Pollution Prevention at Source through ‘Cleaner Production’ – Contribution of GCPC

Gujarat Cleaner Production Centre
(Established by Industries & Mines Department, Government of Gujarat)

Dr. Bharat Jain
Member Secretary
Contents:

• Gujarat: Growth Engine of India
• Introduction to Cleaner Production
  Gujarat Cleaner Production Centre
• Achievements of GCPC
• Cleaner Production Case Studies
• Industrial Symbiosis and Eco – Industrial Park
• Cleaner Production Award
• Financial Assistance Scheme under Gujarat Industrial Policy – 2015
## Contribution of Gujarat in Chemical Sector (in %)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt Processing</td>
<td>98</td>
</tr>
<tr>
<td>Diamond Processing</td>
<td>80</td>
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<tr>
<td>Plastic Industry</td>
<td>65</td>
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<tr>
<td>Petrochemicals</td>
<td>62</td>
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<tr>
<td>Chemicals</td>
<td>51</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>35</td>
</tr>
</tbody>
</table>

## Gujarat's share in India (in %)

<table>
<thead>
<tr>
<th>Category</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exports</td>
<td>22</td>
</tr>
<tr>
<td>Fixed capital investment</td>
<td>17</td>
</tr>
<tr>
<td>Value of output</td>
<td>16</td>
</tr>
<tr>
<td>Net manufacturing values</td>
<td>12</td>
</tr>
<tr>
<td>No. of factories</td>
<td>10</td>
</tr>
<tr>
<td>Geographical area</td>
<td>6</td>
</tr>
<tr>
<td>Population</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Vibrant Gujarat Summit 2015, manufacturing sector profile
Industrial Development in Gujarat

1 State - Gujarat
12 SIRs
60 SEZs
83 Product Clusters
257 Industrial Estates
Delhi Mumbai Industrial Corridor

- A **high impact industrial area** within 150 km distance on both side of the **Dedicated Freight Corridor (DFC)**, with an investment potential of Rs. 6000 billion.

- Being laid down between Delhi and Mumbai, **DFC is a new rail transportation system with high axel, multi modal and computerized features**.

- 38% (564 km) of the 1500 km length of DFC will pass through Gujarat.

- DMIC area to be developed as ‘**Global Manufacturing & Trading Hub**’ in two phases (6 nodes) – supported by world class infrastructure & enabling policy framework.

- Expected to **triple industrial output in five years**

- The influence area covers
  - 62% of total area of Gujarat (**18 out of 26 districts within the influence area**)
  - Investment potential for Gujarat is about US$30bn (**1/3rd of total investment potential in DMIC**.)
DMIC: Proposed Module in Gujarat
Dahej PCPIR & Dholera SIR
Dholera SIR: Ideally located, widely connected...

- **Silent Features**
- Total Area: 920 Sq. km
- Developable Area: 567.39 Sq. Km
- High Access Corridor: City Center, Industrial, Logistic, Knowledge & IT, Recreation & Sports, Entertainment
- World-class infrastructure & connectivity: within & outside
- Central spine express way & **Metro Rail to link the SIR with mega cities**
- **Airport & Sea Port in the vicinity**
- Proximity to mega cities: Ahmedabad, Bhavnagar, Vadodara
Petroleum, Chemical & Petrochemical Investment Region (PCPIR), Dahej

Location | Dahej, Gujarat (India)
--- | ---
Area | 453 sq. Km
Focus Sector | Chemical & Petrochemical
Investment Already made & committed | Rs. 90,000 Crore (USD 20.5 bn)
Infrastructure Development | Rs. 3,200 Crore (USD 727 mn)

- Concentration of Petroleum, Chemical and Petrochemical estates around PCPIR
- Rich natural resources and feedstock
- All infrastructure - road, rail, port, power, gas, water - in place, with planned up-gradation
- Chemical Port and Storage Facility
- LNG terminal
- PCPIR specific infrastructure - effluent disposal pipelines, solid waste disposal sites
- Quality Work Force, Peaceful Labour
Such a Large Number of Chemical Industrial Estates demand Adequate Steps for Environment Protection....

Gujarat Cleaner Production Centre
Reactive steps towards pollution control:

**Effluent collection system:**
GIDC has provided net work of underground collection system with pumping stations to collect treated effluent from each unit in all of its major chemical estates.

**Treatment:**
There are total of 34 CETPs, (out of which 28 are operational) constructed to treat the effluent from various industries.

**Disposal of treated effluent:**
Treated effluent has to be disposed off at suitable disposal point identified by GPCB. For Ankhleshwar, Panoli & Jhagadia and Dahej, Vilayat & Sarigam estate, marine diffuser arrangement has been done.

**Disposal of solid waste:**
There are total 8 nos. of common TSDFs available for disposing solid waste.
A step towards Proactive Approach...

Pollution Control

to

Pollution Prevention (Cleaner Production)
“Cleaner Production is the continuous application of an integrated, preventive environmental strategy towards processes, products and services in order to increase overall efficiency and reduce damage and risks for humans and the environment.”
Cleaner Production Tools

CP TOOLS

- Source Reduction
  - Good House Keeping
  - Raw Material Change

- Process Change
  - Better Process Control

- Recycling
  - On-site Reuse and Recovery
  - Equipment Modification
  - Technology Change

- Product Modification
  - Creation of Useful By-product
CP Methodology

Planning and organization

Pre-assessment (qualitative review)

Assessment (quantitative review)

Evaluation and feasibility study

Implementation and continuation

The recognized need for Cleaner Production

• Obtain management commitment
  . Establish a project team
  . Develop policy, objectives and targets
  . Plan the Cleaner Production assessment

• Collection of quantitative data
  . Material balance
  . Identify Cleaner Production opportunities
  . Record and sort options

• Prepare an implementation plan
  . Implement selected options
  . Monitor performance
  . Sustain Cleaner Production activities

• Company description and flow chart
  . Walk-through inspection
  . Establish a focus

Sustain and continue EMS

Preliminary evaluation
  . Technical evaluation
  . Economic evaluation
  . Environmental evaluation
  . Select viable options

Successfully implemented Cleaner Production projects
Economy and Ecology in opposite Direction
Sensitive balance

ECONOMIC FACTORS!

ENVIRONMENTAL FACTORS!

Gujarat Cleaner Production Centre
Happily Married
The Global CP – Network

UNIDO / UNEP National Cleaner Production Centres (NCPC)

Other CPC and network members (not exhaustive)
The Gujarat Cleaner Production Centre (GCPC) has been established by Department of Industries & Mines, Govt. of Gujarat, working as an Environment Cell of Gujarat Industrial Development Corporation (GIDC) since 1998 under technical guidance of United Nations Industrial Development Organization, Vienna (UNIDO) to solve environmental problems of GIDC industrial estates in Gujarat.
Objectives

- To create awareness on cleaner production.
- To provide cost effective training on CP to industrial personnel for production assessment and implementation of CP tools.
- To organize and conduct cleaner production Demonstration projects in different clusters of Industries.
- To develop expertise and thus provide consultancy advisory services on cleaner production.
- To create databank and information centre on CP.
- To work as nodal agency for transfer of Cleaner Technology.

Activities

- Orientation Programmes
- CP assessment projects
- Training Programmes
- Dissemination Programs

Gujarat Cleaner Production Centre
Welcome to GCPC website

Cleaner Production (CP) is a holistic proactive approach to End-of-pipe Treatment (EOP) that is applied to the entire production cycle to:

- Increase productivity by ensuring a more efficient use of raw material, energy and water
- Promote better environmental performance through reduction at source of waste and emissions

GCPC aims at promoting the application of CP and other environmental management practices across various industries and help them in its implementation. It does so through CP Orientation Programmes, Training Programmes, CP Assessments and Dissemination Programmes. Adopting such
GCPC at State, National and International Level

- FORESTS & ENVIRONMENT DEPARTMENT GOVERNMENT OF GUJARAT
- GUJARAT POLLUTION CONTROL BOARD GOVERNMENT OF GUJARAT
- GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION GOVERNMENT OF GUJARAT
- INDUSTRIES COMMISSIONERATE GOVERNMENT OF GUJARAT
- INDUSTRIES ASSOCIATION
- LOCAL CLEANER PRODUCTION CENTRES
- ACADEMIC INSTITUTION
- INDUSTRIES
- UNITED NATIONS INDUSTRIAL DEVELOPMENT CORPORATION (UNIDO)
- DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT (GIZ) GMBH
- UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)
- RESOURCE EFFICIENT & CLEANER PRODUCTION NETWORK (RECP)
- CLIMATE TECHNOLOGY CENTRE & NETWORK (CTCN-UNFCCC)
- MINISTRY OF ENVIRONMENT FOREST & CLIMATE CHANGE, GOVERNMENT OF INDIA
- CENTRAL POLLUTION CONTROL BOARD GOVERNMENT OF INDIA

Gujarat Cleaner Production Centre
Achievements: At International Level

- GCPC is a regular member of Global Network on RECP (RECPnet) and recognized at par with NCPCs by UNIDO.
- Participated in Regional meets organized by UNEP and UNIDO.
- GCPC is regular member of Climate Technology Centre and Network (CTCN), the operational arm of the UNFCCC Technology Mechanism, hosted and managed by UNEP in collaboration with UNIDO.
Regional training on “Resource efficient and Responsible Production” organized by UNEP and NCPC, Sri Lanka

Dr. Bharat Jain, Member Secretary, GCPC participated in the Regional training on “Resource Efficient and Responsible Production” at Sri Lanks (In the First row of upwards L to R second)
“9th Asia Pacific Roundtable for Sustainable Consumption and Production” at Sri Lanka for Paper presentation organized and sponsored by UNIDO

Dr. Bharat Jain, Member Secretary, GCPC discussing Cleaner Production initiatives taken up by Government of Gujarat in “9th Asia Pacific Roundtable for Sustainable Consumption and Production” at Sri Lanka
Regional Working Meeting of National Cleaner Production Centers and Programmes in Asia Pacific Region held from 20-21 January 2011, UNIDO Regional Office at Jakarta, Indonesia

Dr. Bharat Jain, Member Secretary, GCPC had presenting the inventory of activities and achievements of GCPC, Gujarat, India relevant to eco industrial parks in the workshop held at Jakarta, Indonesia
Inaugural meeting of the Regional Chapter of RECPnet and training on Knowledge Management System (KMS) for Asia and Pacific Region sponsored UNIDO and VNCPC

Ms. Chinkal Patel, GCPC had presented the inventory of activities and achievements of GCPC, Gujarat, India relevant to eco industrial parks in the workshop held at Hanoi, Vietnam
An International Training program on "Green Economy – Policy Measures and Implementation of Green Growth" was held at the Weitz Center for Development Studies, Israel on 22nd July to 15th August, 2013
3rd Global Network Conference of RECP at Montreux, Switzerland on 2nd to 7th Sept 2013
A three day Review Meeting on “Eco-Industrial Parks in Emerging and Developing Countries: achievements, good practices and lessons learned” was organized by UNIDO at Vienna

On the third day, Dr. Jain made a presentation on the case studies of EIP at Naroda, Vatva and Sachin

Gujarat Cleaner Production Centre
Visit to Beijing, China to participate in Regional Expert Validation and Training Workshop for the Eco-Innovation Manual on 21st - 24th October, 2014.
Achievements: At National Level

- **GCPC – ENVIS:**
  - GCPC also acts as an ENVIS Centre on Cleaner Production / Cleaner Technology since 2005, for Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India, under “Chemicals, Wastes and Toxicology”
  - ENVIS is the largest network on environmental information in world.
  - GCPC is operating/maintaining/updating website, [www.gcpcenvis.nic.in](http://www.gcpcenvis.nic.in) and also publishing a quarterly newsletter.
  - MoEFCC instructed 60 nos. other ENVIS Centres across India, to replicate the format of GCPC-ENVIS.

- GCPC has enrolled students of national institutes viz., IIT – Kharagpur, IIT – Roorkee for their Post Graduate Dissertations.
GCPC – ENVIS Website

The image displays the website of the Gujarat Cleaner Production Centre (GCPC), an ENVIS Centre focused on Cleaner Production and Clean Technology. The website features sections such as About Us, ENVIS Network, Online Query, Experts, FAQs, Related Links, Site Map, Feedback, and Contact Us. It includes databases on Cleaner Production/Clean Technology, Cleaner Production for Better Environment, Research & Statistical Data, News & Events, and a Glossary. The website is updated regularly with various resources and information.
Our Publications

GCPC – ENVIS: Newsletter being published quarterly since July - Sep 2003.

July - September: 2014

October - December: 2014

January - March: 2015

April - June: 2015

ENVIS-G CPC

ENVIS-G CPC

ENVIS-G CPC

ENVIS-G CPC

Gujarat Cleaner Production Centre
Our Publications (Cont...)

CLEANER PRODUCTION IN ELECTROPLATING

Background:
Electroplating is one of the varieties of several techniques of metal finishing. It is a technique of deposition of a thin layer of one metal on another through electrolytic process to impart various properties and attributes, such as corrosion protection, enhanced surface hardness, luster, color, aesthetics, value addition etc.

Electroplating industry in India is spread throughout the country. They are mainly in small scale sectors with over 3, 00,000 small scale units.

On one hand, the process has number of applications but, simultaneously it has been included among 17 major polluting industries in India by Central Pollution and Control Board, government of India. Electroplating is considered a major polluting industry because it discharges toxic materials and heavy metals through wastewater (effluents), air emissions and solid wastes in an environment. It was found that a large amount of metals and chemicals is disposed into main streams without treatment as they have no effective measures for treatment or recovery of metals in unorganised sectors.

At the same time it is to be kept in mind that majority of units are in tiny and small scale, which are not able to upgrade the technology immediately to achieve cleaner production.

CLEANER PRODUCTION IN WASTE PAPER RECYCLING INDUSTRIAL SECTOR

1. Background:

There is huge potential for conservation of natural resources and reduction in pollution by increased recycling of secondary fibres. The waste paper recycling yields fibre at low chemical and energy input thereby considerable cost reduction. The energy consumption in waste paper based mills is 30-40% less than that of an integrated pulp & paper mill. The efficiency problem is also considerably less severe for waste paper based mills. A wide range of boards, lower grade writing papers and tissue papers may be produced from waste paper. Investment for processing equipment is lower as compared with chemical pulp making equipment. A large number of mills based on recycled fibres were set up in Last 70’s to meet the paper demand in the country. Since 1990 these mills are growing and expansion of capacities is a regular phenomenon. The Indian paper industry produces 10.11 million tons paper per annum, just 2.6% of the total world production of 394 million tonnes/annum of paper, paper board and paperboard. As compared to international capacities, we lag far behind. Many of the Indian Paper mills are also working activity in the areas of water and environmental management not only to better the statutory norms but also in a proactively move closer to Cleaner Production.

CLEANER PRODUCTION IN TEXTILE INDUSTRY

TEXTILE SCENARIO IN INDIA:

The Indian Textile Industry has an overwhelming presence in the economic life of the country. Apart from providing one of the basic necessities of life, the textile industry also plays a vital role through its contributions to national output, employment generation, and the export earnings of the country. India is the 2nd largest textile economy by production in the world after China. This sector contributes about 14 percent to industrial production, 4 percent to the gross domestic product (GDP), and 17 percent to the country’s export earnings. It provides direct employment to over 35 million people. The textile sector is the second largest provider of employment after agriculture. Thus, the growth and all-around development of this industry has a direct bearing on the improvement of the economy of the nation. India has the potential to increase its textile and apparel share in the world market from the current level of 4.3 percent to 8 percent and reach US$ 80 billion by 2030. Currently consumption of Technical Textiles in India forms only 9% of total global consumption.

Guajarat Technical Textiles market is estimated around Rs. 6, 100 crore in 2011-12 contributing around 10% to the national Technical Textiles output. Currently, 1,000 plus Technical Textiles units are already present in Guajarat, with presence in all the 12 sub-sectors of Technical Textiles. There are more than 200 products classified as Technical Textiles. Technical Textiles units are mainly concentrated in Ahmedabad, Surat, Vadodara and Kutch.
Achievements: At State Level

- Technical guidance for environment clearance on CP/Waste Minimization to the State Level Environment Impact Assessment Authority of MoEFCC, GoI.

- Conducts yearly Cleaner Production Award of Forests & Environment Department, GoG since 2004. Organized “Gujarat Cleaner Production Award Ceremony” under Vibrant Gujarat 2015 on 13th January 2015.

- GCPC is assisting Government of Gujarat in framing Gujarat Industrial Policy, assisting Industries Commissionerate in evaluation, recommendation and inspection of CP Project applications.

- CP subject has been included in course Curriculum of BE and ME Environment by GCPC. GCPC organizing Cleaner Production Awareness Programs in various engineering colleges.

- Working as Environment wing of GIDC and working to develop an model to transform GIDC Industrial Estate into Eco-Industrial Parks with Vapi and Naroda Industrial Estate under technical guidance of GIZ.

- Site master planning for retrofitting of Vapi & Naroda Industrial Estate is under process.
• GCPC conducts Cleaner Production Awareness Programs regularly, in industrial estates.
• GCPC signed MoU for “Intension of Strategic Partnership for Knowledge Sharing” with Forests & Environment Dept. GoG under Vibrant Gujarat 2015.
• GCPC in cooperation with GIZ working on Best Available Techniques for Textile and Pulp & Paper Sector in Gujarat. For implementation in other industries, GPCB included the recommendations into “Guideline” for the Sectors.
• GCPC is providing technical support on “Dust Pollution Control System” to Unjha Spices Cleaning Association, Unjha & Bhavnagar Bentonite Products Association, Bhavnagar.
• GCPC is providing technical assistance through manpower to Gujarat Pollution Control Board (GPCB) for Hazardous Waste Management in Gujarat.
• GCPC is preparing Cleaner Production Guideline for Various industrial Sectors in Gujarat.
• Local Cleaner Production Centre (LCPC) was established at Industries Associations like Naroda, Vapi and Surat.
Successful CP Implementation in Gujarat

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Sector</th>
<th>Investment (one time) in Rs.</th>
<th>Savings per year in Rs.</th>
<th>Environmental Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dyes and Dye Intermediates</td>
<td>3040700</td>
<td>10652870</td>
<td>• Conservation of Water and Energy</td>
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<tr>
<td>2.</td>
<td>Chemicals</td>
<td>3876300</td>
<td>14333319</td>
<td>• Reduction in TDS, BOD, COD, quantity of liquid and Solid Waste</td>
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<tr>
<td>3.</td>
<td>Agrochemicals</td>
<td>253000</td>
<td>2254144</td>
<td>• Substitution of Hazardous material into non hazardous material</td>
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<tr>
<td>4.</td>
<td>Petrochemicals</td>
<td>379600</td>
<td>153712.8</td>
<td>• Elimination of Hazardous Waste Generation.</td>
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<tr>
<td>5.</td>
<td>Pharmaceuticals</td>
<td>2271200</td>
<td>18443072</td>
<td>• Elimination in Generation of Spent Acid.</td>
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<tr>
<td>6.</td>
<td>Fish Processing</td>
<td>458900</td>
<td>1859672</td>
<td>• Reduction in gaseous emission</td>
</tr>
<tr>
<td>7.</td>
<td>Textile Processing</td>
<td>1938100</td>
<td>5601526</td>
<td>• Improvement in the working environment.</td>
</tr>
<tr>
<td>8.</td>
<td>Hospital</td>
<td>11118900</td>
<td>5739854</td>
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<tr>
<td>9.</td>
<td>Hotel</td>
<td>9524400</td>
<td>5658935</td>
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<tr>
<td>10.</td>
<td>Electroplating</td>
<td>1196700</td>
<td>1170095</td>
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<tr>
<td>11.</td>
<td>Pulp &amp; Paper</td>
<td>54415800</td>
<td>10705151</td>
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<tr>
<td>TOTAL</td>
<td></td>
<td>88503800</td>
<td>76572351</td>
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</table>
Case Studies of Successful Implementation of CP in Industries

Case Study: 1 (Ceramic Sector)

Recycling of 100% waste and waste water generated during the process in Ceramic Industry

About the company:

The company has been engaged in manufacturing of Ceramic Glazed wall and Floor tiles. The installed capacity of wall and floor tiles is 18000 SQM of wall and floor tiles per day.

The total investment for implementing CP was Rs. 10,00,000 (One time) and saving was Rs. 1,75,00,000 (Yearly) with payback period of 21 Days.
Scope of CP at the company

- The floor tiles manufacturing facility has technological edge over the present technology with single firing facility of tiles higher production capacity and less process loss and recovery of heat.

- The single firing productivity is higher and it is more energy efficient.

- The best performance in term of process control is achieved by utilizing the output of previous process as the input of next process, so intermediate quality parameters are checked for assurance to get finished products with good quality.

- As an environmental friendly company, there is no wastage discharged outside the plant.

- All types of 100% waste is reused in process after recycling. Even effluent treated water is also 100% recycled in process.
Steps taken for the implementation

- Defined and reduced all types of losses in every process
- Waste plastic containers and used oil sell to the registered Re-Processors & Recyclers.
- Installation of sub energy & fuel meters with respect to quantity centre
- Precise and perfect management by right input for quantifying production and losses
- Reduced losses in: washing loss at spray dryer, dust loss, green pitchers at press and glazing section
- Used rubber tire in low in cost and used as seal at ball mill lead to avoid leakage during grinding
- Reduction in bad printed tiles by optimization in speed of machine
- Periodic maintenance report of strapping machine at packaging area to avoid strap loss.
- Plastic covers are provided while loading material to ball mill to reduce spillage.
- Press charging system is modified by limiting movement of filter to the charger to avoid spillage.
Steps taken for the implementation (Cont.)

- To avoid formation of lumps and bigger size granules from dust in silos during ageing due to % of moisture, temperature and humidity, online roller grinding system is designed in house to eliminate this loss at vibro shieve at press.
- Store department has made break up in issuing raw material & spare parts Q/C wise instead of whole process wise (Department wise)
- Dust collector efficiency improved to collect flying dust recovers for reuse.
- Reusing 100 % treated water from effluent treatment plant in wet grinding of body material in Ball Milling.
- Reusing 100 % sludge generated from Effluent Treatment Plant in body preparation.
- Installation of hydro filter unit to collect flying dry glaze particles during application.
- Installation of Pulse jet dust collectors unit for collecting flying dust near press and dry sizing and chamfering area.
- Installation of Cyclone and wet scrubber unit to control fine dust escape from chimney of spray dryers.
Case Study: 2 (Pulp and Paper Sector)

**Recovery of Fibre from Couch Pit and 2nd Stage Centri Cleaner**

**Problem:**
- Accept of 2\textsuperscript{nd} Stage Centri-cleaner through Couch pit was reprocessed after inclined screen finally to the thickener.
- The inclined screen being not efficient, there is loss of about 5\% (Base on 70 TPD Production) fibre with the rejects.
Pilot measure:
- Additional side hill screen is placed in process
- Reduces continuous recirculation of pulp with direct supply to mixing chest after screening
- Fibre recovery with by-passing thickener and refiner.

Cost Benefit Analysis:
- Capital Investment: Rs. 1,17,000
- Operating Cost: Nil
- Total Savings: Rs. 14,17,000 annually
- Simple Payback: 2 months
Case Study: 3 (Pulp and Paper Sector)

Acidic Sizing (Alum & Rosin) Replaced by Surface Sizing

Problem:

- In kraft board & MG kraft paper industries, alum & rosin is used as a sizing agent which reduce drainability, fibre retention

- Acidic sizing disables manufacturing of high GSM paper. It also increases total dissolved particles in effluent.

- The acidic material was responsible for deterioration of cellulose, decreased paper permanence and also found that rosin-sized paper has a lower thermal decomposition temperature. It reduced the strength of paper also.
Pilot measure:

- Surface sizing of paper refers to the application of starch by means of a size press or film press which is placed after the M. G. Cylinder and 6 nos. dryers
- Increased internal and surface strength from 16-18 BF (Burst Factor) to 28 BF,
- Improved printing quality and paper stiffness

Cost Benefit Analysis:

Capital Investment : Rs 54,00,000
Operating Cost : Minimum
Total Savings : Rs. 2,60,00,000 annually
Simple Payback : 3 months
Case Study: 4 (Dyes and Pigments Sector)

Optimize the resource consumption from present level resulting in increase of product yield and reduce environmental degradation by reduction in waste generation & emission.

About the company:

The company is involved in the manufacturing of Pigments, dyes and Dyes Intermediates, Organic Pigment Intermediates, Pesticides and Pesticides Intermediates, Other Specialty Chemicals.
Problem:

- High resource consumption (Acrylonitrile)
- High amount of effluent generation, which was sent to ETP for treatment
- SO\(_2\) gas is generated in reaction. It was scrubbed into Caustic Soda lye solution to get Sodium Sulphite, which needed reprocessing.

Implemented Solution:

- Reduction in the consumption of acrylonitrile to increase the yield of Tetra Chloro Butyronitrile. Reduction in the acrylonitrile: \(1,42,800 \text{ kg/year}\)

- SO\(_2\) is scrubbed in Soda Ash solution to manufacture Sodium Bi Sulphite. It is the value added product, sellable in the market. Manufacturing of value added byproduct will achieve significant cost benefit of Rs. 3,12,12,000/year
Case Study: 5 (Textile Sector)

Replacement of alkaline scouring with bio-scouring enzyme for enzymatic scouring

Problem:

• Scouring process is carried out to remove impurities that are present in cotton.

• This is usually done at high temperatures (above 100 °C) with sodium hydroxide.

• Scouring produces strongly alkaline effluents (around pH 12.5) with high organic loads, tends to be dark in colour and has high concentrations of Total Dissolved Solids (TDS), oil and grease in wastewater.
Implemented Solution:

The pilot measure consisted of replacing of alkaline in scouring in the manufacturing process with bio-scouring enzyme.

Advantages:

Bio-scouring process provides many advantages, such as

• Reduced water and wastewater costs
• Reduced treatment time and lower energy consumption because of lower treatment temperature.
• Commercial bio-scouring enzyme products are based on pectinases which are used for enzymatic scouring.
• Biological oxygen demand (BOD) and chemical oxygen demand (COD) of Enzymatic scouring process are 20-45 % as compared to alkaline scouring (100%). TDS of enzymatic scouring process is 20-50% as compared to Alkaline scouring (100%).
Benefits Achieved:

Environmental:

• Water consumption reduction: 45.45%
• Chemical consumption reduction: 8.65%
• Electrical power consumption reduction: 37.04%
• Fuel (coal) consumption reduction: 24.55%

Economical:

• The initial processing cost of fabric Rs. 5.15 / kg of fabric.
• The processing cost of fabric reduced to Rs. 3.91 / kg of fabric after implementing CP.
• No capital cost required, since replaced chemical only (although with 10% additional cost compared to existing chemicals)
• The total savings achieved was Rs. 50,22,000 per annum.
Case Study: 6 (Textile Sector)

Reuse of Alkaline Stream from Mercerizing

Problem:

• In mercerizing, fabric is treated with caustic soda (NaOH) solution. NaOH reacts with the cellulose, swells it and imparts properties like strength, improve luster and increase absorption of the fabric for dyes.

• After treatment, fabric is washed with water with starching tension to remove un-reacted caustic soda (98 to 99 % of un-reacted caustic) from the fabric.

• Resource loss in the form of wastewater, also it generates pollution in the wastewater (higher COD, TDS, TSS, alkalinity etc).

Implemented Solution:

• Collection of the alkaline stream in an underground storage tank
• Reuse of the waste stream in the dyeing process as well as for preparation of next batch, where it is used for boiling and bleaching of fabrics
Benefits Achieved:

Environmental:

• Reduction of caustic consumption by 15,000 kg per year
• Reduction of resource consumption and reduction in the high TDS, TSS, COD alkaline effluent to the ETP
• Reduction in the load of pollution to environment

Economical:

• Reduction of CETP charges for reduced volume of waste water
• Capital cost for implementation: Rs. 5,00,000/- (One time)
• Operating cost: Negligible
• Total savings: Rs. 5,40,000/- per annum
• Payback period: 12 months
Industrial Symbiosis and Development of Eco – Industrial Parks
Cleaner Production Award Resolution,
Government of Gujarat
Department of Forests & Environment
Dated: 29/6/2004

Award for Exemplary Application of the Cleaner Production Implementation in Small, Medium and Large Scale Industry in Gujarat State.
Gujarat CP Award Ceremony – 2006

Ex – Chief Minister (Gujarat) and Current Prime Minister of India, Shri Narendra Modi, presenting CP Award to the winner industry.

Year 2004-05 & 2005-06

Year 2006-07

Gujarat Cleaner Production Centre
Gujarat CP Award Ceremony
2011 – 12 and 2012 – 13
Financial Assistance to implement Cleaner Production in Gujarat

Schemes of Assistance for Common Environment Infrastructure
Resolution No: GID-102014-922945-G

(UNDER INDUSTRIAL POLICY – 2015)
Dated: 19/01/2015
Scheme – 1: Financial Assistance for Common Environmental Infrastructure Facilities

Eligible Activities:

1. New common effluent treatment plant including collection, storage and treatment of effluent.
2. Augmentation and / or Technology upgrading of existing CETPs.
3. Conveyance pipeline for safe disposal of treated effluent.
4. Recycling of treated waste water for industrial use and other use.
5. Common spray drying system for effluent.
6. Common multiple effect evaporators, mechanical vapour recompression evaporator (MVRE) etc.
7. To install system for water, air, land, noise etc. for ambient
8. To install online continuous stack monitoring system with connectivity to GPCB server.
9. Common waste management projects
10. Any other environment management project as approved by SLC

Quantum of Assistance:

Assistance upto 25 % of eligible fixed capital investment in the project for the activities and maximum upto 50 crore.
## Scheme – 2: Common Boiler Project by SPV Constituted by minimum 10 MSMEs

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Eligible Activity</th>
<th>Quantum of Assistance per Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project should be promoted by SPV of minimum <a href="#">10 MSMEs</a> using steam in the process and having independent Boiler in their premise.</td>
<td>35% or maximum Rs. 2 Crores, if solid fuel used and 50% of cost maximum Rs. 2 Crores, if cleaner fuel is used for Common Boiler</td>
</tr>
<tr>
<td>2</td>
<td>New boiler should be energy efficient All statutory permissions from the concerned authority for operation of boiler and distribution pipe line shall have to be obtained by SPV</td>
<td></td>
</tr>
</tbody>
</table>
Scheme – 3: Scheme for Strengthening the Regulation and Environmental Compliance

Eligible Activities:

1. Scientific report / pilot projects on cleaner production and technology through institutions such as IITs, NITs, Science & Engineering Colleges of the State. Scientific R & D institutions and GPCB/GEMI/GCPC.

2. Installation of testing infrastructure and network for monitoring ambient environmental quality and progressively ensure real-time and online availability of the monitoring data to GPCB/GEMI/GCPC/recognised science and engineering college of State.

3. Source inventory and remediation programs for polluted rivers of the state and regional environment impact assessment for vulnerable estate / district and air quality monitoring, emission inventory and sources apportionment study for vulnerable areas to GPCB/GEMI/GCPC/recognised science & engineering colleges of the State through institutions such as IITs, NITs, Scientific and R & D institutions.

4. Workshop / seminar programs for capacity building, environment compliance and enforcement, industrial pollution prevention / control / remediation etc. by GPCB/GEMI/GCPC.
Eligible Activities (Cont.):

5. Environmental clinics / an effort to bring the industrial association and professionals on a common platform to provide expert advice and cost effective solutions on real time environmental issues to be executed by GPCB with the help of scientific and R & D institutes/GEMI/GCPC/recognised science & engineering colleges of the State.

6. Assistance for establishment of training centre or training program cost i.e., skill development programs for instructors, operators and managers of industries by Environment and Forest Department or by GPCB/GEMI/GCPC in association with industries association.

7. Any other activities as approved by SLC.

Quantum of Assistance:
Need based support will be provided as may be decided by the state level committee.
**Scheme – 4: Scheme for Development of Green Estate**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assistance for preparation of site master plan for relocation / retrofitting of existing polluting industrial units into Green Industrial Estate as per the direction of GPCB/ MoEF by recognize science &amp; Engineering collages of the state, IITs, NITs, scientific and R &amp; D institutions, GEMI, <strong>GCPC</strong> etc.</td>
<td>75 % assistance maximum Rs. 80.00 Lakh</td>
</tr>
<tr>
<td>1. Assistance for setup / relocation / retrofitting of existing polluting industrial units into Green Industrial Estate</td>
<td>25 % of capital cost or maximum Rs. 25.00 Cr</td>
</tr>
</tbody>
</table>
Schemes of Assistance for Environment Protection Measures
Resolution No.: GID-102014-922884-G

(UNDER INDUSTRIAL POLICY – 2015)
Dated: 19/01/2015
**Scheme – 1:**
**Financial Assistance Environment Management**

Assistance under the scheme will be sanctioned by State Level Implementation Committee, on the basis of opinion by Gujarat Cleaner Production Centre (GCPC)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Eligible Activity</th>
<th>Quantum of Assistance per Project</th>
</tr>
</thead>
</table>
| 1       | Implementation of CP Technology in Place at Existing Process such as Substitution & Optimization at raw material, reduction in Water Consumption or Energy Consumption or Waste generation. | 1. Up to 35% at cost at Plant & machinery with ceiling at Rs. 35 Lacs during the operative period at the scheme for MSME.  
2. Up to 10% at cost at Plant & machinery with ceiling at Rs. 35 Lacs during the operative period at the scheme for Large Project. |
| 2       | Any other environment management project with us at clean, efficient and innovative Pollution Control Equipment. | 1. Up to 25% at cost at Plant & machinery with ceiling at Rs. 35 Lacs during the operative period at the scheme for MSME.  
2. Up to 10% at cost at Plant & machinery with ceiling at Rs. 35 Lacs during the operative period at the scheme for Large Project. |
Scheme – 2: 
Scheme for Assistance to encourage “Green Practices and Environmental Audit to MSMEs”

Eligible enterprise means existing enterprise of MSME who intends to adopt green practices in its enterprise.

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Eligible Activity</th>
<th>Quantum of Assistance per Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Periodic environmental audits except those required to be carried out under provision of Act &amp; Rules or direction of Court of law.</td>
<td>Upto 75% of fees of audit services with a ceiling of Rs. 50,000/Audit whichever less.</td>
</tr>
<tr>
<td>2</td>
<td>Installation of online continuous stack emission monitoring system (CEMS), online effluent quality monitoring system with connectivity to GPCB / CETP project.</td>
<td>Upto 25% of cost of system or Rs. 5 lakh, whichever is less.</td>
</tr>
<tr>
<td>3</td>
<td>Industrial building of more than 2,000 Sq. m. built up area which obtains green rating under Indian green building council (IGBC/LEED) or GRIHA.</td>
<td>Upto 50% of consulting charges or Rs. 2.5 lakh, whichever is less.</td>
</tr>
<tr>
<td>4</td>
<td>Setting up of environment management system including setting up environment management laboratory.</td>
<td>Upto 50% of equipment cost, ceiling of Rs. 10 lakh per unit once during operative period</td>
</tr>
</tbody>
</table>
### Scheme for Assistance to encourage “Green Practices and Environmental Audit to MSMEs” (Contd....)

<table>
<thead>
<tr>
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</tr>
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<tbody>
<tr>
<td>5</td>
<td>Purchase of new equipment/system related to safety, occupational health or for environment compliances for common use of industries located in cluster of minimum 10 units</td>
<td>Upto 35% of cost of equipment, ceiling of Rs. 35 lakh per cluster</td>
</tr>
<tr>
<td>6</td>
<td>Industries practicing at least 50% waste water recovery through Zero liquid discharge as certified by GPCB</td>
<td>Upto 35% one – time capital subsidy on relevant equipment /system or Rs. 35 lakh, whichever is less</td>
</tr>
</tbody>
</table>
Gujarat Cleaner Production Centre
(established by Industries & Mines Department, GoG)
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