphate sludge	9.32	8.43	6.4	MTA
5	Contaminated Sludge	0.03	0.06	0.07	MTA
6	Paint Sludge	82.73	75.92	87.69	MTA
7	Waste Epoxy powder	9.97	7.11	8.08	MTA
8	Waste Rockwool/glass tissue paper	5.33	6.84	5.11	MTA
9	Discarded liners contaminated with powder	0.00	0.00	0.00	MTA
10	Grinding Wheels	0.48	2.00	1.15	MTA
11	Waste softner resins	0.00	0.22	0.0	MTA
12	Discarded contaminated drums, empty aerosol bottles	11150.00	11616.00	13764.00	Nos/A
13	ETP sludge	62.57	47.18	56.16	MTA
14	Lead acid batteries	8.07	4.09	3.95	MT/A
15	Used Tubelights/Bulbs	0.39	0.21	0.29	MTA
16	E-Waste	1.88	1.49	0.0	MTA

Waste utilization and Management

Sr. No.	Name of Waste Utilized	FY 2022-23	FY 2023-24	UOM
1	Used Oil	160.09	243.5	KL/A
2	Bio-methane from waste food	7058.28	5537	m3/A
3	Fuel from plastic waste	5.3	10.2	KL/A
4	Organic compost from OWC	1.708	4.4	T/A

Organic Waste Converter

Use of Plastic fuel for burners and material handling equipment

Use of Bio-methane for electricity generation

GHG Inventorization

Carbon Foot Print Report Data - **Kagal-1** Plant

Sr. No.	Source	Scope	Unit	Consumption			GHG Emission (tco2)		
				FY21-22	FY22-23	FY23-24	FY21-22	FY22-23	FY23-24
1	HSD	1	kl	1,348.00	1,642.00	1,635.00	3,539.31	4,219.94	4,201.95
2	LPG	1	kg	1,90,285.00	1,86,552.00	43,500.50	570.86	546.60	127.46
3	FO	1	kl	73.14	-	-	217.88	-	-
4	Compact Natural Gas (CNG)	1	SCM	-	-	1,79,743.00	-	-	338.81
5	CO2 for cutting	1	kg	-	-	-	-	-	
6	CO2 for welding	1	kg	-	-	-	-	-	
7	CO2 in fire extinguisher	1	kg	-	-	-	-	-	
	Total Scope 1 =						**4,328**	**4,767**	**4,668**
	Scope 2								
1	Electricity Purchased	2	kWh	1,12,23,809	1,26,26,398	1,25,02,586	10,241	10,354	10,252
	Total Scope 2 =						**10,241**	**10,354**	**10,252**
	Offset								
1	Electricity Renewable		kWh	58,05,352	69,25,379	94,27,729	5,297	5,679	7,731
2	Biogas		m3	3,713	6,171	5,537	7	12	10
3	Solar		kg of steam	3,506	-	9,589	0.00	-	1.94

GHG Inventorization

GHG Emission Sources - Scope1

LPG

1. LPG Bank used for process

HSD & FO DG sets

CO2 fire extinguishers

Fork Lifts – HSD Consumption for internal material handling

Engine test beds – test beds at ME,SE,HHP ATPP & GENSET shop consumes HSD during testing of engines

GHG Emission Sources- Scope 2

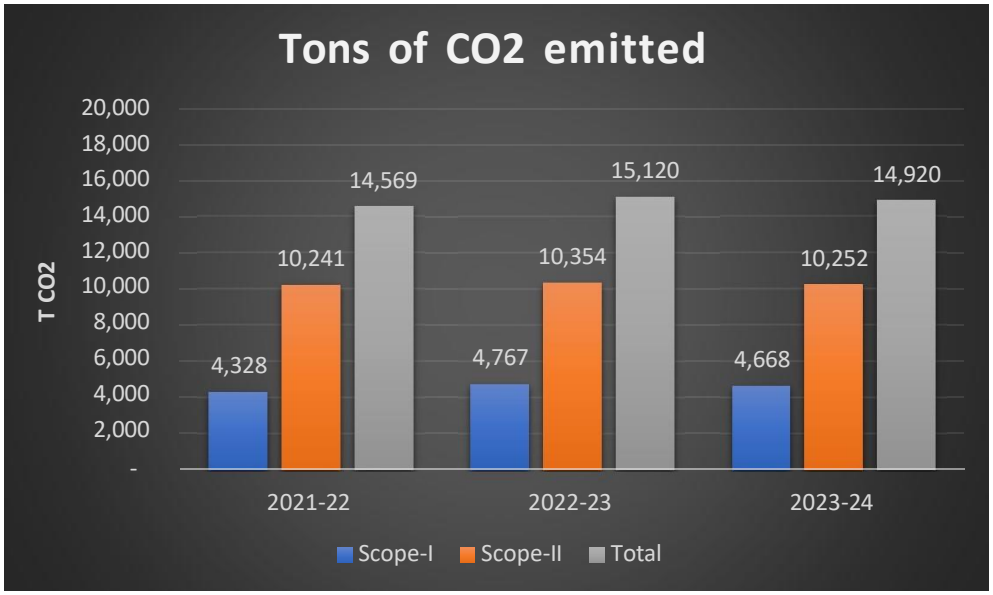
GHG Emission Sources - Scope3

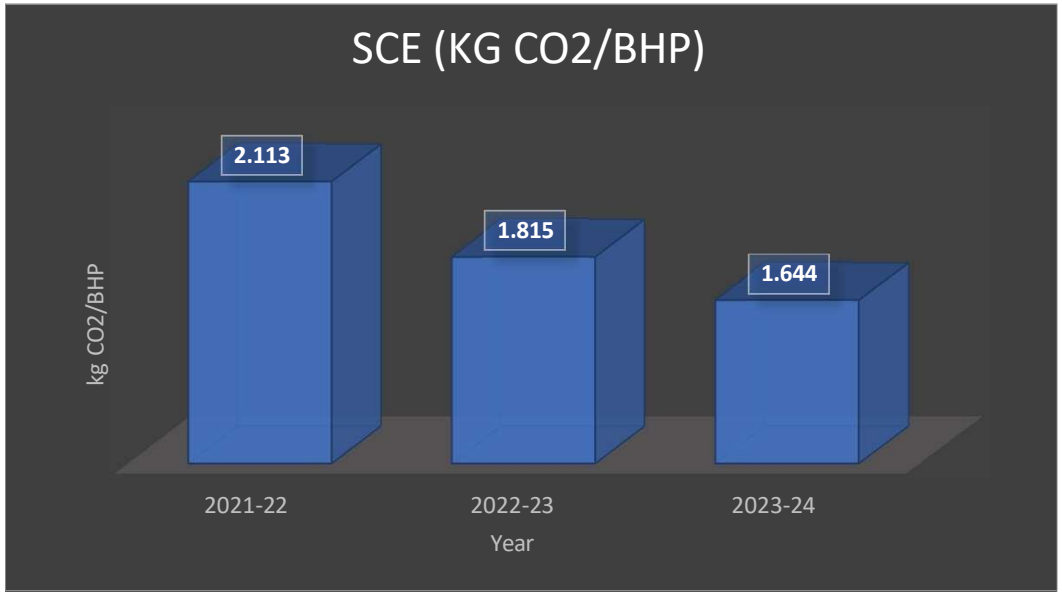
Employee commute to workplace Transportation of employees between their homes and their worksites – 49 and 27 seater buses

Employee business travel (Data of cabs booked through company, flights, rail etc.)

T&D losses (for electricity purchased)

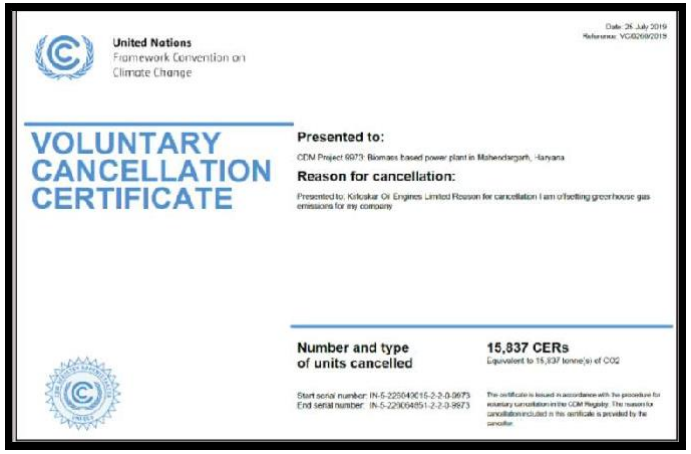
GHG Inventorization





Location	Tons of CO2 emitted		BHP		kgs of CO2 emitted/BHP		
	FY 22-23	FY 23-24	FY 22-23	FY 23-24	FY 22-23	FY 23-24	Reduction
Kagal	15120	14920	83,29,536	90,74,399	1.82	1.64	9%

GHG Inventorization - Initiatives



United Nations
Framework Convention on
Climate Change

VOLUNTARY CANCELLATION CERTIFICATE

Presented to:

CDM Project 6973: Biomass based power plant in Mahendergarh, Haryana

Reason for cancellation:

Presented to: Kirloskar Oil Engines Limited Reason for cancellation I am offsetting greenhouse gas emissions for my company

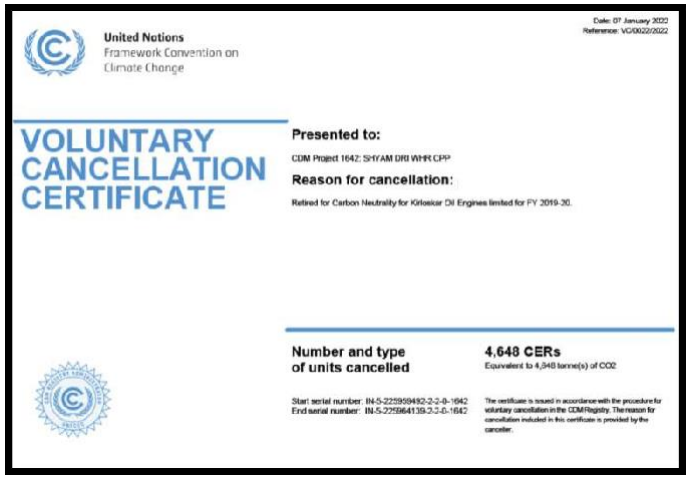
Number and type of units cancelled

15,837 CERs

Equivalent to 15,837 tonne(s) of CO2

Start serial number: IN-5-225040615-2-2-0-9673
End serial number: IN-5-225094851-2-2-0-9673

The certificate is issued in accordance with the procedure for voluntary cancellation in the CDM Registry. The reason for cancellation included in this certificate is provided by the canceller.



United Nations
Framework Convention on
Climate Change

VOLUNTARY CANCELLATION CERTIFICATE

Presented to:

CDM Project 1642: SHYAM DRI WHR CPP

Reason for cancellation:

Retired for Carbon Neutrality for Kirloskar Oil Engines limited for FY 2019-20.

Number and type of units cancelled

4,648 CERs

Equivalent to 4,648 tonne(s) of CO2

Start serial number: IN-5-225959492-2-2-0-1642
End serial number: IN-5-225964139-2-2-0-1642

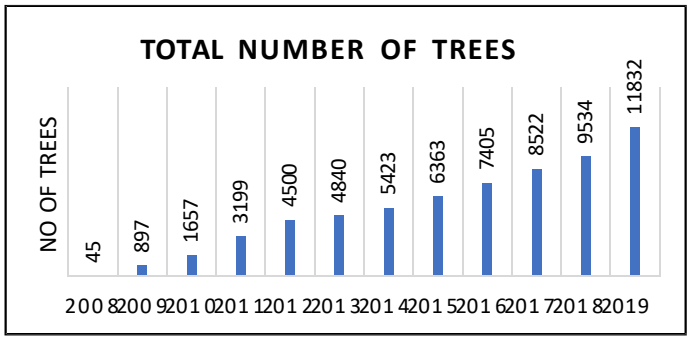
The certificate is issued in accordance with the procedure for voluntary cancellation in the CDM Registry. The reason for cancellation included in this certificate is provided by the canceller.

Carbon neutral certification for consecutive 2 years

kirloskar
Oil Engines

Total Carbon Stock in trees of KOEL, Kagal campus is 61.47 tons.

Carbon sequestered through vegetation is 1.22 tons per year.



Recommendations from Carbon Sequestration study:-

Key indigenous species such as Ficus religiosa (Pimpal), Ficus benghaensis (Vad), F.racemosa (Umbar), Tamarindus indica (Chinch) will help sequestering more amount of carbons in future.

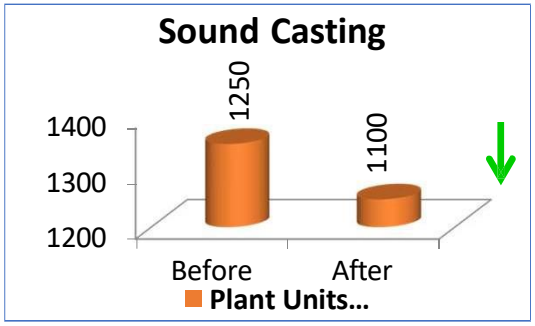
Carbon Sequestration Study

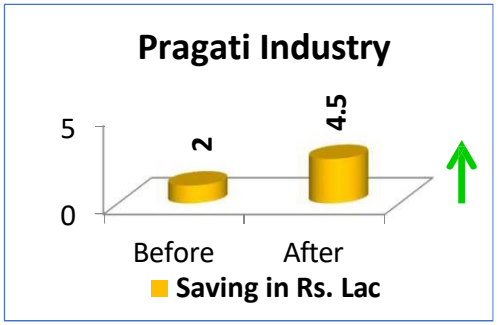
Green supply management

Kirloskar Oil Engines

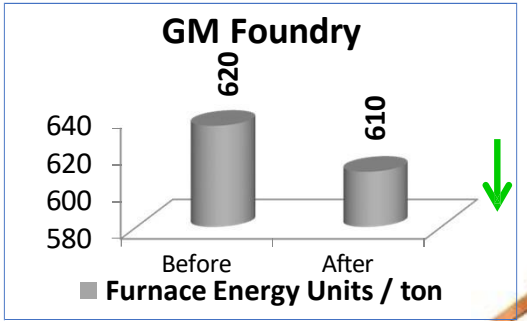
Make or Buy	Supplier Base	Supplier Quality	Supplier Engagement	Commodity Strategy

• Decision on Product Platform
• Outsourcing of Components
  • Sub Contracting
  • Finished parts
• O/S of Products
• O/S of In House Parts
	• Location
	• Certification
	• Infrastructure
	• Technology
	• Payment Terms
	• Freight
	• After Market
		• PPM reduction
		• Supplier Processes Improvements
		• Process and Product Audits
		• PPAP approvals
		SCM Policy
			• Supplier Conference
			• Quarterly Communication
			• Monthly Score Card
			• Supplier Training
			• Supplier Survey
			• Quality Contest
				• Industry Analysis
				• Commodity Source Plan
				• Dual Sourcing
				• Supplier Rationalization
				• Risk Mitigation & Financial Analysis



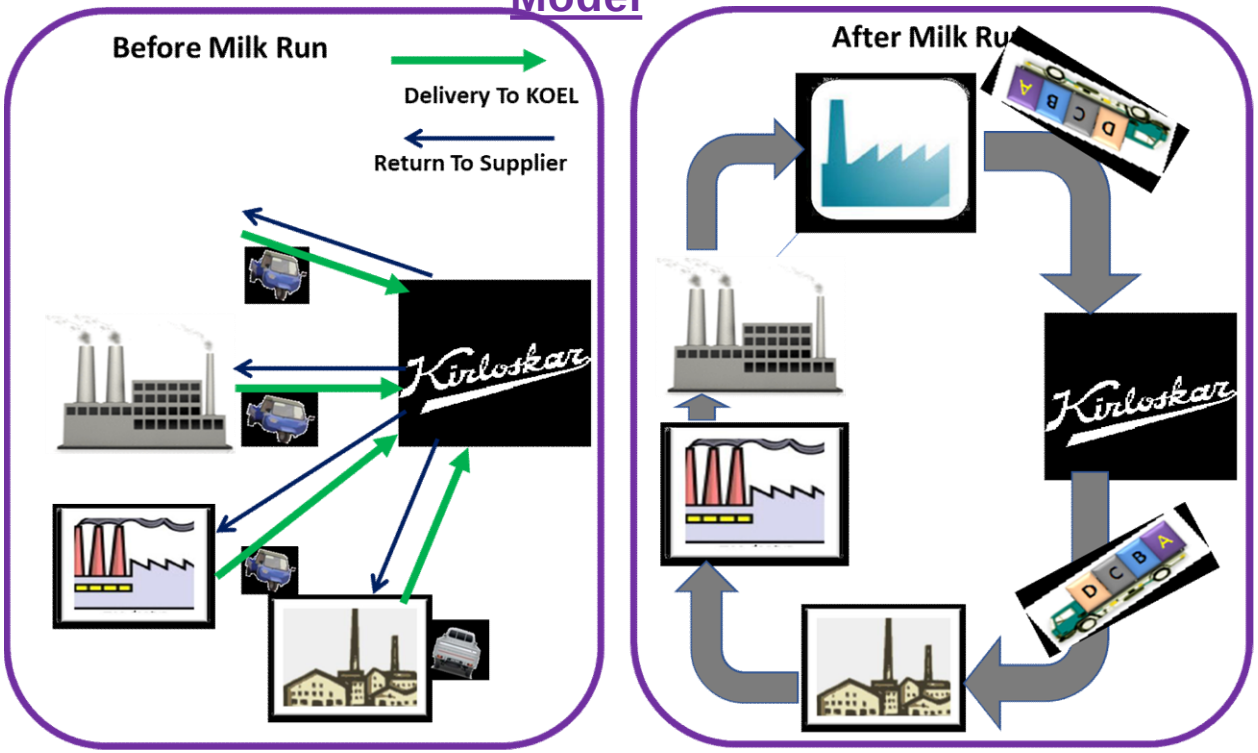


• KOEL Investment • Amortization • Capitalization • Upkeep & Maintenance	• Price Approval Process • 8 Levers of Cost Reduction • Capturing Cost Reduction	• Material Planning • Ordering • TOC-Consumption based Procurement • Material Handling • Packaging • Milk Run	• Requirements at Supplier end • OSHAS compliance • Child Labour • Hazardous Material Handling • Waste Disposal



Green supply management

Milk Run - Model



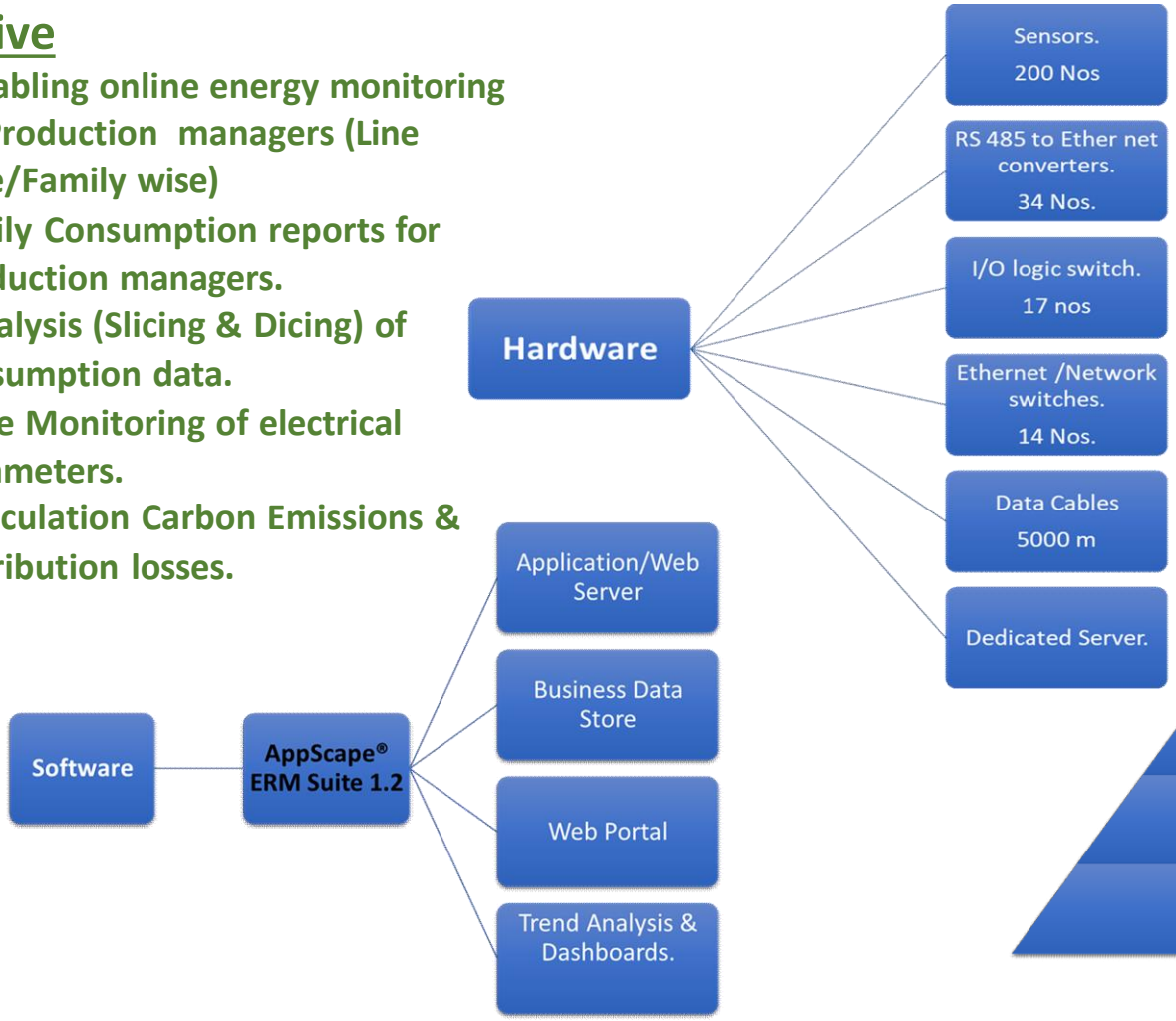
Benefits

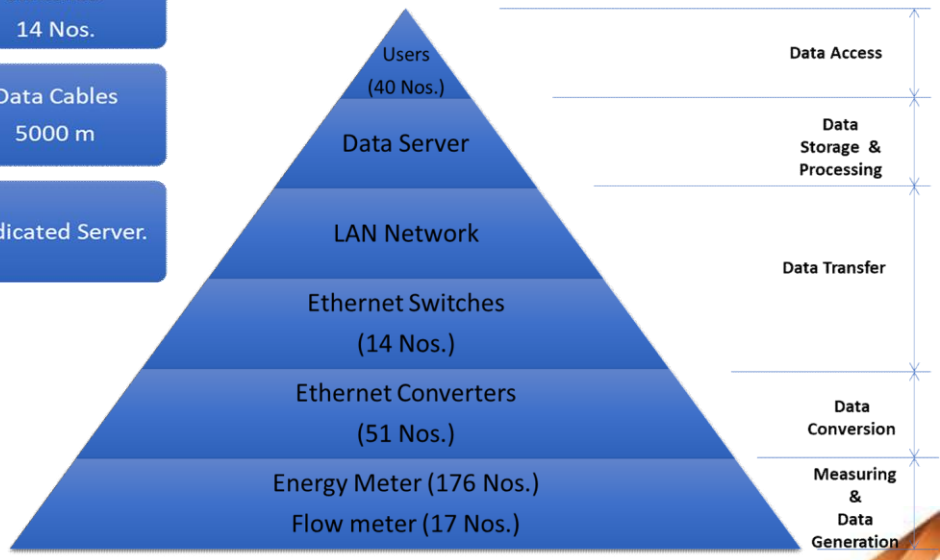
- Earlier Traffic Incoming Avg. 77 vehicle entries/day. - Aprox. 21% reduction
- Earlier Avg. monthly Diesel Consumption 2200 ltrs. - Approx. 12% reduction
- Reduction Freight Payment by 4.13 Crs in last three years. - Avg. 13.8 % reduction per year.
- Advance information Proactive alerts.
- Reduced personal visits .
- Defined accountability & Responsibility.
- Improved relationship .

EMS system and Other requirements

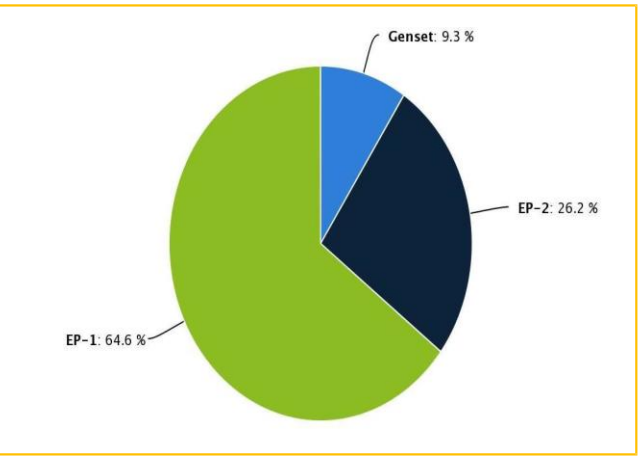
Objective

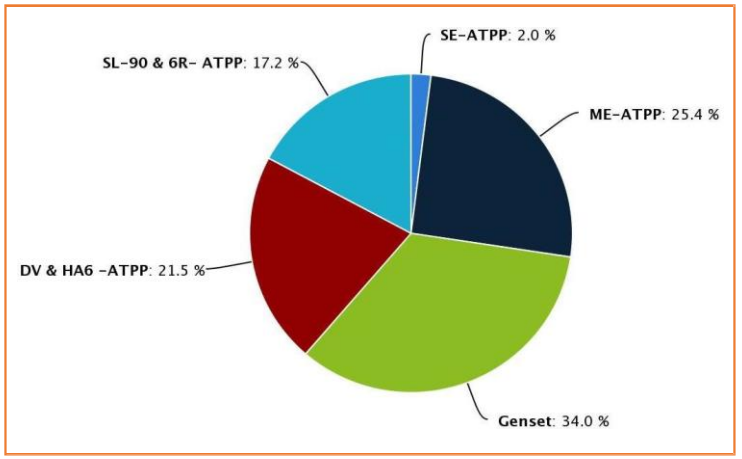
- Enabling online energy monitoring by Production managers (Line wise/Family wise)
- Daily Consumption reports for Production managers.
- Analysis (Slicing & Dicing) of consumption data.
- Live Monitoring of electrical parameters.
- Calculation Carbon Emissions & distribution losses.

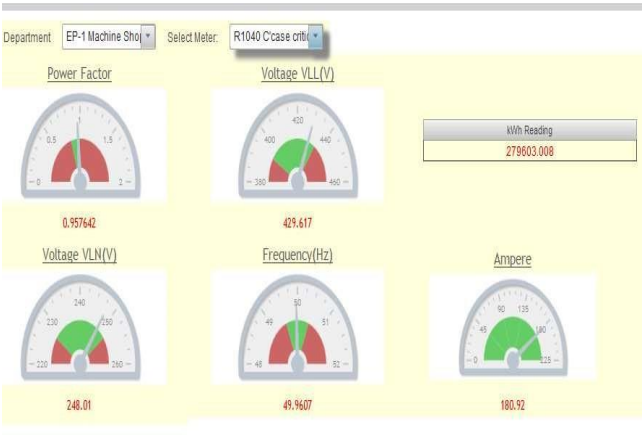


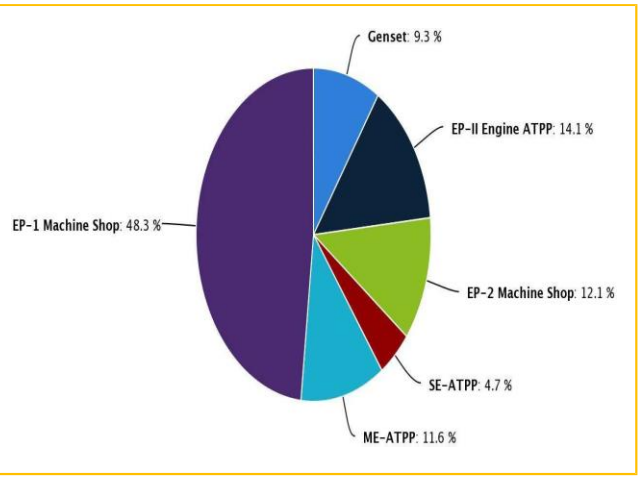


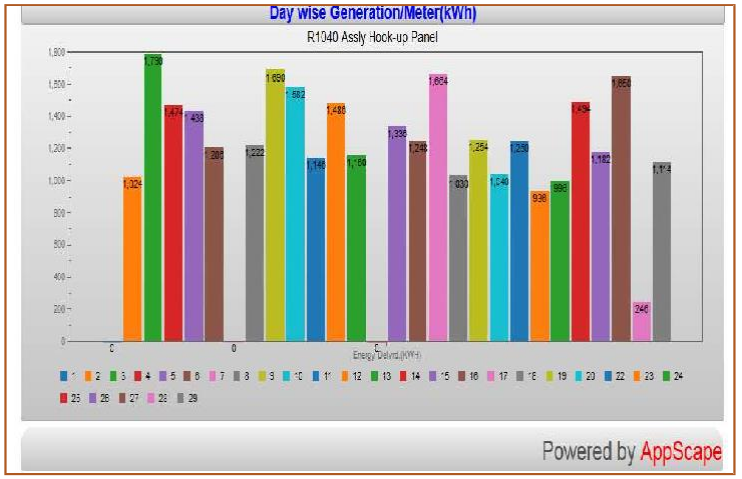
Data Analysis from EMS system

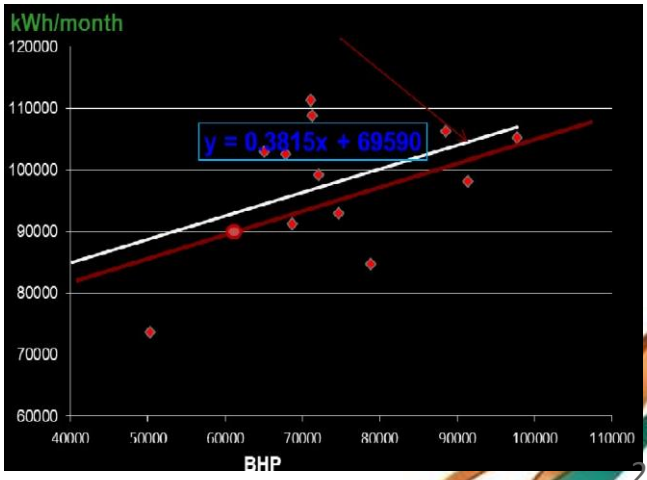












Net zero and Roadmap

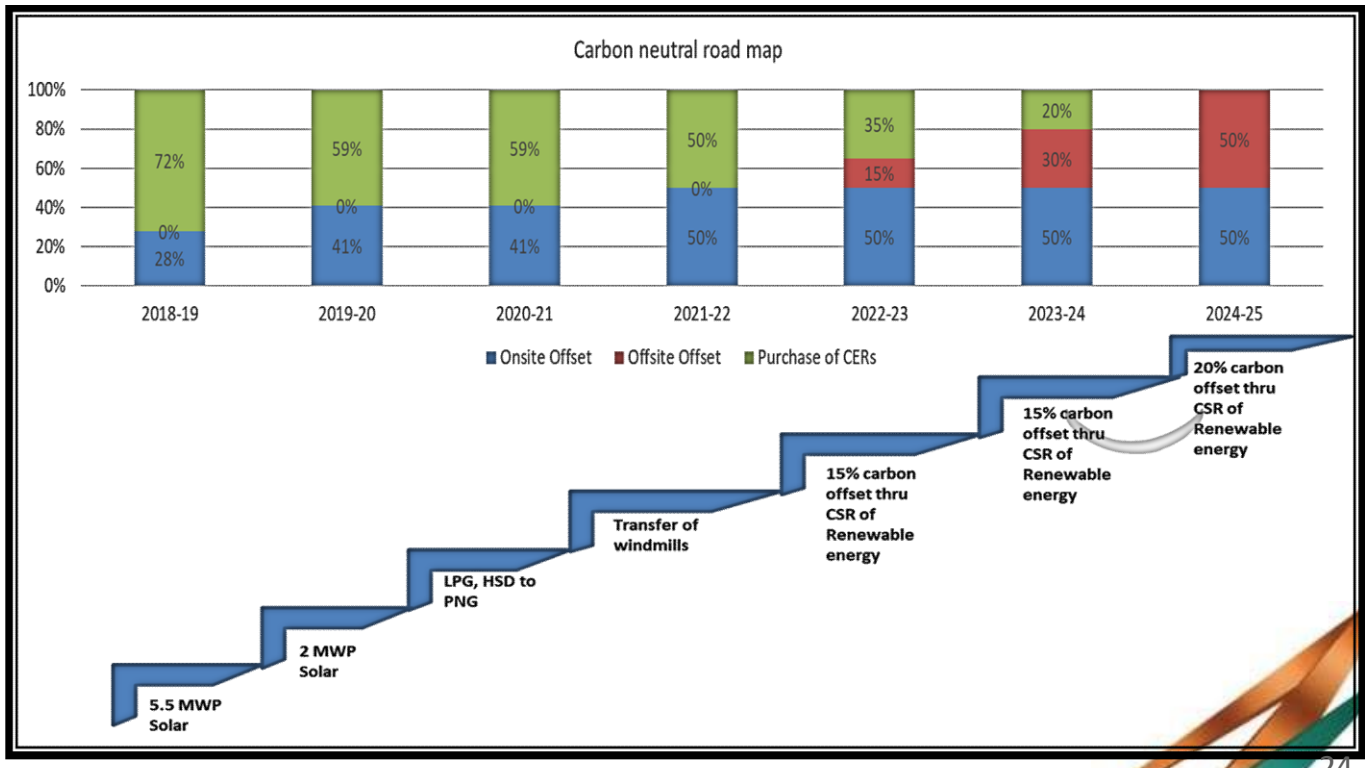
- Net zero commitment year- 2030
- EP-100 commitment-Implementation of EnMS (ISO 50001:2018) by 2024, Double energy productivity

KOEL Kagal certified carbon neutral operations for 2018-19

Published on September 25, 2019 Edit article | View stats

Pravin Jadhav
Sustainability, ESG, CSR, CO2 footprint & reduction | 7k+ connections
7 article

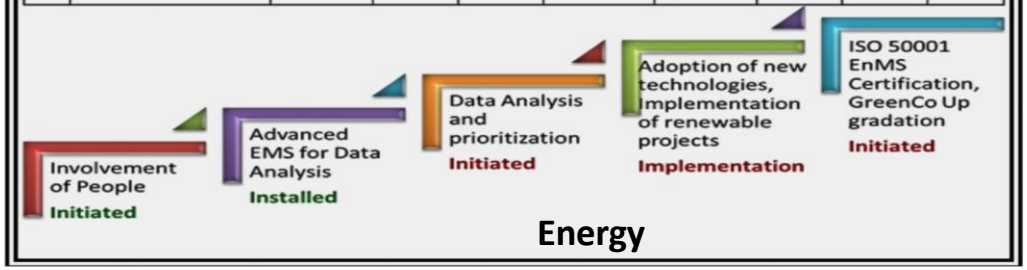
Kirloskar Oil Engines Limited (KOEL) is a leading engineering conglomerate, manufacturing internal combustion engines, generating sets and parts. Its largest manufacturing plant in Kagal, Kolhapur has been certified for carbon neutral operations in 2018-19 as per PAS 2060. Publically Available Specifications, PAS 2060 by BSI, 'Specification for the demonstration of carbon neutrality' was used to declare a Qualifying Explanatory Statement in consultation with RSM GC Advisory Services. RINA Services S.p.A. has provided



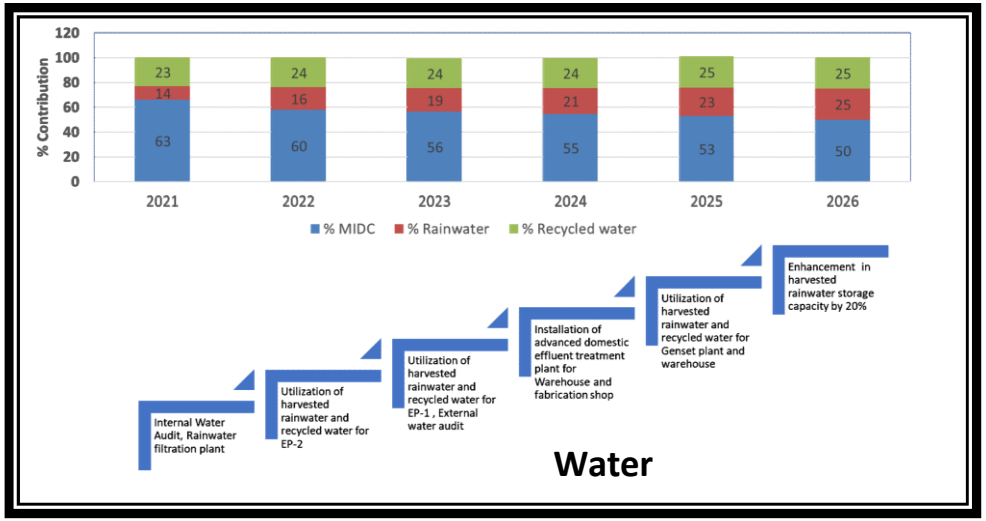
Roadmaps for the future…

Kirloskar Oil Engines

Sr. No	Specific Energy Consumption	Present Status (kWh/BHP)			Short term target for specific Energy Consumption reduction		Long term target for specific Energy Consumption reduction		
		FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY23
1	Specific Energy Consumption	3.25	2.68	2.46	2.39 (3% Reduction)	2.32 (3% Reduction)	2.20 (3% Reduction)	2.10 (5% Reduction)	2.00 (5% Reduction)



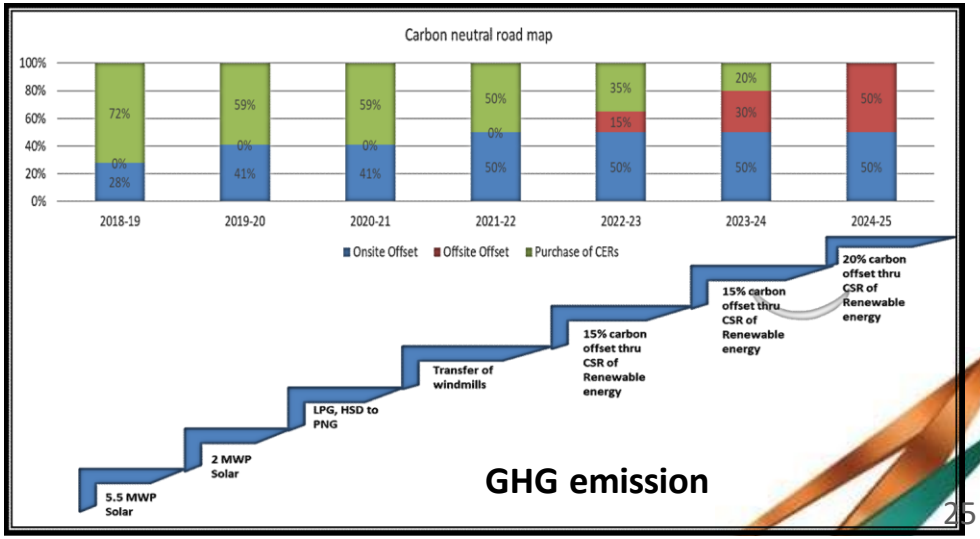
Energy



Water

Projects to achieve the Target	Units to be substituted in Lakh kWh	% Contribution	Financial year							Status
			2018	2019	2020	2021	2022	2023	2024	
5.5MWp Captive Solar Power Plant	75	48								Completed
Installation of Wind ball	0.10	0.10								Completed
Installation of Solar Pumps	0.10	0.10								Completed
Solar Charging system for battery operated vehicles										
Solar steam cooking for central kitchen										
2.16MWp Solar Power Plant	24	27								Completed
Transfer of windmill	12	13								In process
Substitution of Thermal energy with renewable energy	2	2								In process

Renewable Energy



GHG emission

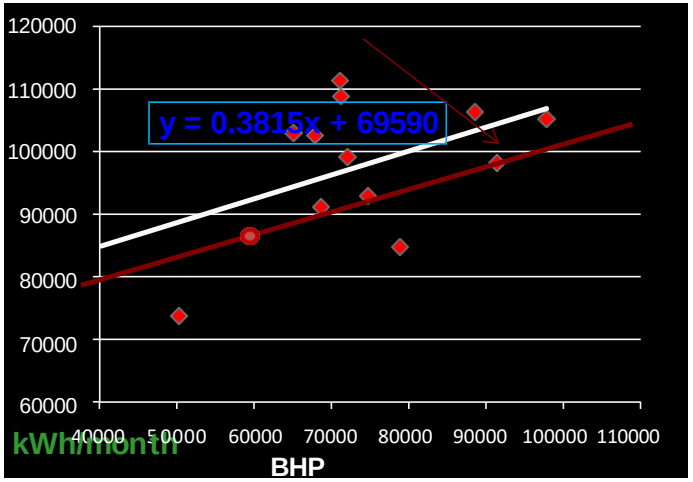
Implementation of GreenCo/IGBC/ISO 50001 rating

"GreenCo Platinum rated Factory" by the Confederation of Indian Industry (CII) in adherence to its GreenCo rating system.

"Platinum" certification in IGBC existing building certification category for Ep- 1 office building.

Implementation of EnMS ISO 50001 system is in process.
Lead Auditors-
Mr. Nitin Kulkarni
Mr. Santosh Parab

Learnings from various forums



Regression analysis

Target setting and Benchmarking

Technology adoption

- **Horizontal deployment of best practices**
- **Green CO and IGBC certification**
- **National and International benchmarks**
- **SWOT analysis of Organization**

Adoption of new energy efficient technologies-

- **Vaayu**
- **Axial blowers and fans**
- **Heat pump**
- **Solar Light pipe**
- **Optimization in TAKT time**

Awards and Accolades

"GreenCo Platinum rated Factory" by the Confederation of Indian Industry (CII) in adherence to its GreenCo rating system.

CII's 20th National Award for being an "Excellent Energy Efficient Unit" and "National Energy Leader" award. 9 consecutive years winner at National level.

"Platinum" certification in IGBC existing building certification category for Ep- 1 office building.

Achieved carbon neutrality under the guidelines of PAS 2060:2014 for 2018-19.

Consecutive 6 years winner at State Level energy conservation awards by MEDA

"Noteworthy Water Efficient Unit" National Level certificate by CII Triveni water Institute CII Water Con Awards 2018.

Awards and Accolades

"Dr. R.J. Rathi Award" For Green Initiatives organized by MCCIA Pune, 2018"

2nd consecutive year winner in **Industry sector for Garden competition held by Garden's Club**

"Hat-Trick"- Consecutive Three years winner of "Golden Peacock Award for Energy Efficiency"

CII SR Award for best practices of rainwater harvesting in water management 2022

Installed and commissioned "Waste plastic to Fuel Conversion plant" with a yield of almost 70%.

Rainwater harvesting structures to utilise rainwater for industrial processes

Thank You.

Team - Kirloskar Oil Engines Ltd. Kagal-Kolhapur

https://koel.kirloskar.com

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