GMR Warora Energy Limited

CII National Award for Environmental Best Practices – 2021

(Thermal Power Stations)

1. Praveen Shetty –Head EHS
2. Suraj Tandon –Manager EHS
3. Murali Bodda-AM TS

Presentation Contents

- GWEL - At a Glance
- Project Details
- Challenges faced during implementation of the Project
- List of Tangible Benefits
- List of Intangible Benefits
- Project Replication
- National Benchmark
- Environmental Performance Evaluation
- Other Environmental Sustainability Initiatives at GWEL

GMR Group – Vision, Mission and Values

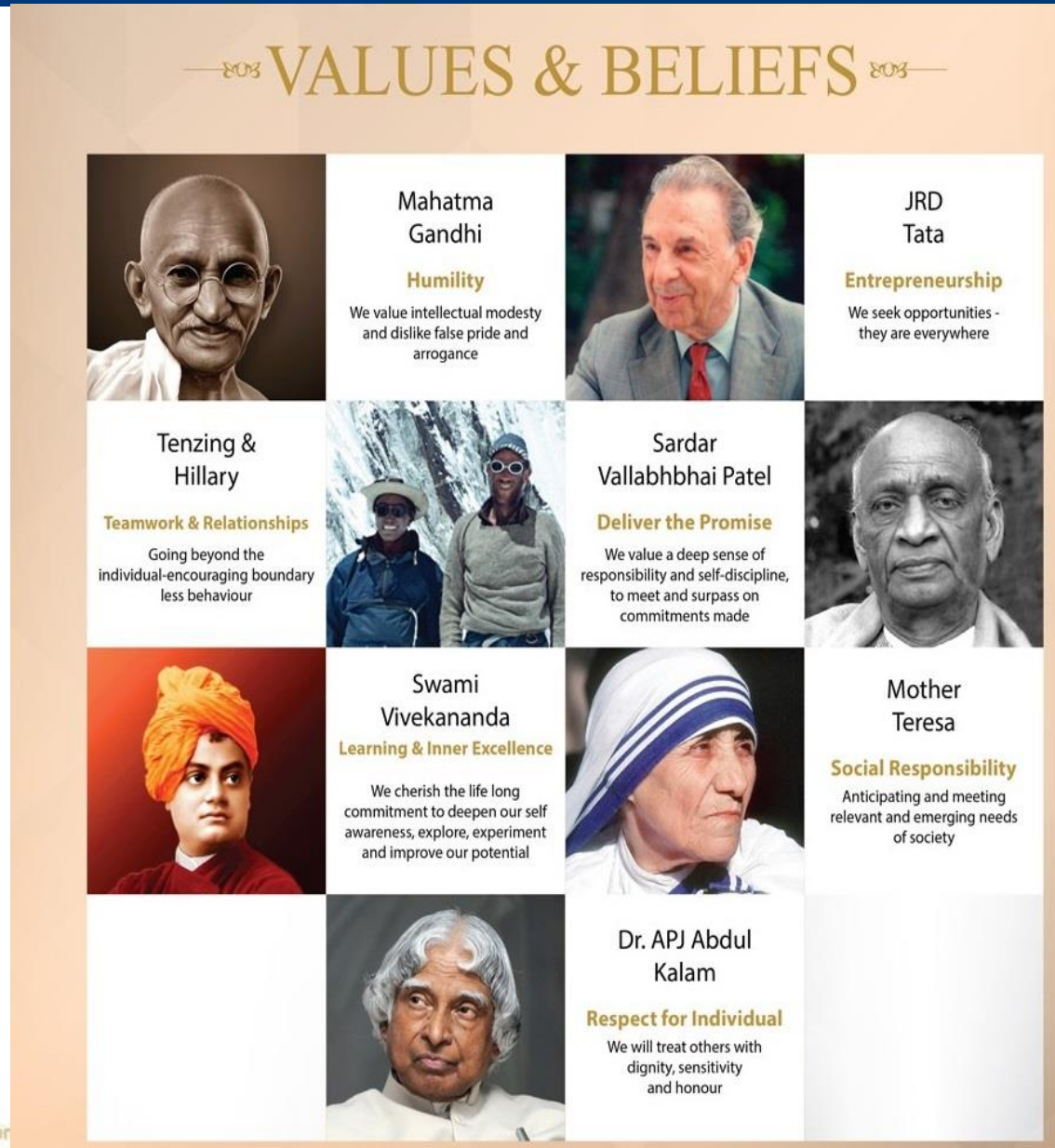
Vision

"GMR Group will be an institution in perpetuity that will build entrepreneurial organization making a difference to society through creation of value."

Mission

"GMR Energy wants to be the most profitable and one of the leading Integrated Energy Companies in India and derive value by

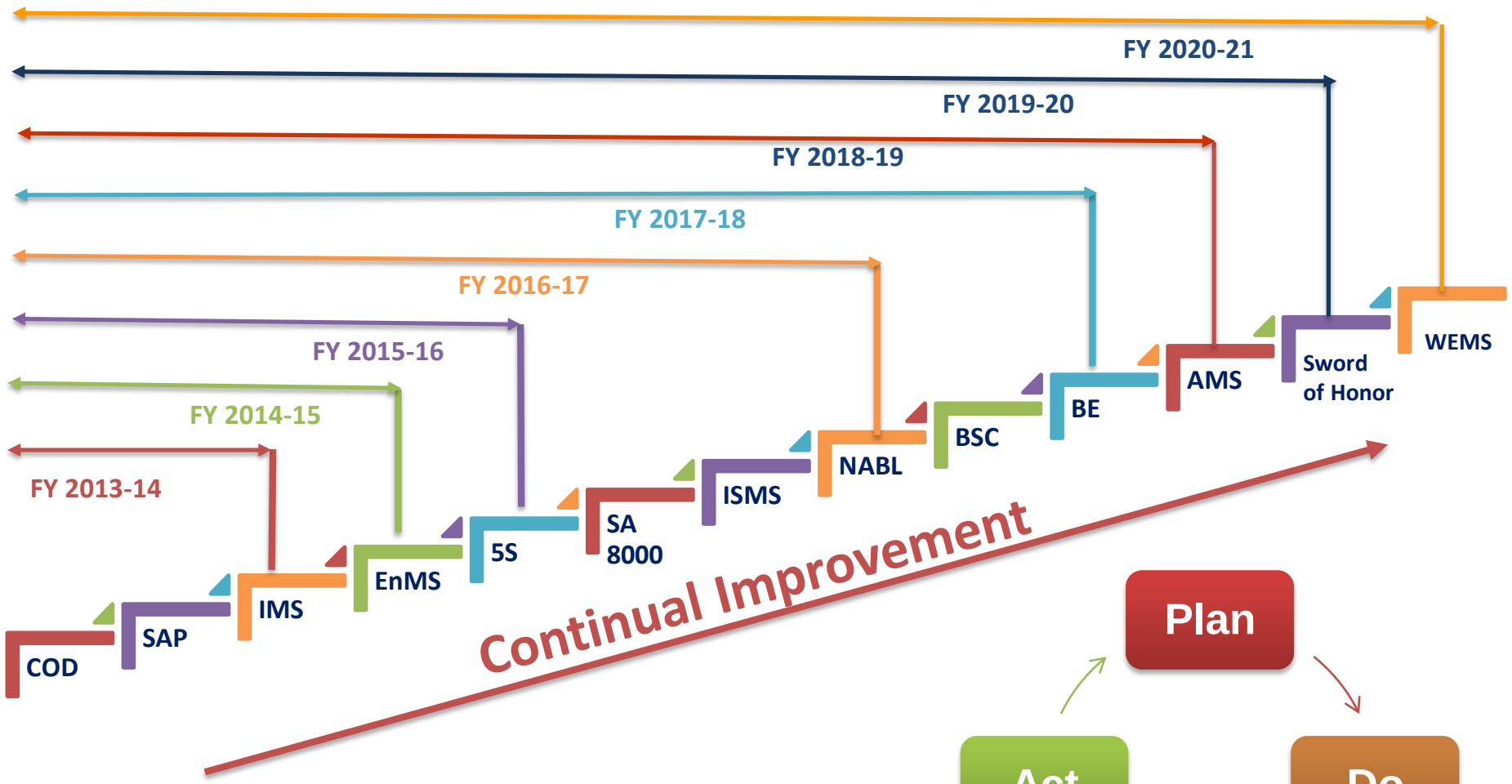
- ***Diversifying strategically across Energy value chain***
- ***Being a preferred employer***
- ***Being socially responsible"***



About GMR Warora Energy Ltd

Sr.	Features	Details
1	Plant capacity	600 MW
2	Configuration	2 X 300 MW
3	Product	Electricity
4	Fuel	Primary Fuel: Coal Secondary Fuel: LDO
5	By Product of Process	Ash
6	Stack	Single stack Twin Flue chimney of 275m height
7	Approved Water allocation	50 MLD
8	Unit-1 COD	19th Mar, 2013
9	Unit-2 COD	01st Sep, 2013

Journey Towards Excellence



GWEL Follows
"Auditable System Based Approach"
Driven by

Deliver the Promise I Learning and In

Project Details

Project Details

Project Title: Sustainable reformation of Green forest from Abandoned stone quarry reclaimed with Pond Ash

Project Trigger : Mission Zero Harm

No harm to Health and Safety of stakeholders

+

Minimum impact on the environment

Employees
- Health & Wellbeing
- Safety

Contractor's workforce
- Health & Wellbeing
- Safety

Community stakeholders
- Clean Environment
- Social wellbeing

Start Date: April-2017

End Date: Mar-2020

Group's Mission-Being Socially Responsible

Mission Zero Harm initiative taken in 2017

One of the pillars of this initiative

- Clean Environment
- Social Well being

Project Details

Under this umbrella initiative of **Zero harm**, to **achieve goal of clean environment** looking at challenges in Ash utilization the project was initiated.

- **Huge amount of Ash being generated on annual basis, which needs to be disposed off.**
- **Location disadvantage-Farthest distance from Cement companies**.
- **Less Avenues:** Over dependency on cement plants & bricks units for utilization of Ash.
- **Challenge in achieving 100% Ash utilization compliance.**
- Storage of good amount of unutilized Ash in our **Ash Ponds**.
- Availability of abandoned mines/ stone quarries .
- **Social responsibility** : Risk posed by the abandoned stone quarries in the near by area.

Project Details

Project Road Map

Project Initiation	Stakeholder Consultation	Execution	Sustenance Phase
Zero Harm: Environmental Obligation of 100% utilization of Ash	Submission of application to PCB	Kick start of project	Dedicated workforce with all the resources
• Challenge in complying . • Lesser avenues for disposal	Apprehension from Pollution board & Local stakeholders	Engagement with local villagers for PPP	Impact assessment
Exploring the alternative options for disposal of Ash	First of its kind -Delay in Approval.	Ash transportation and refilling of stone quarry.	Plant Survival monitoring – 2 years
Initial Study	Detailed explanation on Study	Selection of suitable species	Regular monitoring
Abandoned stone quarries is selected - having good potential	Finally approval	plantation started over reclaimed area	

Project Details

Uniqueness

Our transformational project of stone quarries to lush green project have played a pioneering role in the sector being followed by many others. The uniqueness of the project lies in:

- **First time**: The project is first timer in the sector.
- **Multiple Benefits:** Its caters us multiple benefits like 100 % Ash utilization, Sound Environment Management, complying statutory requirements, Enhances Biodiversity Improvement.
- **Reuse:** The Environmental benefits of transforming an abandoned stone quarries to a lush green forest with utilization of ash is what makes this project most unique.
- **Non Conventional disposal of ash**: It also open the door for getting more approvals from Board for disposal of Ash.
- **Sustainability Through PPP:** Involved local stakeholders for maintenance of plantation.

Challenges faced during implementation of the Project

Challenges faced during implementation of the Project

Some of the challenges we faced during the execution of the projects are:

- Getting **approval** from the statutory bodies.
- **Transportation** of the Ash and Scientific disposal of ash in the quarries
- Very harsh and **detoriating soil condition** in the stone quarries.
- Selection of proper and **tolerant species for better survival**.
- Mobilization of **resources and manpower for working in the interiorly located** stone quarries.
- Management of area **post disposal**.
- **Surveillance** of the site post plantation in every season.

Tangible Benefits of the Project

Tangible Benefits of the Project

- Able to transform the landscape of an abandoned stone quarry from a degraded pit to lush green forest. About **5-hectare** forest with **9326** surviving plants was developed.
- Successes of this project also opened the doors for **further approval** from Board for reclamation of some more abandoned stone quarries which has helped us a lot in meeting our fly ash utilization statutory obligation & Environmental conservation obligation.

- **Decreased pressure on the ash pond. (No need to construct new ash pond)**

TRANSFORMATION

In-Tangible Benefits of the Project

In-Tangible Benefits of the Project

Mostly the benefits of Reclamation/Restoration projects are always long terms which cant be counted and are In-tangible in nature. But the interest which we get in the future is much more than our principal leading to a sustainable development. Some of the in-Tangible benefits are:

- Environmentally sound utilization of ash.
- Improvement of climate
- Restoration/remediation of soil health.
- Conservation of moisture and soil
- Development of wildlife habitat.
- Improvement of agro system.
- Restoration/remediation of soil health.
- Safety of wild life and general public living around
- Prevention of Soil Erosion
- Oxygen Enrichment
- Water Conservation
- Cleaner water and natural filtration
- Carbon Sequestration
- Helps in developing sustainable communities

Replication potential of the project in Indian Industry

Replication potential of the project in Indian Industry

These project have huge replication potential in same and other sectors due to the following aspects:

- **We don't have much avenues in Ash utilization** other than cement pants and Ash Brick Plants for disposal of huge quantity of ash generated from TPPs.
- The alternatives have to be explored and their successful implementation will definitely pave the path for other plants.
- Along with the ash utilization, the **Environmental benefits** derived from development of forests in the degraded areas makes the replication potential of the project multifold.
- Complying with the **statutory obligation** of 100% utilization of Ash.
- Satisfactory utilization of Ash will put **less pressure on the existing Ash Handling system/Ash pond of the Plant.**
- The **Goodwill developed** due to successfully implementation of such project helps the plants a lot in many areas like obtaining **new clearances**.

Project Journey

Project Journey

Environmental Performance Evaluation & Benchmark

Environment Performance Evaluation

- As a Environment conscious organization, carried out the Analysis to ascertain the project impact.
- The results clearly shows that the ash disposal on the site have no adverse impact on either Soil Health or Quality of Ground Water as a result of Phytoremediation through Plantation post disposal.

Ground Water Analysis

S. N.	Parameter	Unit	Result	Standard
1	pH	-	7.8	6.5-8.5
2	TDS	mg/L	525	2000
3	Alkalinity	mg/L	302	600
4	Calcium	mg/L	91.4	200
5	Magnesium	mg/L	34.0	100
6	Sodium	mg/L	28.9	200
7	Chloride	mg/L	22.1	1000
8	Sulphate	mg/L	101	400
9	Nitrate	mg/L	15.1	100
10	Potassium	Mg/L	9.06	No Relaxation
11	Phosphate	Mg/L	0.208	No Relaxation
12	Fluoride	mg/L	0.422	1.5

S. N.	Parameter	Unit	Result	Standard
13	Iron	mg/L	0.165	1.0
14	Manganese	mg/L	<0.04	0.3
15	Cadmium	mg/L	N.D	No Relaxation
16	Chromium	mg/L	N.D	No Relaxation
17	Copper	mg/L	N.D	1.5
18	Lead	mg/L	N.D	No Relaxation
19	Zinc	mg/L	0.039	15.0
20	Barium	mg/L	<0.1	No Relaxation
21	Arsenic	mg/L	ND	No Relaxation
22	Mercury	mg/L	ND	No Relaxation

Environment Performance Evaluation

Soil Leachate Analysis

#	Parameter	Unit	Result	Standard
1	Loss on Drying	%	4.0	-
2	Loss on Ignition	%	5.2	-
3	pH	-	8.5	-
4	Iron	mg/L	1.80	-
5	Arsenic	mg/L	<0.05	5.0
6	Cadmium	mg/L	<0.1	1.0
7	Tri. Chromium	mg/L	<0.1	5.0
8	Lead	mg/L	0.20	5.0
9	Manganese	mg/L	0.22	10.0
10	Mercury	mg/L	<0.005	0.2
11	Selenium	mg/L	<0.05	1.0
12	Ammonia	mg/L	0.62	50.10
13	Hex. Chromium	mg/L	<0.1	5.0
14	Cobalt	mg/L	<0.1	80.0
15	Copper	mg/L	0.18	25.0
16	Nickel	mg/L	<0.1	20.0
17	Zinc	mg/L	0.56	250.0
18	Fluoride	mg/L	2.56	180.0

Surface Water Analysis

S. N.	Parameter	Unit	Result	Standard
1	pH	-	8.0	6-8.5
2	Odour	-	Agreeable	-
3	Turbidity	NTU	1.2	-
4	TDS	mg/L	440	2100
5	TSS	mg/L	10	-
6	Alkalinity	mg/L	228	-
7	Total Hardness	mg/L	268	-
8	Ca-Hardness	mg/L	148	-
9	Magnesium	mg/L	29.2	-
10	Potassium	mg/L	4.2	-
11	Chloride	mg/L	89.7	600
12	Sulphate	mg/L	64.8	1000
13	Nitrate	mg/L	3.28	-
14	Phosphate	mg/L	0.342	-
15	Fluoride	mg/L	0.56	-
16	Copper	mg/L	<0.04	-
17	Manganese	mg/L	<0.04	-
18	Zinc	mg/L	0.056	-

Overview of Environmental Sustainability Initiatives at GWEL

GWEL Policy

Group Environment, Health, Safety and Quality (EHSQ) Policy

We, at GMR Group with interests in diversified businesses, driven by our core Values & Beliefs, are committed to our stakeholders and meet customer satisfaction through integrated EHSQ management system to achieve Corporate Sustainability, in all our existing and future businesses.

To attain this objective, we shall

- Implement and maintain an integrated EHSQ management system to achieve sustainable performance
- Adopt and sustain a Business Excellence framework for continual business process improvement
- Protect environment, conserve natural resources, reduce energy consumption, improve occupational health and safety performance and mitigate risks by adopting optimal production processes and services, driven by environment friendly technologies
- Comply and endeavour to exceed all applicable legal and other requirements
- Continuously strive to achieve satisfaction of all stakeholders through contribution to social development
- Communicate effectively about the EHSQ system across the Group; create awareness and increase the competency of all employees through training
- Establish specific organizational structure for guidance, implementation and regular review of EHSQ management system

G M Rao
Group Chairman

15th June 2013

GMR WARORA ENERGY LIMITED

Occupational Health & Safety Policy

GMR Warora Energy Limited (GWEL) believes that all occupational injuries and illnesses as well as all types of unacceptable safety and environment incidents are preventable. We are committed to achieve our goal of ZERO harm with an active leadership role in occupational health and safety by providing a healthy and safe work environment, to prevent Injuries and ill health of our employees, workers, contractors, visitors and other stakeholders who may be affected by the company's operations. GWEL shall establish and follow occupational health and safety management system in line with the GMR Group Vision, mission, values and beliefs, as well as GMR Corporate EHSQ Policy and GWEL IMS Policy. We shall support sustainable and competitive business activities including activities performed by associates under its organizational control.

To accomplish this, GWEL shall;

- Ensure timely compliance of all applicable legal and other requirements relating to Environment, Health and Safety and establish systems for their tracking, monitoring and review
- Integrate OH&S in all its activities and be proactive in achieving the goal of zero harm and prevention of Injuries and ill health to all its employees, other stakeholders by establishing an effective OH&S management system to carry out this policy
- Pro-actively identify the OH&S risks and opportunities throughout the organisation and apply the risk management philosophy and practices that aims to identify and eliminate the hazards wherever possible, and where this cannot be achieved, implement appropriate control measures to manage the risks at a level that is as low as reasonably practicable
- Provide OH&S induction training to all new entrants, carry out hazard communication and disseminate relevant information to all employees and contract associates, provide them need-based training and ensure adequate supervision Provide Training & Learning to employees and contractors associates to ensure competence and awareness in order to effectively carry out the requirements of OH&S Management System
- Set up appropriate OHS objectives for Continually improve occupational health and safety performance parameters by establishing short-term and long-term OH&S objectives & targets in consultation with all stakeholders and measure and; monitor our performance against these targets and conduct periodic performance reviews
- Planning and providing all the required adequate resources and support in terms of man, material, machine, money and method (5 M) for implementing the OH&S management system in a time-bound manner
- Work closely with employees and contract associates, establish organisational set-up with allocation of appropriate role, responsibility, accountability and authority at different levels, and lead by example.
- Encourage employee participation by way of safety committees and other means for improved and effective OH&S management and monitor the progress through periodic management reviews
- Encourage adopting of best practices and establishing a non-punitive safety culture where every incident, accident and dangerous occurrence is reported, recorded, investigated and all corrective and preventive measures implemented and regularly monitored
- Establish a Management of Change procedure to ensure that health, safety and environmental risks are controlled when the it makes any change or modification in its facilities, infrastructure, equipment, materials, procedures, documentation, operations, or personnel
- Conduct periodic audits and risk assessments for regular evaluation of the status of OH&S
- Integrate OH&S in all decisions like purchase of equipment, machinery, material as well as selection and placement of personnel
- Take into account the OH&S performance of individuals while considering their career advancement
- Communicate the management's intent of continually improving the OH&S performance and fostering the expectation that every employee shall follow this policy and report any OH&S concern to the management
- Provide a résumé of the OH&S performance in the company's Annual Report and corporate sustainability report
- Display the policy prominently at conspicuous places and revise it as often as appropriate
- Make the policy available to all employees, stakeholders and to other interested external parties.
- The policy shall be reviewed periodically every three years or as and when required.

We request every one working for GWEL to foster an attitude of good practice and co-operation to promote this policy and comply with the requirements and duties.

D.V. Deshpande
Chief Operating Officer (Occupier)

01st August 2018
Revision: 01

Other Environment Sustainability Initiatives

GWEL Complies with all the Stipulated Environment Norms following the State of Art Pollution Control system / devices have been installed to Control, Air & Water Pollution

- Electrostatic Precipitator
- Flue Gas Stack (275 Meters)
- Low NOx Burner
- Effluent Collection & Neutralization Pits
- Coal settling Pits
- Oil water separation tanks
- Dust Extraction & Dust Suppression system
- Ash Dykes & Ash Disposal System
- Dry Ash Extraction System
- Water Treatment Plant & Management
- Sewage Treatment Plant & Facility
- Hazardous Waste Storage facility
- Bio composter for Waste Management
- Green belt development-
  1.4 Lac trees planted in and around the Plant including 16000 Fruit bearing plants

Other Environment Sustainability Initiatives

Significant Environmental Initiatives

Organic Composting system

Drip Irrigation System

Rain Water Harvesting

Weed Mat

Hazardous Waste Storage & Disposal

Other Environment Sustainability Initiatives

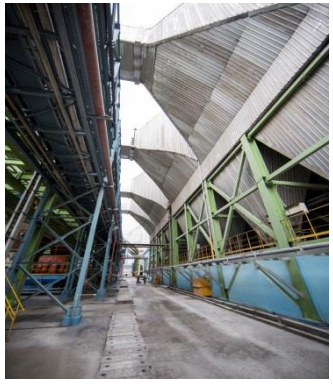
Significant Environmental Initiatives

Environment Day Celebrations

Training & Awareness

Greenbelt Development

Sampoorna Swachchata



Fly Ash & Bottom Ash System

Other Environment Sustainability Initiatives

Greenbelt Development Drive

Before

Other Environment Sustainability Initiatives












Greenbelt Development

Summary of Plantation Plan (Acres)

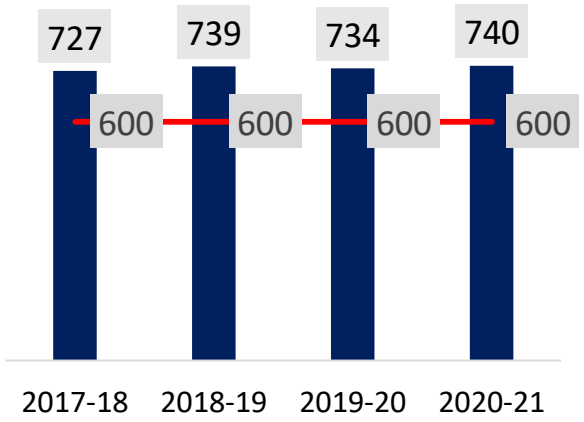
Sl. No.	Year	Forest Plants	Ornamental / Fruit Plants	Total
1	2013 - 14	90,000	-	90000
2	2014 - 15	30000	10000	30000
3	2015 - 16	15000	6000	16000
4	2016 - 17	12500	-	12500

Sl. No.	Type of Trees	Name of the Trees	Quantity (Nos.)
1	Fruit Bearing	Mango	10000
2		Jamun	1000
3		Nimboo	1000
4		Amla	1000
5		Custard Apple	1500
6		Guvava	1500
Sub - Total			16000
7	Forest Species		118500
Grand - Total			**134500**

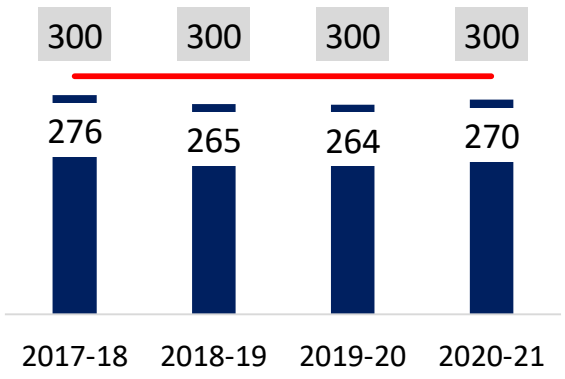
Particular	Land (Acre)	Plantation (Acre)	Plantations (%)
Total Plot Area	**428.61**	**173**	**40.39**

Environment Management

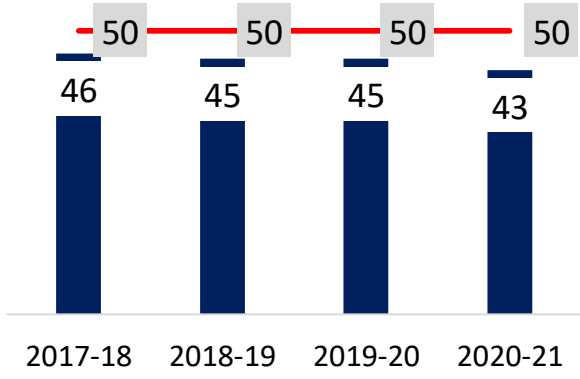
Sox Emission -mg/Nm3



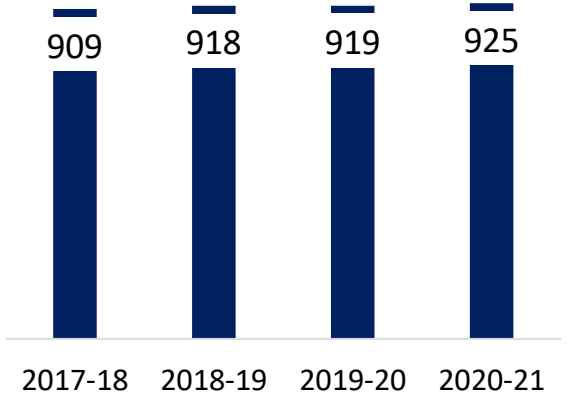
Nox Emission -mg/Nm3



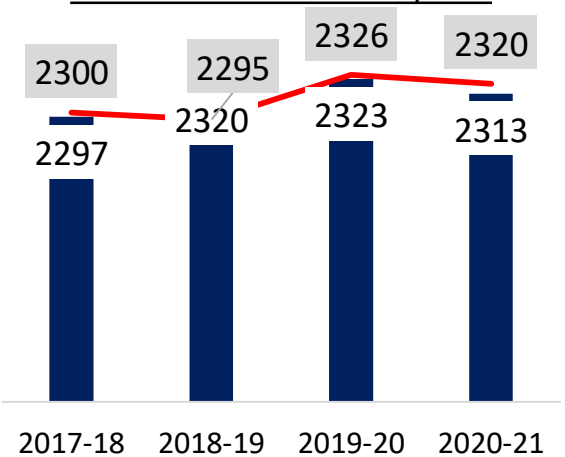
PM -mg/Nm3



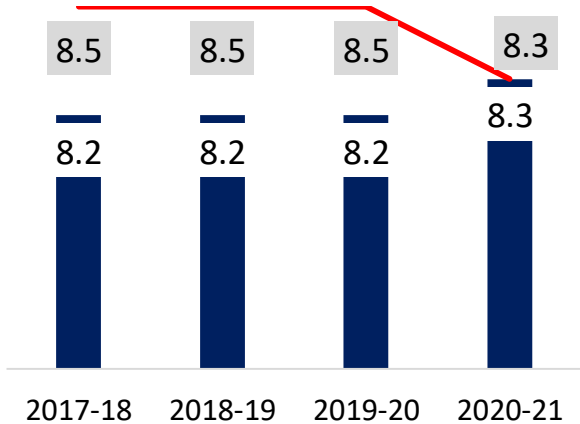
Co2 Emissions-Ton/kw



Station Heat Rate -Kcal/Kwh



APC %



Note: FGD Completion data as per CEA is Dec'24. Currently commercial bid evaluation is in progress.

Awards & Accolades

BEE-National Energy Conservation Award-2017

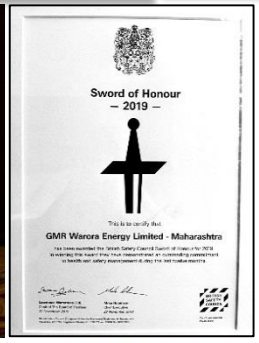
CII National Award for Excellence in Energy Management-2018 & 2019

13th State Level Award for Excellence in Energy Conservation & Management by MEDA

Best Boiler Award 2019

IMC Ramakrishna Bajaj National Quality Award 2017

Global Performance Excellence Award 2018-World Class



Sword of Honour 2019

BSC 5 Star 2019

Quality Circle Award

Scientific Approach coupled with Hard work and constant surveillance resulted in transformation of Abandoned stone quarried to lush green forest.

Thus

There is a Name for those Who Conserve Environment

… SUSTAINABILIST

Thank You…

Team Member Details:

1. Mr. Praveen Shetty	- Head-EHS	- 8390991219	-Praveen.Shetty@gmrgroup.in
2. Dr. Suraj Tandon	- Manager-EHS	- 9172386112	-Suraj.Tandon@gmrgroup.in
3. Mr. Murali Shankar	- Asst. Manager	- 8390903648	-Murali.Bodda@gmrgroup.in