



RESPONSIBLE **ENVIRONMENTAL** **CARE** 2019-20



Responsible Environmental Care

Environment Management and Compliance

At GFCL, sustainability goes much beyond fulfilling economic, legal or regulatory requirements. It is one of the many ways in which we create enduring value for our stakeholders, natural environment and the society at large, and become part of resolving the most unyielding causes through awareness and engagement. We consider ourselves responsible for mitigating not just the social and environment impact of our business but also helping resolve various social and environmental issues present in our society. We aim to follow and promote sustainable business practices and co-create sustainable business value for our stakeholders.

We measure the impact of our business operations through the three key pillars of sustainability, namely People, Planet and Profit. Hence, we make continuous efforts to optimize efficiency across these aspects. This encourages involvement from all stakeholders and ensures that sustainable framework policies are well communicated, implemented, monitored and reviewed on regular basis. In order to further strengthen this cause, we have implemented a Corporate Integrated Management System (IMS) Policy for all our operations which makes environmental protection a key pillar in the Company's operations and strengthens better stakeholder relationship. As per the IMS policy, we are committed to achieve pollution prevention, waste reduction, recycling, energy and resource conservation (including water) and overall environmental protection relevant in the context of our business.

We have taken up Responsible Care activities as one of the most important management pillars. Based

on the core principle of 'Safety in not only a priority but a Value' of our Company, the Management has aggressively taken action based on the Responsible Codes pertaining to pollution prevention, process safety, employee health and safety, community awareness and emergency response, product stewardship and security. Our Commitment to Responsible Care is part of the Company's sustainability initiatives to positively impact People, Planet and Profit. We formally pledged our commitment to the Responsible Care Guiding Principles in February 2020.

We are accountable for our products and their effects on environment and this is the primary reason for conducting life cycle assessment (LCA) studies. The main objectives of life cycle thinking are to reduce a product's resource use and emissions to the environment as well as improve its socio-economic performance throughout its entire life cycle. This facilitates linkage between the economic, social and environmental dimensions within an organization and throughout the product's entire value chain, while also enabling environmentally sound policies to be adopted.

Our eco- friendly product range adheres to international compliance standards such as REACH 2020. As we have operations majorly in India, REACH applies to some of our products (such as fluoropolymers) which we produce and export in quantity greater than 1 MT to the EU region. For our fluoropolymers, all monomers are registered for REACH. It also applies to some chemical substances we buy, for which we ensure that our suppliers are complying with REACH regulations for that product.

We have set up a SARS Committee to address climate-related issues. The prime responsibility of SARS is to

drive, review and provide direction to all social accountability, regulatory, compliance and sustainability (including health, safety and environment aspects) initiatives. It also looks after the Responsible Care related initiatives, activities and interventions across the Company. It identifies strategic initiatives and executes them in the Company along with constant monitoring of the progress. The Committee has 10 members and is chaired by the CEO of the Company. It also has representation from different verticals of the Company along with some C-suite level officers. From each plant, two senior representatives including the Plant Head are also members.

The Committee reviews the unit level activities with the site-level teams on a monthly basis. The Steering Committee also meets every month and appraises the gaps identified, plan of action, etc. on all related activities. It also publishes monthly Sustainability and Social Accountability Dashboard for continuous monitoring of our sustainability performance.

In our management initiatives, we place the highest priority on ensuring environmental compliance by maintaining a check system based on our original environmental audits as well as through environmental education and other HR development programmes. In addition, we also focus on improving information disclosure, developing networks with stakeholders to propagate positive environmental actions, and conserving environment. We have developed an Environmental Management Information System for collection and analysis of environmental data required to promote sound environmental management.

These management systems have also helped us in adopting targets for all

key environmental parameters which are strictly followed and continuously monitored by top Management through regular updates and surprise visits. As a Company that is conscious of the potential risks associated with climate change, we have become signatories of the SBTi.

Hazard Identification and Risk assessment (HIRA) is conducted every year for both the plants for continuous monitoring and assessment of risks. In addition, we also conduct various other environmental risk and impact studies. We also make an 'Environmental Aspects/Impacts, Occupational Health and Safety Hazards and Quality Risk & Opportunity Matrix' on a regular basis covering the different type of risks, their severity and control measures in place for various activities that may have an environmental impact. For further strengthening our commitment towards environment protection, our key pollution prevention equipment has an emergency backup system. In the rare case that there is a failure in backup system, operations are stopped, and corrective actions are taken immediately.

To manage and continuously monitor all environment and safety parameters, a monthly review is done by top Management along with other stakeholders to analyse and further motivate employees to improve the environmental performance. For integrating environmental stewardship principles, our APEX Committee has an Environmental Sub-Committee which, under the guidance of top Management, monitors and controls all new environment initiatives and tracks their progress on monthly basis. It is also responsible for resolution of any issue/grievance from employees and local community towards any type of

environmental impact in or around our plants.

We believe in over-achieving our targets and compliance requirements, which ensures that we are always much below our environmental compliance limits. During the reporting year, there were no instances of monetary fines or non-monetary sanctions or cases brought against the Company through dispute resolution mechanisms pertaining to environmental non-compliance. The total monetary value of significant fines pertaining to environmental non-compliance during the year 2017-18 was INR 3,25,000.

One of the most important aspects of forming policy and setting up targets is ensuring its awareness among all employees and other stakeholders, for which we conduct regular training sessions / seminars. In addition, we also celebrate various occasions like Ozone Day, Environment Day and Safety

Week. All our employees must complete Environment, Health and safety (EHS) training during induction. We conduct regular stakeholder consultation every 15 days with local community around our plants to address any grievances related to environment.

We not only believe in forming policies and committees but also in effectively implementing actions and achieving targets. We have ISO 14000 certification for our entire Company. All our plants have conducted environmental risk assessment and have implemented Environmental Management System (EMS). We participate in various local, regional, national and international forums on the environmental topics in order to showcase our work and participate in knowledge exchange.

With these key initiatives, we are known in the industry for not just our products but also for the responsible growth we have achieved.



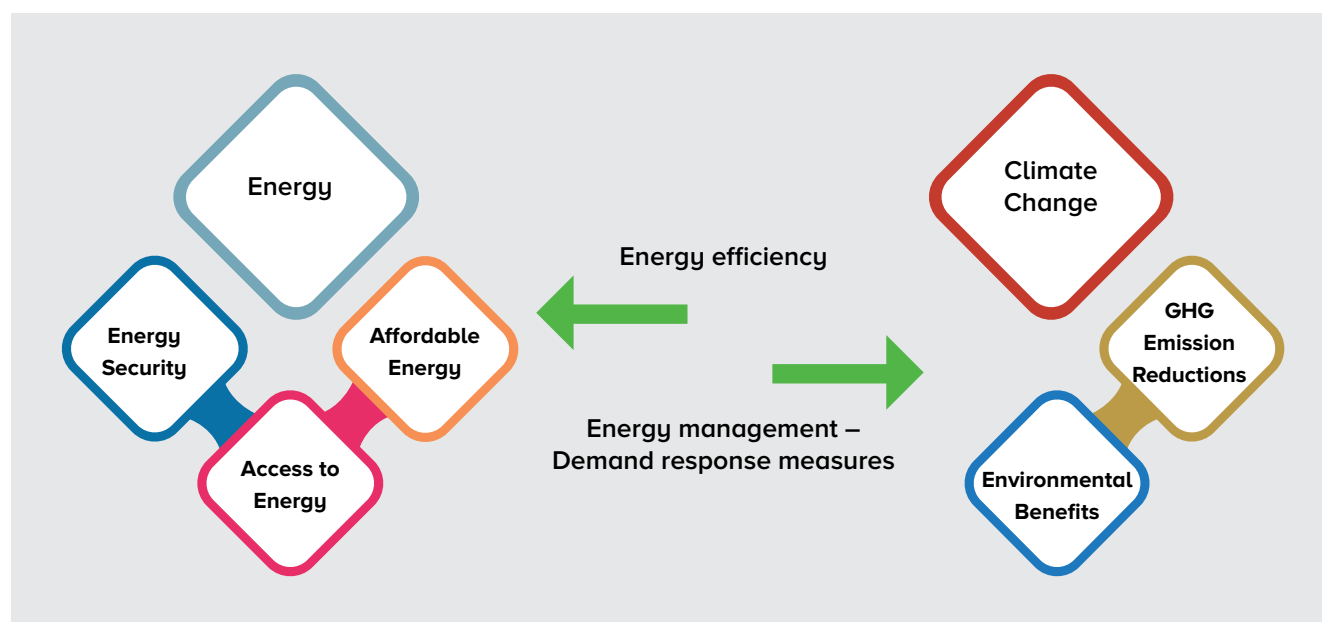
Energy Management

We are driven by the principle of 'conservative Aggression'. Our dynamic senior leadership very meticulously identifies and plans new energy conservation, cost saving projects and growth opportunities, which, once selected, are aggressively implemented by a professional management team. We believe that strategic energy conservation and cost saving is key

to achieving the main objectives of sustainable development. As part of chlor-alkali industry that we are part of, we have implemented the PAT scheme and have over-achieved our targets in the last cycle.

For finalization of energy conservation/ cost saving projects, brainstorming is being done at all levels throughout the

Company which ensures systematic work process management and benchmarking against our own best achieved figures on process parameters, utility consumption norms, production norms etc. This is continually monitored at individual plant level by the nominated Energy Coordinator of the respective plant.



Key measures for environmental sustainability are as elaborated below:

Description of Key Measures	Monitoring Mechanism	Outcomes / Examples
Changes in Projections	Monthly variance & performance review meeting with Unit Head	Based on changed business scenario and market demand the monthly projections are being changed / altered with respect to annual production plans. This is being done to meet the monthly business targets & enhance overall profitability.
Innovative changes	Monthly performance review with Unit Head	Installation and commissioning of Effluent Recycling System (ERS) to save fresh treated water make-up to individual cooling towers(CTs) resulted in the savings of raw water intake bill apart from the quantity of treated effluent discharge to GIDC (Gujarat Industrial Development Corporation) pumping station. TFE-2 Utilities: To meet the plant's (-35) OC Brine system demand by operation of one (-35) OC and one (-15) OC chillers, instead two (-35) OC chillers, to achieve power savings of 183 Kwh.

Description of Key Measures	Monitoring Mechanism	Outcomes / Examples
		<p>Installation and commissioning of sulphate recovery system has been done at the Chlor-Alkali (CA) plant to reduce the daily brine sludge generation. Also, its electrolyzers membranes have been changed from original to zero gaps type membranes, resulting in substantial power savings at CA plant. Also, most of the critical CTs fans have been changed with ENCON fans to save power along with various energy conservation and cost saving projects.</p> <p>Power and steam savings through replacement of AVAM (Ammonia Vapor Absorption Machine) by Vapor Compression Systems, thereby achieving substantial cost savings on account of reduced steam and power.</p>
Environmental consideration	Monthly IMS review with Unit Head	<p>Desired compliances pertaining to GPCB / (Central Pollution Control Board) CPCB are being achieved through online monitoring of complex key parameters of water and air via centralized server of CPCB linked to their main controlling / monitoring office. Beyond it, the Effluent Water Recycling Project has been commissioned. Utilities Loss Survey (ULS) system is in place to ensure zero lead complex and its status are being regularly monitored throughout the complex against all major utilities.</p>

Schemes Implemented for Sustainability and Overall Performance Improvement in Energy Conservations:

- Advanced Process Controls – e.g. SCADA & Operating Guideline software from General Electric (GE); This is being used for input data analysis to conceive energy conservation scheme.
- Strengths, Weaknesses, Opportunities & Threats (SWOT) is done to analyse the energy conservation schemes.
- Electronic Talent Management System(e-TMS), Individual KPI's related to energy conservation.
- Quality Circle – Quality Improvement Programme, Energy conservation by waste reduction.
- PRAYAS – Employee Suggestion Schemes for Energy Optimization.

- SPOT ON – For various sustainability improvement at shop floor.

Details of Total Energy Consumed within the Company Boundary

We have all the required energy monitoring and measuring mechanisms in place in our Company. Our energy consumption data for this year is reported below.

Fuel Consumption

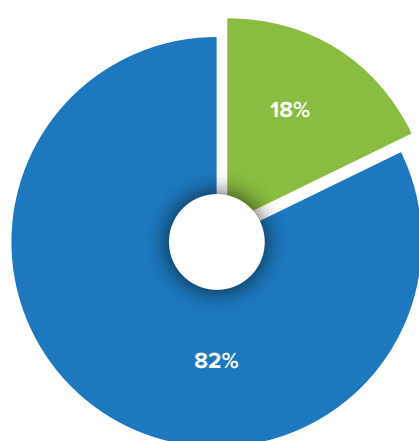
Fuel Type	Energy (in MWh)
Coal	32328529.04
Natural Gas	323146.34
Diesel	195.32
Total Fuel Consumed	32651870.70

Our Dahej plant uses Regasified Liquefied Natural Gas (RLNG) as one of the fuels for its operations which is considered as one of the cleanest fossil fuels. At Ranjitnagar plant, captive power generation is from RLNG and process heating is also from RLNG. We do not purchase or consume heating, cooling or steam. We purchase renewable and non-renewable electricity, the details of which are given below. Energy Consumption is monitored on daily basis.

Total Purchased Electricity

Type of purchased electricity	Energy (in MWh)
Renewable electricity	77,364.81
Non-renewable electricity	353,440.61
Total electricity purchased	430,805.42

Energy Management



- Renewable electricity
- Non-renewable electricity

The renewable purchased electricity component covers around 18% of our total electricity purchased. We do not sell electricity, heating, cooling or steam. The electricity generated through CPP is used within the Company itself.

Total Energy Consumption

Fuel Type	Energy (in MWh)
Coal	32,328,529.04
Natural Gas	323,146.34
Diesel	195.32
Electricity	430,805.42
Total Energy Consumed	33,082,676

For the calculation of energy consumption, we have obtained the conversion factors from government databases and had calorific values in place for all the types of fuel used by us. Monitoring of direct as well and indirect energy consumption is done on daily basis.

Energy Intensity

Our energy intensity is 81.84 MWh/MT of production. The energy value

used in the calculation comprises of energy consumed from fuels (Coal, Natural Gas and Diesel) and electricity (renewable and non-renewable). The energy intensity ratio reflects the energy consumed inside the Company.

Waste Heat Recovery Systems & Combined Heat and Power (CHP) unit

At our Ranjitnagar plant, we have three gas-based gensets installed (2 gensets of 1365 KW capacity each and one genset of 1021 KW capacity). The fuel utilization efficiency of the gas-based power plant at 90% load is as below:

- Fuel energy input utilized to generate Electricity: **36.5 %**

- Fuel energy input utilized to generate Steam: **24.5 %**
- Fuel Utilization Efficiency: **61 %**

Rest 39% fuel energy was lost in the form of heat - approximately 19% in flue gas going out of the chimney and remaining 20% in engine jacket water cooling system. The system is implemented to recover heat from gas engine jackets as hot water at 82°C, distributed and utilized this heat in place of steam in AHF, HCFC and Effluent Treatment Plant (ETP) plants. The recovered heat in the form of hot water is completely utilized to replace steam as heating media in the plants, where reduction in steam requirement to the tune of 72 TPD is achieved.

Energy Consumed from Renewable (Wind Power)

Wind energy consumption	FY 17-18	FY 18-19	FY 19-20
Total wind power purchased KWH	84,014,426	100,016,014	77,364,806
Percentage of wind power	14%	16%	12%



Energy Conservation Projects

Sr. No.	Energy Conservation Initiatives	Outcome FY 19-20
1	Replacement of AVAM by Vapor Compression Systems	Substantial cost saving for steam and power
2	S&A CTs CW Pump - P812C main driving motor replacement from existing 90 KW/2900 rpm to 55 KW/1440 rpm	Power savings of 353 MW per annum
3	TFE1 Utilities' (-35) oC Primary Pump's Impellers Trimming Viz. P805C for Pumping Energy Optimization	Power savings of 98 MW per annum
4	Stoppage of TFE-3 Utilities (-35) oC Brine supply to 8 & 9th Reactors and additional loading of TFE-1 Utilities (-35) oC Brine system, to serve the purpose of energy conservation due to reduced throughput of Polymer complex	Power savings of 2932 MW per annum
5	Meeting the plant's (-35) oC Brine system demand by operating of one (-35) oC and one (-15) oC chillers, instead of two (-35) oC chillers, to save power	Power savings of 183 Kwh in TFE-2 Utilities
6	TFE-2 Utilities' (-35) oC Primary Pump's Impeller Trimming Viz. P805A & P805B	Power savings of 218 MW per annum
7	Replacement of Condensate Extraction Pump (CEP) Pump of STG-1 with High Efficiency Pump to save Operational Power	Power savings of 67 MW per annum
8	Installation and commissioning of VFD at Boiler-2 PA (Primary Air) Fan-1	Power savings of 126 MW per annum
9	Installation and commissioning of bigger size Condensate Transfer (CST) Pump for De-Mineralized (DM) Water pre-heating and stoppage of one pump to save power through Pumping Energy optimization	Power savings of 142 MW per annum
10	Optimization of Service Air Usage at Ash Handling System to save Air Compressor Power	Power savings of 58 MW per annum
11	Stoppage of C-4214 Column Feeding pump by feeding of Crude R-21 directly from C-4224 bottom to C-4214 by Pressure Difference at A&H process	Power savings of 70 MW per annum
12	Replacement of HPMV Well Glass 125 W Electrical lights with LED Well Glass Fitting (45 Watt, Qty-110), and replacement of HPMV Halogen lights with 100W LED lights	Power savings of 38945 KWH per annum
13	Motor replacement of 90KW chilled water Compressor X-201C to 132 KW	Power savings of 140000 KWH per annum
14	New Energy efficient Motor installed in P-215A/B (30KW), L106 (15KW), SFD Fan of Coal Boiler (7.5KW), Active load. old conventional motors with efficiency of ~85% was replaced.	Power savings of 18000 KWH
15	Energy Efficient Motor Replacement in X-201D	Power savings of 24000 KWH
16	Energy saving through increased production and behavioural changes	Power savings of 2843012 KWH
17	Maintaining near to unity Power factor with the addition of APFC Panel /additional Capacitor banks with increased Load to receive cost rebate from MGCL	Cost saving of 16.51 Lac per annum
18	Traded 6368640 KWH through GEB Power Trading Initiatives in 2019	Cost savings through trading H 56 Lacs

Energy Management

Emissions

Our management approach is to reduce all kind of emissions, pollution, maximize the share of renewable energy, and continuously optimize energy and water to reduce carbon footprints and wastage. To ensure no failure occurs in our pollution control equipment, a double seal mechanism is used. Further, Preventive Maintenance (PM) of all equipment is controlled through SAP. These equipment maintenances are done as per the PM schedule and monitored on a monthly basis. Each machine has a PM checklist which ensures that no equipment failure occurs. Optimization of layout of the distillation condensers has been taken care in design stage. Any further changes that are required to be done are taken during shutdown and these points are also covered in our PM checklist.

A legal compliance portal designed by KPMG named Vision 360 is in practice for last few years. In this portal all relevant laws related to environment are being regularly monitored. These requirements are given specific number with its detailed description, location like Ranjitnagar, Dahej, Corporate office etc. is finalized, frequency of compliance, department applicable, and person responsible are defined. This portal needs to be updated regularly by the person responsible, necessary certificates are to be uploaded. Any non-compliance is directly escalated to the next level after a specified duration. If still there is non-compliance, then it is automatically escalated to the Board level.

At GFCL, we have established a Board-level sustainability committee (SARS Committee) which is primarily responsible to take all the sustainability and climate-related initiatives. The

chairperson of the committee is the CEO and there are other nine members represent different functions and units. The role of Sustainability Committee is to integrate both business and sustainability priorities so that the Company can thrive. The committee also helps in addressing the climate-related issues raised in the business, managing carbon emissions, and integrating triple-bottom line i.e. social, economic and environmental aspects in business strategy. It also oversees the health and safety dimension for the Company in order to provide a safe workplace environment.

Apart from the Board level Committee, we have also established an Apex Committee which looks after site level sustainability aspects such as climate change, safety, regulatory, legal and other issues of the site. There are site-level people in the Committee, and it is spearheaded by the plant head. To facilitate and support the functions of the committee, there are Sub-Committees for different functions, such as:

- Canteen committee to address the reduction of food wastages, reduce cooking gas consumption, etc.
- Transport Committee addresses route optimization, optimization of transport vehicles, etc.
- Department level Safety Committees
- Water Conservation Committee

Along with the responsibilities of sustainability committee and apex-level committee, there are some individual climate-related responsibilities given to domain experts for ensuring the effective management of environmental parameters. Some examples are listed below:

- GFCL owns a CPP for generating energy for the plants and a Head is appointed to look after processes and overall efficiency of CPP. One of his major roles is to maximize the efficiency by maintaining optimum consumption of fuel. Apart from fuel consumption, responsibilities also include managing power consumption and emission management of CPP.
- The Head of Utility Department is primarily responsible for looking after water consumption. Furthermore, he devises the strategies for reusing and recycling wastewater.
- The Head of Technical Department assists in optimum use of resources across other departments. Furthermore, the members of all departments which consume resources are responsible for optimizing the use of resources, minimize their carbon emissions, and waste generation objectively.
- The Factory Manager/CSR committee directly reports to the COO/Group Head HR on matters such as green belt development, management of vehicular emissions, and CSR projects.

The Sustainability Committee meets at least once in a quarter. In the meetings, the status of sustainability objectives, action plans, future strategies, and other sustainability aspects including climate-related matters are discussed. The action plans developed are further reviewed and revised in order to enhance their effectiveness. Post the meeting, minutes are circulated among all members of the Committee to keep everyone abreast with the developments.

One of the prime examples of effort to manage climate issue is that we have become signatory of the SBTi and are aspiring to obtain Responsible Care logo.

For monitoring the climate-related issues, the Committee reviews the unit level activities with the site-level teams on a monthly basis. The Steering Committee meets every month and appraises the gaps identified, plan of action, etc. on all the related activities. It also publishes monthly Sustainability and Social Accountability Dashboard for constant monitoring of our sustainability performance.

We also have Corporate Integrated Management System Policy in place and has made 'Responsible Care' an integral part in conducting business and operating facilities in a safe, environment friendly and sustainable manner. This policy covers 10 broad verticals including Occupational Health & Safety, Environment Protection, Product Quality, Compliance Obligation, etc. By the policy, Company seeks to achieve the following objectives:

- Long-term trust of its stakeholders
- Incident free, environmentally friendly and sustainable operation in complete supply chain
- Respect of neighbours and society at large

We also have multiple Environment Management Plans being planned and implemented, some of them are as follows:

- Minimizing fuel consumption through ENCON measures and maximizing use of cleaner fuel.
- Sourcing and use of sulphuric acid with low SO₂ content and provision

of standby SO₂ scrubber in the AHF plant.

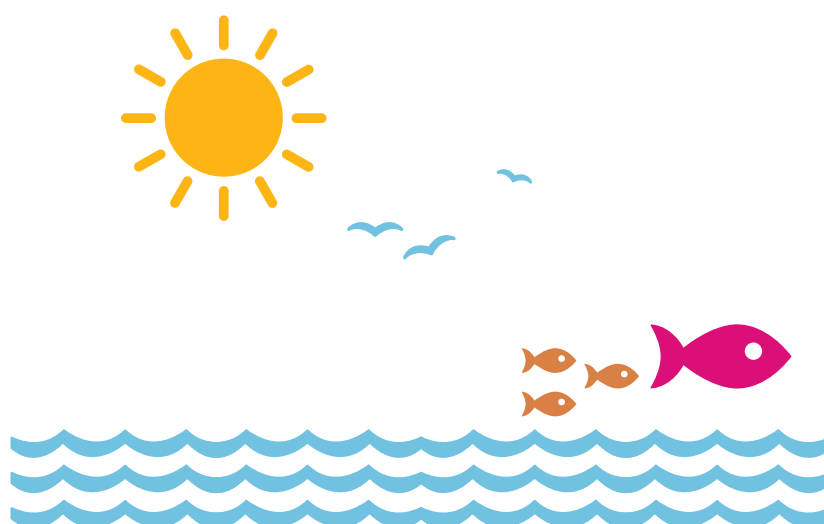
- Maximizing efficiencies of in-process scrubbers for recovery and recycle of low volatile gases.
- Continuous monitoring and improvement in bag filter efficiencies.
- Providing electronic detectors and alarms for corrosive gases at different locations for timely detections of leaks.
- Providing a close loop sampling system.

Since inception we always strive to keep a check on our air emissions and

have introduced cleaner fuels and efficient designs which would not only help us keep environment clean, but also ensure continuous improvement of our systems. We keep ourselves abreast of the developments in the field of clean environment and are always on the lookout for schemes and new technologies which can further improve our environment. This has enabled us to remain well within the statutory limits for criteria pollutants. In addition to our routine monitoring, the SPCB (State pollution Control Board) does frequent monitoring at random intervals of our air emissions and has found that we have adhered to the strict norms imposed.

GHG Emissions

Fuel Type	Emissions (in tCO ₂ for FY 2019-20)
Scope 1	635,054.32
Scope 2	289,821.30
Total	924,875.63



Energy Management

We have all the required mechanisms for monitoring and measurement for calculating GHG emissions of the Company. This is the first year of our GHG emissions reporting and we have used The GHG Protocol: A Corporate Accounting and Reporting Standard (Revised Edition) for calculating our emissions. Starting from the next year, i.e. FY 2020-21, we shall start reporting the trend of our GHG emissions, considering FY 2019-20 as the base year

HCFC-22 process leads to the generation of by-product HFC-23, having a Global Warming Potential of 11,700, which was earlier being thermally destroyed. The thermal destruction used to result in consumption of utilities and emissions generation. We are now utilizing HFC-23 for producing BTFM, which is raw material for various insecticides, thereby reducing several negative environmental impacts. Any leftover R23 is destroyed in the Thermal Oxidiser using RLNG. During thermal destruction, HF gas is produced which is quenched in water to produce 20% DHF (Dilute Hydrofluoric Acid) and this DHF is a raw material for Ethyl difluoroacetate (EDFA).

In our efforts to fight climate change, we have adopted several initiatives to increase our energy efficiency and thereby reduce GHG emissions:

- Sourcing and use of sulphuric acid with low SO₂ content and provision of standby SO₂ scrubber in the AHF plant;
- Multi-cyclone dust collector followed by bag filter has been provided to control the particulate matter;
- Installed close loop sampling system to avoid emissions;
- Switching to energy efficient machineries and processes such

as replacement of motors, reduced throughput, flash steam recovery systems, etc.;

- Use of condensate water for regeneration of caustic washing / water washing columns instead of fresh DI water;
- Recycling treated water from ETP in scrubbers.

Emission Intensity

Parameters	Value (for FY 2019-20)
Emission Intensity (in tCO₂/MT)	2.288
Total Production (MT)	404,199.81

Scope 3 GHG Emissions

Parameters	FY 2019-20
Scope 3 Upstream T&D	132,167.17
Scope 3 Downstream T&D	5,313,578.54
Scope 3 Use of Sold Products	2,307.12
Scope 3 Total (tCO₂)	5,448,053.83

This is the first year where we have calculated our Scope 3 emissions. As of now we have reported emissions data for three emissions categories. Going forward, we intend to establish mechanisms that will help us account other Scope 3 emissions. One of the initiatives undertaken by us to decrease our emissions is to increase the use of telecom, WebEx and other media for conducting internal discussions and reviews in place of physical travel to our plants.





Energy Management

In order to reduce emissions caused by upstream and downstream transportation and distribution emissions, we have started using Hazira port (Surat) as our primary port for transportation, which is comparatively near to our manufacturing facilities as compared to Kandla port, which was used earlier. Due to this change, we have saved road travel distance (approximately 400 kms) without any significant increase in ship travel distance. As emissions factor for road transportation is significantly higher than that of ship transportation, this has helped us further curb our GHG emissions.

NO_x, SO_x and Other Significant Air Emissions

We have necessary measures and controls in place to monitor and manage SO_x, NO_x and particulate matters well within the permissible limits. Each of our plants have necessary controls and measures in place to manage these emissions well within the permissible limits. Our Dahej plant has a coal-based

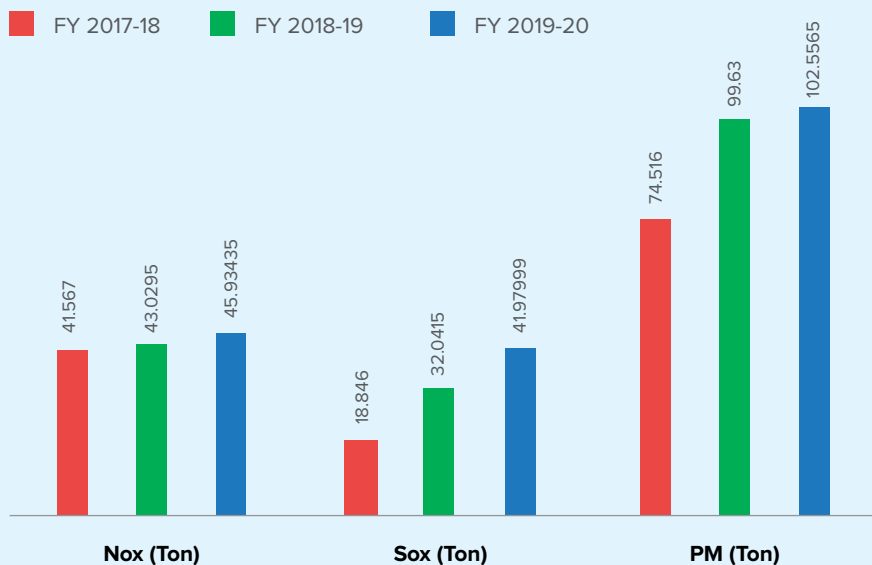
power plant where an electrostatic precipitator has been installed in the power plant for removing fine particles, dust and smoke from flue gas stack. Dahej also has installed cyclone separator, bag filter, Low NO_x burner and scrubbing system in production process for reduction of air pollution. Ranjitnagar plant has a gas-based power plant with low NO_x burner. At Ranjitnagar, Atmospheric Fluidised Bed Combustion (AFBC) has a low NO_x design and cyclone separator, dust collector, reverse pulse bag house to reduce the emission to atmosphere. Both Ranjitnagar and Dahej have online continuous stacks/

vents monitoring system for continuous monitoring of stacks/vents emission. To control the dust emissions during coal handling, a water spray dust suppression system is in place to improve air quality. Further, we have installed a dust collection system at the limestone handling facility and made provision for water spray system on grizzly to control coal dusting. We conduct ambient air monitoring twice a week through third party to ensure the quality of ambient air is within the limits prescribed in the National Ambient Air Quality Standards.

Air Emissions

Air Emission	FY 2017-18	FY 2018-19	FY 2019-20
Nox(Ton)	41.567	43.0295	45.93435
Sox(Ton)	18.846	32.0415	41.97999
PM(Ton)	74.516	99.63	102.5565

Air Emissions (MT)



Emissions of ozone-depleting substances (ODS)

We have modified our processes in order to reduce our emissions from ODS. HF (Hydrofluoric Acid) is key raw material for HCFC and is due for phase out as

per the Montreal Protocol, due to which we are reducing HCFC production for refrigerant. Some of the extra capacity of plant is being utilized for making HCFC for feed stock purpose which is PTFE. Since the overall HCFC production is reduced, more quantity of HF (produced

in-house) is now available, which will be used in making various Fluoro-speciality products for which plant installation is in progress. This complete strategy of reducing HCFC will lead to lowering of our emissions.

ODS Emissions

Production, imports, and exports of ODS in metric tons of CFC-11 (trichlorofluoromethane) equivalent.	Unit	FY 2017-18	FY 2018-19	FY 2019-20
HCFC-22 (R-22)	MT	14,176	17,999	20,217
Carbon Tetrachloride	MT	5,190.36	4,664.78	4,764.45
BTFM	MT	67.68	104.01	168.53

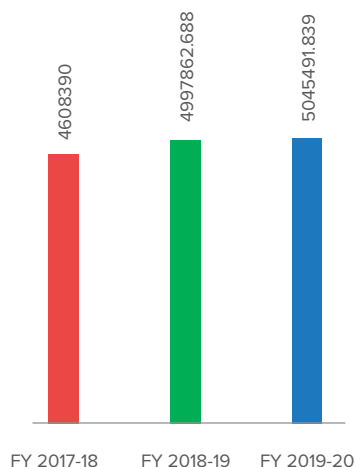
Water Management

Our source of water is surface water from the Narmada river through an express pipeline for both Dahej as well as Ranjitnagar plants. At Dahej, the water is being pumped through Narmada river by GIDC to their water reservoirs, which is located at about 12 kms from our plant. At GIDC reservoir's RCC channel, we have our own pumping station with reliable submersible pumps having standby facility, from where the water is being pumped to fulfil our daily average water requirement of about 12000 cum/day. For interim storage, we are also having water storage reservoirs having storage capacity of 60000 cum. At Ranjitnagar, for our regular water requirement we are procuring water from GWSSB (Gujarat Water Supply & Sewerage Board) through the pipeline from their canal. Average daily water requirement of Ranjitnagar plant is about 750 cum/day. For interim storage, we are also having water storage reservoirs with a storage capacity of 1890 cum. At our both our plants, we do not use ground water considering the low water table in the area and the problem of salinity.

In addition to this, we have installed rainwater harvesting modules within Ranjitnagar plant. The area covered under rainwater harvesting is 0.5 acre and a capacity of 450 cum, which helps increase the surrounding ground water table. In order to address water-related risks, we have adopted a strategic approach in our operations. As part of the approach, we have taken a holistic view of our water management to encompass fresh and recycled water consumption, water conservation

efforts and efforts on water reusing and recycling. Water is considered as raw material for our plant operations thus its utilization is directly linked with the production targets. Water conservation is a critical part of our IMS and Responsible Care Policy. Considering water as scarce resource, its consumption is being monitored at all consumption points by installing water flow meters. We are also tracking specific water consumption on a year-on-year basis.

Total Water Consumption



Energy Management

Water Withdrawal

Water withdrawal from GIDC for Dahej plant and GWSSB for Ranjitnagar plant against for the last three year is shown below:

Details of Water Withdrawal (cubic meter)

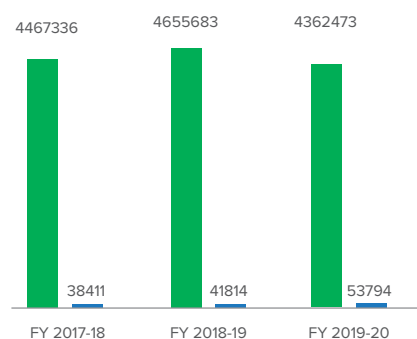
Plant	FY 2017-18	FY 2018-19	FY 2019-20
Ranjitnagar	161789	180380	216303
Dahej	4343958	4517117	4199964
Total	4505747	4697497	4416267

Following are some of our key responsible water consumption principles adopted by us:

- Continual improvement in our specific water consumption;
- Ensuring a 'near zero water leak' complex through the drive of ULS and Leak Detection and Repair (LDAR);
- Consistently ensuring leak-free systems for water withdrawal from source to our plants.

Water withdrawal at GFCL (M³)

- Surface water plant
- Surface water colony



Water Consumption and Water Conservation

We are consistently working to optimize consumption of raw water throughout our operational activities by substituting

it with recycled water based on its feasibility and suitability.

The key steps taken to reduce water consumption are as listed below:

- Increased focus on water recycling;
- Substantial increase in recovery of steam condensate from various processes and utilities. Steam condensate recovery of Ranjitnagar plant has been improved in last three years from 23280 cum to 39264 cum, i.e. the condensate recovery has been improved by 68%;
- Auto level controllers has been installed at various overhead

domestic water storage tanks at both plants;

- Auto control water level make up has been implemented at all the CT sump at both plants;
- At Ranjitnagar plant, we have taken CPP and Electrical MCC block's RCC roof top overflow water as rainwater harvesting in monsoon season, which is being diverted to water reservoirs, resulting in reduced water withdrawal from GWSSB;
- Sewage Treatment Plant (STP) treated water is being used for the purpose of green belt development at both plants (Ranjitnagar - 30 cum/day and Dahej - 40 cum/day)



Sr. No.	Water Conservation Initiatives	Outcome FY 2019-20
1	De-Ionization Water Treatment Plants to recover water from Ultra Filtration (UF) & RO rejects at CTs, to facilitate optimum water consumption across processes	Water savings from pt. no. 1 and pt. no. 2 by 2719 KLD
2	Increased throughput of ERS and utilization of treated water for most of the CT	Total water saving of 3136 KLD
3	Replacement of Honeycomb PVC fills to improve efficiency of CTs of S&A/PTFE cooling towers	Cooling efficiency of circulating cooling water was drastically improved
4	Reduction in Steam consumption from 1.15 to 1.14 Mt/Mt of NaOH	Steam savings of 0.01 Mt/Mt of NaOH through better insulation
5	Use of Condensate water for regeneration of Caustic washing / Water washing columns instead of fresh DI water in TFE-2 plant (Steam saving by heating DI water up to 65 oC)	Steam savings of 175 MT per annum
6	Installation & Commissioning of Boiler blow down Flash Steam Recovery	Steam savings of 2436 MT per annum
7	Overall Increase in Cycle of Concentrations (COC) of Cooling Water at identified CTs	Helps to save treated water

Water Recycling

We conserve water by reusing and recycling effluent water, wherever possible at both plants. Recycled water forms a significant portion of water consumed in our plant operations. Treated water from ETP, Reverse Osmosis and STP is recycled in process scrubber, CTs make up and gardening. Entire steam condensate from steam traps and heat exchangers is fully recycled back to steam boilers. We have considerably increased our water recirculation and recycling rate. Keeping in view the Responsible Care and IMS policies and guidelines, we ensure that all our facilities meet or exceed requirements for release of effluents. The details of water recycled at our plants are given below:

Water Recycled in FY 2019-20

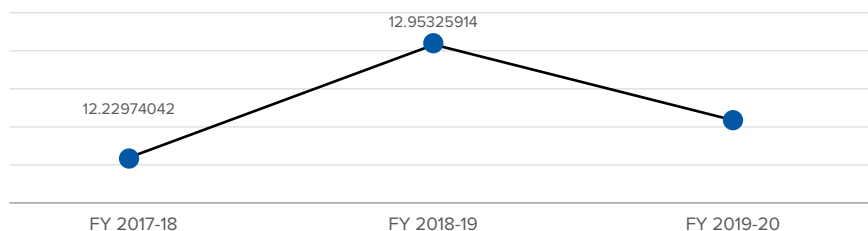
Plant	Quantity of Water Recycled (m ³)	Water Recycled as a % of Water Withdrawal
Ranjitnagar	51732	23.92%
Dahej	152636	3.63%
Total	204368	4.63%

Water Intensity

We have adopted a process-based approach to arrive at the values for water intensity. We aim to accomplish the target of reducing specific water consumption by maximum extent possible on year on year basis. At Ranjitnagar, overall water consumption has increased due to overall increase in production volume. However, during the reporting period, we have reduced the water intensity by about 8% compared to previous year, as per details captioned below. At Dahej plant, the water consumption pattern has been decreased substantially due to various initiatives taken for conservation of raw water which has resulted in reduction in specific water consumption by 10% in FY 2019-20 compared to the previous year.

Energy Management

Total water intensity (m³/MT)



Impact on Local Water Bodies

Since there is no water discharge from our plants to local water bodies, there is no polluted / contaminated at any local water bodies. Ranjitnagar is a zero-liquid discharge (ZLD) plant and at Dahej, the discharge of treated effluent is to deep sea through GIDC pipeline. To improve the local water bodies, a scheme of large check-dam is being implemented in Nathkuwa village near Ranjitnagar plant, which will increase the ground water table by surrounding area of about 3 km radius. We have conducted evaluations of all our facilities to determine proximity of our plants to ecologically sensitive or significantly important biodiversity areas. Aquatic evaluations are also completed at the corporate level to determine if any of our plants are located near rare, threatened, or endangered species, sensitive habitats, or the International Union for Conservation of Nature's (IUCN) Red List species. Water withdrawals from our facilities do not exceed volume thresholds and/or do not extract from Ramsar Wetlands sites or other highly sensitive water resources.

Water Discharge

The volume and nature of the wastewater we generate depends on the type of production at our locations.

We have therefore installed wastewater / effluent treatment techniques that are appropriate for each plant's production processes. Our Effluent data is monitored online and is made available to the Regulatory Authorities (Gujarat Pollution Control Board). Latest technologies are being implemented for the treatment of waste sewage water also at STP of both the plants. These techniques include physical, chemical as well as biological wastewater treatment. Ranjitnagar plant, being a ZLD facility, its entire wastewater is treated, recycled and reused, and the concentrate generated from the wastewater treatment is evaporated in spray dryer. A separate stream has been maintained for treatment of chloro-methane effluents (biological waste) which is treated biologically through aeration technology in ETP and no waste is moved out, where in Mixed Liquor Suspended Solids (MLSS) and Mixed Liquor Volatile Suspended Solids (MLVSS) are being monitored.

There has been no incident of non-compliance associated with water quality permits, standard and regulations in the reporting year.

Water Management Risks and Strategies for Mitigation

Both our plants have only one major source of water each, which have very

reliable and so far, there have been no major interruptions in water supply from both GIDC as well as GWSSB. However, being dependent on a single source, water unavailability risks due to failure in supply from GIDC and GWSSB, major breakage of transmission pipelines and force majeure exists. In order to mitigate any future risks, we have built adequate water storage to cover for any manage minor interruptions.

Closed Water-Cooling Systems

We have a total of 29 closed water-cooling systems to cater for various processes as well as associated utilities operations. These CTs are of various designs / capacities (details provided below) and are installed throughout the complex as per plant specific requirement. These CTs are being used to cool the return hot water from various processes / utilities help it get reused in the systems.

CMS – 1 & 2 PLANT (5)					CA PLANT (7)						
CMS	CMS	CMS-1	CMS-11	CFM	CA	CA	CA	CA	CA	CA	CA
I	II	VAM	VAM		New	Old	Flaker	A-VAM	Freon	China VAM	600-TR VAM
3300	3200	825	1050	450	2400	2400	600	300	300	300	730
600	600	150	150	150	500	500	100	50	50	50	120
5	5	5	5	5	5	5	8	5	5	5	5
Counter-w	Counter-w	Cross-w	Counter-w	Counter-w	Counter-w	Counter-w	Counter-w	Counter-f	Counter-f	Counter-f	Counter-f
4	3	2	1	1	3	3	1	2	1	1	4

Designed system details		Units		A&H Plant (2)		FI (1)
Designed system details				AHF	AHF	Plant + Uti
				Non Acidic	Acidic	
Design Circulation Rate	Dahej-A Complex Design Circulation Flow Rate of CW System	45506	m ³ /Hr	2250	1250	300
CT Sump Hold up Volume	Total Dahej Complex Design CT Sump Hold Up Volume	8338	m ³	436	292	50
Design "Delta # T"	Dahej-A Complex Design "Delta # T" (average value in Deg C)	5.4	°C	5	5	5
Type of the cooling tower	Include Draught Cross Flow / Induced Draught Counter Flow	w-wood, f-frp	Cross Flow / Counter Flow	Counter-w	Counter-w	Counter-f
No. of cells / fans in CT's				3	2	2

Power Plant			Polymer Complex (11)										
New	CCGT	D-PTFE	DPTFE	DPTFE	DPTFE	TFE	TFE	TFE	TFE	FKM/S&A	VDF	New Polymer	PTFE/PT-PTFE
CPP			5 th Reactor	6 th Reactor	7 th Reactor	1	2	3(LP)	3(HP)				
4950	5000	1300	250	250	250	3300	2475	1200	2475	726	1650	825	1200
600	700	320	50	50	50	600	500	300	500	150	300	120	300
10	8	5	5	5	5	5	5	5	5	5	5	5	5
Cross-w	Counter-f	Cross-w	Counter-f	Counter-f	Counter-f	Cross-w	Cross-w	Counter-f	Counter-f	Counter-w	Cross-w	Counter-f	Cross-w
3	6	2	1	1	1	4	3	4	8	2	2	4	3



Energy Management

Case Studies on Water Conservation

Case Study: Installation and Commissioning of ERS at Dahej

1. Project overview:

Conservation of process water by efficient recovery through membrane separation process has been designed and developed. This has reduced the raw water procurement from GIDC and also decreased associated pumping charges.

2. Existing Situation:

Daily, around 4000 KLD effluent is getting collected at Centralized ETP in various streams depending on the influent quality parameters. We have a total of six streams for treatment of the said effluent to meet the statutory norms.

3. Intervention:

Effluent generated from various streams is collected and separated based on its quality like high Total Dissolved Solids (TDS) and low TDS. For treatment of high-high TDS streams, a separate facility has

been installed, which is being used for the reject water of the ERS through membrane separation process.

With this intervention, about 4000 KL effluent is being bifurcated as below:

- 1) Total Incoming Effluent Quantity from the various plants / day to ETP = 4000 KL,
- 2) Total Quantity of low TDS effluent receipt / day at ETP = 2165 KL,
- 3) Total Quantity of high-high TDS effluent receipt / day at ETP = 200 KL,
- 4) Total Quantity of high TDS effluent receipt / day at ETP = 1635 KL,

Therefore, the ERS has been installed for the treatment of 2165 KLD of Low TDS effluent having design capacity of 2400 KLD, which is used to generate 1800 KLD of process water, which is being used as make-up water of most of the critical CTs apart from feed to various processes at Dahej plant. This action has

resulted in savings of around 1800 KLD raw water procurement from GIDC in addition to other benefits.

4. Outcome & Benefits:

- 1) Recycling / In-house generation of 1800 KLD process / raw water from effluent;
- 2) Reduction of 1800 – 2100 KLD effluent discharge to CETP of GIDC, Dahej;
- 3) Cost savings on account of 1800 KLD raw water procurement and saving of water cess charges of 1800-2100 KLD effluent discharge to GIDC;
- 4) Savings on treatment and pumping cost of 1800 KLD of process water from centralized pumping station of common utilities;
- 5) Overall reduction in handling of effluent discharge to GIDC by about 40%.



Case Study: Installation and Commissioning of 75 KLD Reverse Osmosis (RO) Plant at Ranjitnagar

1. Project overview:

A 75 KLD RO plant has been newly procured from a local manufacturer, installed and commissioned in the reporting year to treat the CT and boiler blow down water to reduce the effluent quantity which was earlier sent to ETP for evaporation.

2. Existing Situation:

Due to continuous expansion of specialty chemicals, the load on boiler and CTs was increasing, thereby resulting in higher blow down and increased load on ETP. Being a ZLD facility, the entire effluent had to be treated and evaporated thus consuming more energy and resources.

3. Intervention:

The project is installed by largely using existing infrastructure like tanks,

existing buildings etc. and only main equipment and instruments of the plant were purchased. It was installed in the existing utility section thereby utilizing existing resources like same manpower, building pipelines etc.

4. Outcome & Benefits:

The installation of RO plant has resulted in treatment of 75 KL water in which 60 KL water is pure and suitable for CT make up and other uses. This has resulted in reduction in load on ETP thus reduction in consumption of on average of 3 SCM / day of natural gas.



Effluent Management

Furthering our efforts towards environmental stewardship, our Ranjitnagar plant is a ZLD facility where final effluent after recycling is evaporated in spray dryer. We have adopted a strategized approach of effluent discharge at Dahej plant to ensure that water quality parameters such as pH, Biological Oxygen Demand

(BOD), Chemical Oxygen Demand (COD), colour, fluorides and Total Soluble Solids (TSS) are kept within permissible limits. We have a continuous online monitoring system which is linked with CPCB servers.

The effluent generated from the site is treated in-house as primary, secondary, tertiary and RO treatment. We further reuse RO permeate in cooling towers

and the treated sewage water is used for gardening and for coal dust suppression. The treated effluent is discharged into deep sea through GIDC drainage line after achieving norms prescribed by Pollution Control Board. There is no discharge of wastewater outside the premises in any case. Effluents discharged from our plants do not affect any water bodies in our surroundings.

Waste Management

As a responsible Company, our approach is to eliminate, reduce, reuse and recycle waste across all our operations. Our 'Value from Waste' initiative systematically collects scrap and thereby ensures safe storage / disposal of all kinds of waste generated. This is aimed at reducing the quantity of waste produced by our operations by following the principles of reuse and recycle, in an environmentally friendly manner. To achieve the objectives of waste management and reduction, we have designated teams at both the plants who continuously implement the requirements of Pollution Prevention Code of our Responsible Care management system. We have been making consistent efforts to apply the waste management hierarchy to all our waste.

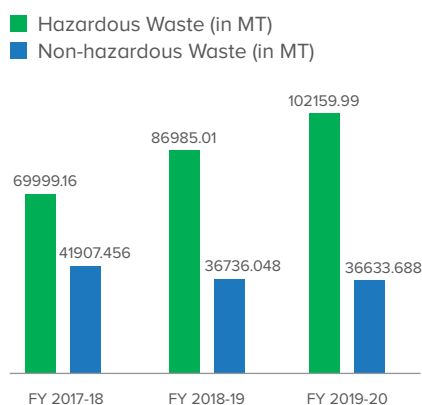
Refining our management governance structure to further strengthen our waste management, we have formed Waste Management Task Forces. These task forces serve the purpose of developing a structured approach for prevention and reduction of waste generation. Further, they also take efforts towards creating some value from the generated waste, which is an extension of our 'Value from Waste' initiative that aims at achieving 100% utilization of key wastes by 2025. These task forces are formed separately for each plant. The assessments made by the task forces are presented to Management for providing resources for executing the recommended actions. The line managers are responsible for strategizing waste reduction and waste disposal methods, following the waste management hierarchy for increased recycling and reusing of waste produced.

Key improvements by Waste Management Task Force:

- Identification of leakages from utilities line, which has resulted in reduction of five KLD of effluent load and reduced excess water consumption;
- Identification and replacement of leaky taps in toilets which has resulted in reduction in STP load by three KLD and has also reduced excess water consumption;
- Replaced regular water taps with push cocks to reduce the effluent load on STP as well to reduce the freshwater consumption by around one KLD.

We also turn all our canteen waste to compost, thereby reducing the burden on landfill sites.

Waste Generated



We monitor the soil environments of worksites, strictly prevent the diffusion of pollutants, and actively work to prevent contamination. To achieve this goal, every quarter we analyse the groundwater at the boundaries of our worksites in nearby villages to confirm

that levels of hazardous materials are below those stipulated by standards. To prevent soil contamination, we have established rules regarding the construction standards along with regular inspections of various equipment, including the gutters, floors, plumbing, and bund walls of facilities handling chemical substances. We are working to prevent soil contamination from leaks by thoroughly complying with these rules. Regular soil sampling is done for plant premises as well the surrounding villages to monitor the soil quality and to confirm if there is any diffusion of pollutants into soil.

An LDAR programme has been implemented to locate and repair leaking components, including valves, pumps, connectors, compressors, and agitators, in order to minimize the emission of fugitive Volatile Organic Compounds (VOCs) and Hazardous Air Pollutants (HAPs). Our entire manufacturing system is designed in closed piping, thus the chances for odour are very rare.

Chemical manufacturing may create noise in many ways, for example by; operations of compressors and vacuum pumps, moving raw materials and goods to and from plant and using vehicles on site, especially if they have reversing alarms. We have a process to control and reduce the noise level below the standard requirement of Ambient Air Quality Standards as per Environment Protection Act, 1986. Noise or vibration from our activities does not cause a nuisance to the surrounding community. We have a yearly environmental monitoring plan wherein we have defined the frequency of samples to be taken internally or externally by third party for Ambient Air, Stacks, ETP and Noise Monitoring.

Non-Hazardous Waste:

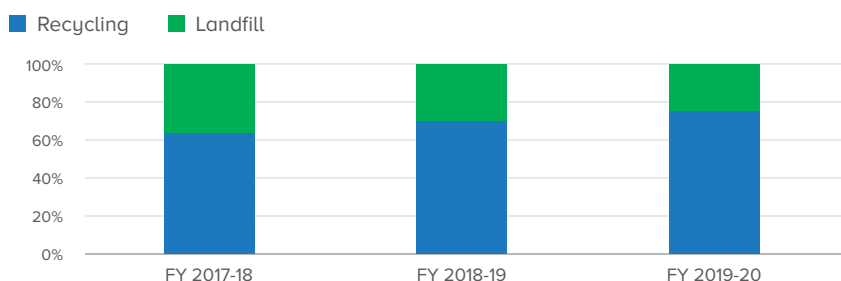
At GFCL, non-hazardous waste is either recycled or reused by third parties. Fly ash, metal scrap, plastic scrap, paper and wooden material scraps are a few major contributors of non-hazardous waste.

Further, we are highly committed about minimising plastic waste and littering. Hence, the products are packaged in bulk quantity and in tankers, which considerably reduces the Company's consumption of packaging materials. We believe in supporting circular consumption patterns of re-using, re-storing and re-pairing rather than buying new products; e.g. Some products are sent in drums and carboys, which are reused wherever feasible.

Classification of Non-Hazardous waste

Non_hazardous Waste	FY 2017-18	FY 2018-19	FY 2019-20
Recycling	26,802.46	25,932.05	29,411.85
Landfill	15,105	10,804	9,394
Total	41,907.46	36,736.05	38,805.85

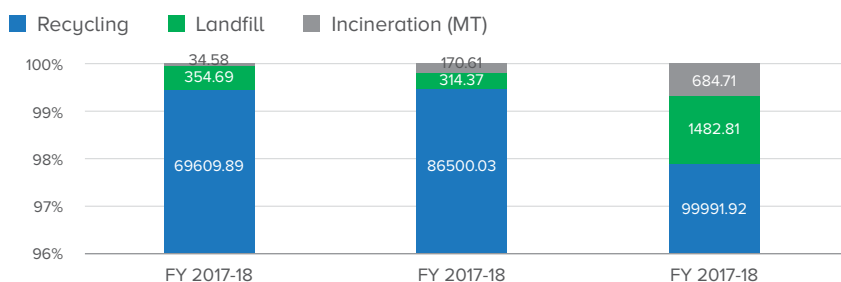
Non Hazardous Waste



Classification of Hazardous waste disposal

Hazardous Waste disposal	FY 2017-18	FY 2018-19	FY 2019-20
Recycling	69,609.89	86,500.03	99,991.92
Landfill	354.69	314.37	1,482.81
Incineration	34.58	170.61	684.71
Total	69,999.16	86,985.01	102,159.44

Hazardous Waste Disposal



Hazardous material and waste:

Hazardous waste generated during production is sent to the SPCB approved agencies and cement industries as co-fuel. This reduces the use of non-renewable fuel and reduces the net overall GHG emissions. All other waste is segregated based on their characteristic and then disposed of as per the hazardous waste authorization issued by the GPCB.

There are two methods for storing, labelling and handling hazardous material. Liquid effluent is directly transferred to suitably designed storage tanks with dyke walls. This liquid effluent is transferred through pumps to designated tankers supplied by authorised waste collector for co processing in Cement industries. Solid hazardous waste is collected in suitably designed, leak proof bags and stored in approved hazardous waste godown. These bags are sealed, properly labelled and sent for disposal to an approved waste collector.

E-waste, decontaminated drums, used oil, corrugated box waste, used batteries and plastic waste and other recyclable waste is sent to SPCB approved agency for recycling. Bio-Medical waste generated from Occupation Health Centre (OHC) is sent to SPCB approved agency for safe disposal as per Bio Medical Waste Management Rules 2016. We always send our waste through GPS system equipped vehicles to track their route.

In case of domestic transportation and disposal of hazardous waste, we make efforts to appropriately transport and dispose hazardous waste to prevent the exposure of toxic materials. Below are some precautions we take during the transportation of Hazardous material;

Waste Management

- Every goods carriage carrying dangerous or hazardous goods shall display a distinct mark of the class label appropriate to the type of dangerous or hazardous goods.
- Every package containing dangerous or hazardous goods shall display the distinct class labels appropriate to the type of dangerous or hazardous goods.
- In the case of packages containing goods which represent more than one hazard, such packages shall display distinct labels to indicate the hazards.
- Every goods carriage carrying goods of dangerous or hazardous nature shall be fitted with a GPS to record the lapse of running time of the motor vehicle; time speed maintained, acceleration and declaration etc., along with a spark arrester.

Classification of Hazardous waste transported

Total weight- Dahej (MT)	FY 2017-18	FY 2018-19	FY 2019-20
Hazardous waste transported- Dahej	148.6	388.73	1338.88
Hazardous waste transported- Ranjitnagar	69850.56	86596.28	100821.11

Our guidelines and procedure for managing, labelling, packing, handling and transporting of hazardous material is based on regulations, including Central Motor Vehicles Rules, 1989, Explosive Rules, 2008, Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 and Hazardous Waste Management Rules – 2016. Various training programmes are conducted on Handling of Hazardous Chemicals on regular basis, including training on packaging, handling and transportation of hazardous material, especially for the drivers. The Company lays emphasis on controlling air pollution primarily at sources rather than on end of the pipe treatment. We aim at going beyond compliance on air emission norm which is reflected by our air pollution control measures.

Regular evaluations of chemical storage safety and security risks are conducted. These evaluations consider the hazards of the material, the likelihood of accidents / incidents, and the potential for human and environmental exposure

from release of the material over the route of transport and handling in the distribution chain as well during storage and handling of hazardous material inside manufacturing unit.

A first step in prioritization is to identify hazards which are likely to occur due to loss of containment associated with existing and new materials or wastes in transit and during off site handling. This includes hazards from exposure, fire, explosion etc., to the general public and also to the environment. The UN international classification system and Central Motor Vehicles Rules, India are useful in this prioritization. This information is included in Material Safety Data Sheets (MSDS) and Transport Emergency (TREM) Cards, along with signages in local languages that installed at various designated locations inside the factory. The materials are then be ranked by hazard, from higher to lower.

At GFCL Hazardous Material Management activity begins with listing

all chemicals including raw materials, intermediates, products, and wastes. It ranks these chemicals by hazard, from higher to lower, based on UN Class / Division and Packing Group, considering factors such as inhalation toxicity, explosivity, flammability, environmental impacts, etc from Global Harmonized Material Safety Data Sheet. It then evaluates them based on storage quantity, standby storage tanks, instrumentation involved with storage tanks, tonners, cylinders and sheds, movement, exposure, considering the volume per trip, number of trips, and trip distance.

Training is given to Company employees and contractor employees to meet regulations and internal Company requirements for safe handling of materials. Once the applicable regulations have been identified, employees and contractors performing the regulated functions are identified and trained in those regulations. Additionally, Company has established a training programme based on job descriptions / function of individual employee (own or contractual). For each training class, the time between subsequent trainings is specified.

In case of regulatory requirements related to training, we follow the requirements of the specific regulation. We give more emphasize to in-person training rather than computer-based training. Also, we have assigned responsibilities to keep training materials up to date according to changes to the regulations or Company requirements.

Trainers are trained to give trainings and they hold a competency certificate. The external trainer's competency certificates are kept along with the training records. We have established a training matrix for each site, to ensure employees requiring certain training are

identified. Adequate training records are kept demonstrating that training has taken place, including date, time, place, and names of the participant and trainer. Effectiveness of training is measured, in addition to tests that may be administered after the completion of training, through other ways to evaluate if the person is performing in accordance with his or her training (field observation, incidents, etc.)

All documented loading procedures and checklists are in place for each chemical, and personnel responsible for loading are fully trained in the procedures. It also includes proper PPE to be worn, fall protection and ergonomics for loaders, vapour and emissions recovery, overfill protection, spill containment, protection from movement of the equipment being loaded, gas detectors as applicable; automatic or emergency shutdown in the case of hose breaks or other emergency, and emergency response to incidents. Before loading commences, the operator checks that the equipment is the correct equipment / specification for the product, is in good condition, and all its regulatory required tests are up to date. It is also ensured that adequate procedures are in place for proper loading of products so that they can be safely unloaded at customer site.

We continuously work towards keeping the environment clean and safe for working in the plant, preventing corrosion to the structures and equipment, ensuring that the flora and fauna flourish in the vicinity. There is continuous effort to improve and achieve the above objectives by identifying the opportunities of air pollution abatement and converting them into Environment Management Programmes (EMPs) and implementing them systematically within the framework of the existing Environment Management System.

Monitoring, measurement and implementation status of Quality EHS Management Programmes is evaluated every month and presented in the form of Monthly Report.

Waste Management initiatives taken by GFCL:

- Equipment process are properly maintained and monitored through Leak Detection and Repair Technique which reduces air emission.
- Plant has confined storage area for raw material, product and waste which reduces the risk of spill, leakage and chemical reaction.
- Generated waste is monitored regularly and sent to disposal facilities in a secured way.
- We have established internal technical standards to voluntarily reduce hazardous substances.

Opportunity to Use Waste Generated as a Raw Material for Other Industries

While minimum waste is being generated as our manufacturing facilities, we believe in following the Circular Economy approach and we have identified opportunity for utilization of waste generated from our industry as a raw material for various other industries. The Organic Solvents containing Copper solution and 5%-20% Ammonia Solution are generated from our Fluoro Intermediate Plant. Earlier we were sending waste to Pre-Processing industries for converting it into Alternate Fuel Source. We have seen valuable resources in Copper solution and 5%-20% Ammonia solution and will be selling to other industries as a raw material for 100% utilization after getting due approvals.

As part of our collective approach, we undertake tasks such as management of waste inventory (hazardous and other wastes), categorization, benchmarking and target setting. We are focused on minimizing waste generation and maximizing waste utilization. To realize our goals of efficient waste management, we also set yearly targets for waste disposal.

Spill Management

At GFCL we know there always exists possibility of spillage of chemicals during handling, storage and use of chemicals. Significant spills are considered based on severity level based on chemical characteristic and as defined by ISO 14000. As a Company policy we have taken measures to prevent unintentional release of chemicals within and outside the boundaries of the factory.

With an objective of minimizing the impact of spillage on-site, off-site and to protect the factory personnel, environment and public in the vicinity of the site, we have established an emergency response plan. The plan sets out Standard Operating Procedure to be implemented in case of any chemical spill in the premises. We have also provided dyke walls and sandbags to contain spillage. Safety Manual and MSDS readily available with Incident Officer and in Shift Executive's Office. There were no significant spills in 2019-20 from both plants i.e. Ranjitnagar and Dahej.

Fly Ash Utilization:

We focus on maximum utilization of fly ash generated from power plant and boiler. We are sending fly ash to brick manufacturing industries for maximum utilization. Following the waste mitigation hierarchy, we adopt an on-

Waste Management

site management strategy for the fly ash generated during the operations. These are being updated considering international best practices and guidelines to enhance our process of fly ash management as per law of land. To prevent dusting of stored fly ash we have installed a water precipitating system in storage warehouse. While transporting the fly ash to brick industries we take utmost care by covering the vehicle entirely with tarpaulin, beside continuously tracking it.

Fly ash generation and disposal

Total weight- Dahej (MT)	Unit	FY 2017-18	FY 2018-19	FY 2019-20
Ranjitnagar				
Waste generation	MT	160.82	297.65	390.08
Landfill	MT	0	0	0
Reuse in cement and brick kiln	MT	160.82	297.65	390.08
Dahej				
Waste generation	MT	24,289	22,215	26,451
Landfill	MT	0	0	0
Reuse in cement and brick kiln	MT	24,289	22,215	26,451

Project overview:

'FOODIE' is a fully automatic composting machine, which converts all kinds of organic waste into compost within 24 hours at our premises and solves our canteen waste management problems completely. 'FOODIE' satisfies the 3R Principle: Reduces garbage at source, Recycles organic waste into compost, Reuse compost for garden, plants.

Problem Statement / Existing Situation:

Handling and managing left out food material and vegetable remains was a huge challenge. It generated bad odour and had the potential to affect the health of people responsible for handling and managing of waste.

Project / Intervention:

'FOODIE' is a fully automatic and highly compact composting machine which uses special microorganisms to break down and decompose all kinds of organic waste into compost within 24 hrs with a volume reduction of 85-

90%. The entire process is natural and biological. Th special microorganisms thrive in high temperature and are effective even in high acidic or salty conditions. The 'FOODIE' has a U-shaped composting tank, with a humidity sensor, heater, mixing blades and an exhaust system.

When organic waste is added to it, moisture is sensed by the humidity sensor, due to which the heater turns ON and the composting tank gets heated. Due to this, the water content in the organic waste is evaporated and it goes out to the atmosphere as water vapor through the exhaust system. As any organic waste contains 70-80% water content, we achieve 70-80% volume reduction at this stage itself.

At the same time, special microorganisms then decompose the organic waste into compost within 24 hours. That's how we achieve 85-90% volume reduction. The process is completely noiseless as there is no crushing or grinding involved. The blades are just for evenly mixing the waste.

Outcome & Benefits:

- Saving in cost of collection, transportation & disposal of waste.
- Help in creating zero garbage in factory.
- Preserving landfills space
- Protects the environment.
- Reduces water pollution.

Intervention Highlights:



Organic waste



Fully Automatic Mechanized Composter



Final Compost

Biodiversity

From our early days, we at GFCL have always encouraged taking positive steps towards environment, which includes protecting the atmosphere and aquatic environments, conserving resources and managing waste, properly managing chemical substances, protecting biodiversity, and protecting soil environments. Our efforts for ecosystem and biodiversity management contribute towards the achievement of UN's SDG 15 - "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss". Each worksite is striving to enhance its initiatives aimed at achieving these goals. At an organization level all key decisions and initiatives for biodiversity are taken by SARS committee, which is headed by our CEO.

Ranjitnagar has a total area of 54 Acre of which 38 % is green belt, while Dahej has 101.4 Acre total area with 11% green belt. Our Dahej plant Lies in industrial area and Ranjitnagar plant in non-Industrial area. Apart from this, GFCL regularly monitors the impact of its operations on the surrounding ecosystem by conducting periodic environment impact studies through external experts. It also carries out environment impact assessments for all greenfield and brownfield projects to understand and mitigate their impacts on the surrounding environment and ecosystem.

Both the plants had their assessment to identify the representative spectrum of threatened species, population and ecological communities as listed by IUCN, ZSI, BSI and in Indian Wildlife Protection act, 1972. As per study conducted, no endangered or listed

flora and fauna was found in the area. Base line study for the evaluation of the flora and fauna biodiversity of the terrestrial environment of the study area was done within 10 Km radius of GFCL site which indicated no adverse effect on flora, fauna, natural habitat etc due to its operation. Training programmes for the conservation and sustainable use of biodiversity are arranged by GFCL. Apart from that, promoting public education and awareness of the conservation and sustainable use of biodiversity is also done by GFCL during environment day and ozone day celebration. During plantation drives in and around plant areas and in the neighbouring villages importance of biodiversity is explained.

We have always taken extra steps for ensuring no damage is done to biodiversity due to the Company's operations, this is done by various initiatives including continuous monitoring and regulating noise level within plant and around factory premises. Units have installed continuous fugitive pollution monitoring devices running all the time to monitor and control the air pollution outside Company. Also, training to villagers and young minds in the school is given on this subject. Ambient Air quality is monitored in neighbouring villages and the same was found to be within the permissible limits in a recent evaluation.



Few of the Initiatives taken include:

- GFCL is working on Miyawaki Methodology, a Japanese methodology of dense plantation proven to work worldwide, irrespective of soil and climate conditions. Some highlights of this methodology which include
 - 1) Approximately 30 times denser, as compared to conventional plantation techniques.
 - 2) Up to 30 times or more carbon-dioxide absorption as compared to conventional forest.
 - 3) Around 30 different native species planted in the same area in cluster plantations.
- Controlling Noise levels- Continuous noise monitoring is done in all operation and non-operation areas and noise levels are maintained below as defined in The Noise Pollution (Regulation and Control) Rules, 2000. Necessary enclosures, buildings, sheds are made in the plant areas where noise level do not meet the standard criteria.
- Conservation steps for flora and fauna inside campus. - There is continuous drive to increase tree plantation on continuous basis. It is made sure that native species are used while planting the trees.
- Tree plantation of 2000 native trees in which 90% survival rate was observed. There are over 10,000 trees of various sizes in the Ranjitnagar plant and some are as old as the plant itself.

Waste Management

Material

At GFCL, we aim to procure raw material in the most sustainable manner, and this is rooted in the commitment of the Company towards Sustainability. Priority is always given to usage of recycled products, material manufactured using least energy and most optimized process. By following this thinking, we ensure that the product manufactured by GFCL have the least environmental impact. Along the same line, all employees responsible for sourcing are given continuous technical trainings and suppliers are also trained on latest trends and knowledge by conducting various seminars.

Non-renewable materials are primary source of our input material. Major

raw materials used by GFCL include Fluorspar, Sulphuric acid, Methanol, Oleum and Salt. Special focus is laid on Packaging material, where after doing feasibility study wooden pallets are preferred in place of plastic or glass. Due to good integration and process optimization we can produce many raw materials inhouse, for example Hydrogen, Caustic Soda, Chlorine, DHF etc are released as by products which are internally transferred from one unit to another for better utilization. As most of the raw materials used in our operations are hazardous due care is taken from safe storage to transportation. Manufacturing, storage, and import of these materials are governed by the Manufacturing, Storage,

and Import of Hazardous Chemicals Act 1989. Furthermore, several vendors are engaged simultaneously to ensure steady and timely supply. HFC 23, DHF are two recycled input material used in our products. In the reporting year 94% of the DHF utilized by us was sourced through in-house recycling.

This year a total of 4,72,564 MT of Raw material was consumed which is 6% less than FY 18-19, along with increase of Renewable material consumption by 20%. This reduction is only possible due to process optimization along with better utilization of material inside the Company.

Classification of raw material consumption

Raw material consumption	Unit	FY 2017-18	FY 2018-19	FY 2019-20
Non-renewable material	MT	4,53,154.70	5,03,146.36	4,72,564.71
Non-renewable material	No.	3,27,514.00	4,69,300.00	4,63,323.00
Renewable material	No.	13,475.00	18,853.00	22,599.00

We have always focussed on manufacturing responsible products which require least amount of resources. We aim to locally source most of our raw materials, this helps us in having better interaction with suppliers and thus optimize and innovate through joint. Purchase and consumption of materials is recorded and monitored through SAP.

In last couple of years our Custom port base has changed from Nhava Sheva and Kandla to Hazira which is much closer to our operation thus reducing significant carbon footprint during inland transportation.

Our entire process for new products is designed in such a way that output of one process is used as raw material

for another product, thus reducing the transportation in sale and purchase. For example, BTFM product is produced at Ranjithnagar uses the available HFC 23 which was being incinerated earlier.

Our well-set R&D focuses on process improvements to achieve efficiency in material consumption. Achieving material efficiency helps in reducing cost of operations and reduces environmental footprint. Moreover, our R&D team continuously tries to use environment friendly raw materials for new products. There is always a great focus on reducing specific raw material consumptions across all stages of value chain starting from design to disposal to improve efficiency and reduce associated carbon footprint.

Way Forward:

- GFL will continue to train all stake holders in all aspects of Environment sustainability.
- GFL will strive to reduce its fugitive emissions for which targets are given.
- GFL is implementing LDAR (Leak Detection and Repair) methodology to identify all leakages to save material and reduce fugitive emissions.
- We will strive to align our Emission reductions in through Pollution Control pillar of Responsible care to bring everyone in line with this goal.
- Emission reductions will be integral part of employees' KRA to put more focus on this aspect.



Gujarat Fluorochemicals Limited

Inox Towers, 17 Sector 16 A,
Noida - 201301, Uttar Pradesh
Tel.: +91 120 6149600
Fax: +91 120 6149610