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OCTOBER 2023

# GTS MAGAZINE

G T S E N V I R O I N D I A  
P V T L T D

WHATEVER YOU ARE, BE A GOOD ONE

Charter for  
ZERO LIQUID  
DISCHARGE  
by

*CPEB*

POTENTIAL for ECO FRIENDLY  
PRODUCTS BUSINESSES in

*India*

HISTORICAL HERITAGE of MUMBAI

*2d TENDAY of India*





# GTS MAGAZINE

**NUMBER 03 | OCTOBER 2023 | News Magazine from GTS Enviro India Pvt Ltd**  
GTS's Innovative Approaches to Environmental Pollution Control and Sustainable  
Development "

**GTS MAGAZINE**  
Number 03 | OCTOBER 2023

**EDITOR**  
THIRUGNANAM G  
Thiru76gts@gmail.com

**CONTRIBUTORS**  
Subhashini v

**CONCEPT & DESIGN**  
THIRUGNANAM G,

**ADVERTISEMENTS:**  
info@gtsenviro.com

**ADDRESS:**  
18 AMBAL NAGAR  
GANAPATHY  
COIMBATORE 641006

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## CONTENTS

<b>Editorial.....</b>	<b>1</b>
<b>Technologies.....</b>	<b>3</b>
Electro Coagulation Systems For ZLD Effluent Treatment Plants And Sewage Treatment Plants What Is Forward Osmosis and How It Works	
<b>Our Environment &amp; Trends .....</b>	<b>8</b>
Eco Sensitive, Historical Heritage Of Mumbai, Gateway Of India Nariman Point Eco Friendly Businesses In India And Its Potential Success	
<b>Important GO / Amendments of Statutory (CPCB/SPCB/MOEF &amp;CC, MNES etc.)</b>	
<b>Energy &amp; Environmental Policies .....</b>	<b>15</b>

## EDITOR'S PAGE



***“Whatever you are, be a good one”***

Our respected Readers...

I am glad to welcome you all to explore our Magazine.

**GTS MAGAZINE** is more than a Newsletter of **GTS ENVIRO INDIA PVT LTD**, a multi-disciplinary, Open Access journal publishing novel information within the broad field of ' Environmental Pollution control and Sustainable Development'.

Our Coverage in GTS MAGAZINE includes, but is not limited to, the following topics:

- 1) Environmental Technologies, Important GO / Amendments of Statutory (CPCB/SPCB/MOEF &CC, MNES etc.) & Energy & Environmental Policies, Our Environment & Trends in Climate change, Biodiversity Sustainability and Public health, our exploration and hearty appreciations of the Leaders engaging in environmental and socially responsible activities.
- 2) Articles from responsible persons about the innovative Environmental Technologies, environmental health, resource recovery, social economics, and sustainability. We welcome articles about research and development related to environmental pollution control and process utilities and Environmental laws and latest regulations and amendments.

GTS Enviro India Pvt Ltd is a rapidly expanding project engineering organization that specializes in the design, engineering, manufacturing, and construction of Air pollution control systems (wet scrubber system, dust collector, fume extraction system, pulse jet bag filter), various types of Zero Liquid Discharge Effluent Treatment Plants, RO/UF/MVR recycling systems, and Raw Water Treatment / Sewage Treatment Projects and Solid waste management Systems and equipments, Heavy Process Equipment Fabrication, Pipeline contract works and Environmental Management Consulting.

**GTS MAGAZINE** is a fully open access journal for which you doesn't need to pay. Once published, the contents will be permanently available in our website [www.gtsenviro.com](http://www.gtsenviro.com) for readers to read, download, and share.

Thanks for every one with warm regards,

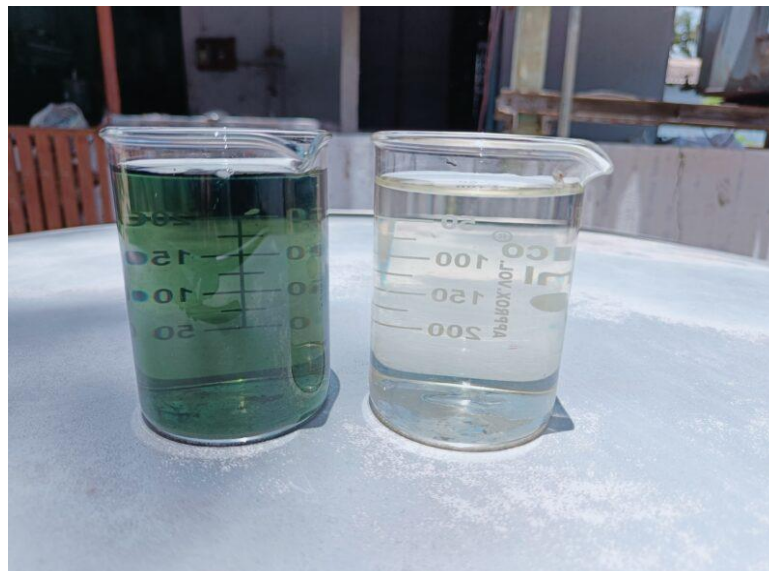
**G.THIRUGNANAM**

**EDITOR | GTS MAGAINE**

**CEO | GTS ENVIRO INDIA PVT LTD**

## ELECTRO COAGULATION SYSTEMS FOR ZLD EFFLUENT TREATMENT PLANTS AND SEWAGE TREATMENT PLANTS

Electrocoagulation (EC) is an electrochemical process used for the treatment of wastewater in Effluent Treatment Plants (ETPs) and Sewage Treatment Plants (STPs). It is a method that involves the use of electricity to remove contaminants from water, primarily through the process of coagulation and precipitation. Here's how electrocoagulation systems work in the context of ETPs and STPs:



**Electrocoagulation Process:** In an electrocoagulation system, two electrodes (typically made of aluminum or iron) are immersed in the wastewater or effluent to be treated. When an electric current is applied to the electrodes, it causes several simultaneous electrochemical reactions to occur:

**Electrolysis:** Water molecules (H<sub>2</sub>O) are split into hydrogen gas (H<sub>2</sub>) at the cathode (negative electrode) and oxygen gas (O<sub>2</sub>) at the anode (positive electrode).

**Metal Dissolution:** The metal electrodes dissolve, releasing metal cations (e.g., Al<sup>3+</sup> or Fe<sup>2+</sup>) into the water.

**pH Adjustment:** The metal cations can hydrolyze and increase the pH of the solution, which can assist in coagulation.

**Coagulation and Precipitation:** The metal cations and the pH increase promote the formation of metal hydroxide flocs in the wastewater. These flocs trap suspended solids, colloidal particles, and some dissolved contaminants, causing them to aggregate and settle out of the water.

**Separation:** Once the contaminants have formed larger flocs and precipitated, they can be easily separated from the treated water using sedimentation or filtration processes. The clarified water is then discharged or subjected to further treatment.

**Advantages of Electrocoagulation Systems for ETPs and STPs:**

**Effective Contaminant Removal:** Electrocoagulation can effectively remove a wide range of contaminants, including suspended solids, organic matter, heavy metals, and certain pathogens.

**Minimal Use of Chemicals:** Compared to traditional chemical coagulation methods, electrocoagulation often requires fewer chemicals for pH adjustment and coagulation.

**Reduced Sludge Production:** The generated metal hydroxide flocs are relatively dense, which can result in reduced sludge production compared to chemical coagulation.

**Versatility:** Electrocoagulation can be adapted for various wastewater types, including industrial effluents, sewage, and stormwater.

**Low Operating Costs:** It can be energy-efficient when designed and operated correctly.

However, there are also some challenges and considerations when using electrocoagulation systems:

**Energy Consumption:** The process can consume significant electrical energy, which can be a cost factor.

**Maintenance:** Electrodes may require regular cleaning or replacement.

**Effluent Disposal:** Proper disposal of the generated metal sludge can be a concern.

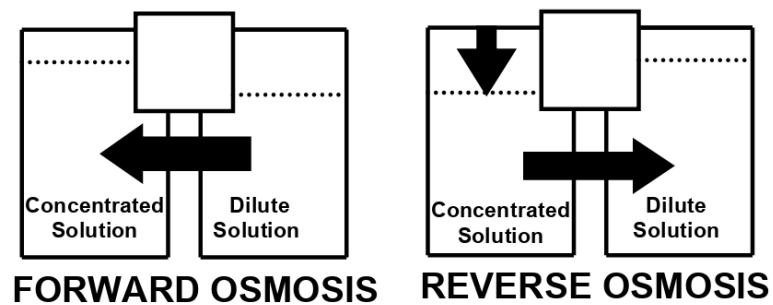
**Selectivity:** The effectiveness of electrocoagulation may vary depending on the specific contaminants in the wastewater.

**System Design:** The design and operation of the system need to be tailored to the specific wastewater characteristics.

Overall, electrocoagulation can be a viable option for wastewater treatment in ETPs and STPs, particularly when dealing with complex wastewater streams containing a mix of contaminants. However, its implementation should be carefully considered based on the specific needs and constraints of the treatment facility.

## WHAT IS FORWARD OSMOSIS AND HOW IT WORKS

Forward osmosis (FO) is a membrane-based separation process that allows water molecules to move from a lower-concentration solution (the feed solution) to a higher-concentration solution (the draw solution) through a semi-permeable membrane without the application of external pressure. This process relies on osmotic pressure differences between the two solutions and is the opposite of reverse osmosis (RO), where pressure is applied to force water molecules through a membrane from a higher-concentration solution to a lower-concentration solution.



**GTS ENVIRO INDIA PVT LTD**

[www.gtsenviro.com](http://www.gtsenviro.com)

[info@gtsenviro.com](mailto:info@gtsenviro.com)

### Here's how forward osmosis works:

**Semi-Permeable Membrane:** The heart of the forward osmosis process is a semi-permeable membrane. This membrane has very small pores that allow water molecules to pass through while blocking the passage of larger solute molecules (e.g., ions, salts, contaminants).

**Feed Solution:** The feed solution, which is the solution to be concentrated or treated, is introduced on one side of the semi-permeable membrane. This feed solution typically contains water and various solutes, including dissolved contaminants or substances to be concentrated.

**Draw Solution:** On the other side of the membrane is the draw solution, which is a solution with a higher concentration of solutes, often composed of salts or other substances. The draw solution serves to create an osmotic pressure gradient that drives the movement of water through the membrane.

**Osmosis:** Osmosis is the natural movement of water molecules from an area of lower solute concentration (the feed solution) to an area of higher solute concentration (the draw solution) through the semi-permeable membrane. This movement continues until equilibrium is reached or until external factors intervene.

**Water Transport:** As water molecules pass through the membrane into the draw solution, they leave behind the solutes and contaminants in the feed solution. This results in the concentration of the feed solution and the dilution of the draw solution.

**Concentration or Treatment:** Depending on the specific application, the concentrated feed solution (retentate) can be further processed to recover concentrated substances or to remove contaminants. The diluted draw solution may also be processed, depending on the goals of the FO system.

### **Applications of Forward Osmosis:**

**Desalination:** FO can be used in desalination processes to extract fresh water from saline water sources. The draw solution is typically a concentrated saline solution.

**Concentration of Food and Beverages:** FO can be used to concentrate fruit juices, dairy products, and other food and beverage products.

**Wastewater Treatment:** FO can be employed in wastewater treatment for the concentration of contaminants or the recovery of clean water.

**Pharmaceutical and Chemical Processes:** FO is used in pharmaceutical and chemical industries for purification and concentration processes.

**Environmental Remediation:** FO can be used for the treatment of polluted water and the extraction of contaminants from industrial effluents.

Forward osmosis offers several advantages, including energy efficiency (as it doesn't require high-pressure pumps like RO), low fouling propensity, and the ability to handle challenging feed solutions. However, it is essential to select the appropriate membrane and draw solution for each specific application to achieve desired results. Additionally, FO is an area of ongoing research and development, with potential for further advancements and broader applications in the future.

### **FORWARD OSMOSIS PLANT FOR ZLD ETP**

Forward osmosis (FO) is a water treatment technology that can be utilized in Zero Liquid Discharge (ZLD) Effluent Treatment Plants (ETPs) to achieve high-quality water recovery while minimizing waste generation. ZLD is an approach that aims to recover and reuse as much water as possible from industrial wastewater streams, leaving almost no liquid waste to be discharged.

Here's how forward osmosis can be incorporated into a ZLD ETP:

**Forward Osmosis Process:** Forward osmosis is a membrane-based process that involves the movement of water through a semi-permeable membrane from a lower-concentration solution (the feed solution) to a higher-concentration solution (the draw solution) without the application of external pressure. This process relies on osmotic pressure differences between the two solutions.

**Pretreatment:** Before the FO process, the influent wastewater from the industrial facility is typically subjected to pretreatment to remove large particles, suspended solids, and some contaminants. This can include processes like screening, settling, and chemical treatment to adjust pH or remove specific pollutants.

**Forward Osmosis:** In the FO system, the wastewater (feed solution) is introduced to one side of the semi-permeable membrane, while a concentrated draw solution is on the other side. Due to the osmotic pressure gradient, water molecules from the wastewater pass through the membrane and into the draw solution, leaving behind contaminants.



**Draw Solution:** The draw solution, which becomes diluted with the transferred water, now contains a concentrated solution of contaminants. Depending on the specific FO system, the draw solution can be selected based on the type of contaminants in the wastewater and the desired recovery goals. Common draw solutions include salts or brines.

**Reverse Osmosis:** The diluted draw solution is then processed using reverse osmosis (RO) or another separation technique to recover clean water from the diluted draw solution. RO is a pressurized process that forces water molecules through a semi-permeable membrane, effectively separating them from the contaminants.

**Water Recovery:** The water recovered from the RO step is of high quality and can be reused within the industrial process or discharged as per regulatory requirements. The concentrated contaminants, which may include salts and other pollutants, are further processed for disposal or recovery.

**Benefits of incorporating forward osmosis into a ZLD ETP:**

**High Water Recovery:** FO can achieve high water recovery rates, reducing the overall water consumption of the industrial process.

**Reduced Discharge:** By recovering most of the water, ZLD with FO can significantly reduce the volume of wastewater that needs to be discharged or treated further.

**Energy Efficiency:** FO typically requires lower energy inputs compared to traditional pressure-driven membrane processes due to the absence of hydraulic pressure.

**Selective Removal:** FO can be selective in the removal of contaminants, depending on the choice of draw solution, making it suitable for a wide range of wastewater streams.

**Sustainability:** ZLD with FO aligns with sustainability goals by minimizing water wastage and reducing environmental impact.

However, it's essential to consider factors like membrane fouling, system design, and the choice of draw solution when implementing FO in a ZLD ETP. Each industrial application may have unique requirements, and consulting with experts in water treatment and FO technology is recommended for the design and implementation of an effective ZLD system using forward osmosis. Additionally, since technology can evolve, it's advisable to stay informed about the latest advancements in FO for ZLD applications

## **ECO SENSITIVE, HISTORICAL HERITAGE of MUMBAI, GATEWAY OF INDIA NARIMAN POINT**

Nariman Point is a prominent business district located in South Mumbai, India, and it holds significance as an iconic part of Mumbai's historical and economic heritage. While Nariman Point is primarily known for its modern commercial buildings and skyscrapers, it is situated in close proximity to several eco-sensitive and historical sites in Mumbai. Here are some relevant points:



**Back Bay Reclamation:** Nariman Point is built on land that was reclaimed from the Arabian Sea, a process that began in the early 20th century. The reclamation project has had environmental impacts, as it altered the city's coastline. The project's impact on the natural environment and the marine ecosystem of the region is a topic of discussion among environmentalists.

**Marine Drive:** This picturesque promenade runs along the coastline just north of Nariman Point and is famous for its art deco buildings. While not an eco-sensitive area per se, it is a historical and cultural landmark in Mumbai. The promenade offers beautiful views of the Arabian Sea.

**Chowpatty Beach:** Located a bit further north from Nariman Point, Chowpatty Beach is a popular recreational spot and has historical significance. It's known for its vibrant atmosphere, street food

stalls, and events. The beach and its surroundings are visited by locals and tourists alike, though it's worth noting that water quality can be a concern at times.

**Colaba Causeway:** To the south of Nariman Point is Colaba Causeway, a historic shopping street that connects to the Colaba area. While it's not an eco-sensitive area, it's a hub of historical and cultural significance in Mumbai, with its colonial-era buildings and bustling market.

**Gateway of India:** Just south of Nariman Point lies the iconic Gateway of India, another historical and architectural landmark. This grand structure was built during the British colonial era and has witnessed significant historical events. It overlooks Mumbai Harbour and serves as a starting point for boat trips to Elephanta Island, which is home to ancient cave temples.

In recent years, there has been a growing emphasis on urban conservation and environmental awareness in Mumbai. While Nariman Point itself is a hub of economic activity, it is surrounded by areas of historical and cultural importance, some of which are also sensitive from an environmental perspective. Efforts to balance development with environmental preservation and historical heritage are ongoing in the city.

## ECO SENSITIVE HISTORICAL HERITAGE MUMBAI GAEWAY OF INDIA

The Gateway of India is one of Mumbai's most iconic historical and heritage landmarks, and it is also located in an ecologically sensitive area. Here are some key points regarding the eco-sensitive and historical aspects of the Gateway of India:



### Historical Significance:

**Colonial Legacy:** The Gateway of India was built during the British colonial era in India. It was inaugurated in 1924 to commemorate the visit of King George V and Queen Mary to Mumbai.

**Independence Day Celebration:** After India gained independence in 1947, the last British troops departed through the Gateway of India, marking a historic moment in the country's history.

**Tourist Attraction:** Today, the Gateway of India is one of Mumbai's most popular tourist attractions. It serves as a symbol of the city and its rich history, drawing millions of visitors annually.

### Eco-Sensitivity:

**Mumbai Harbour:** The Gateway of India is located on the waterfront, facing Mumbai Harbour. This area is ecologically sensitive as it is part of the Arabian Sea coastline, which supports various marine life and ecosystems.

**Boat Activity:** The area around the Gateway of India is a hub for boat and ferry services. Tourists often take boats from here to visit Elephanta Island, which is known for its historic cave temples. The movement of boats in the harbor can have environmental impacts, including water pollution and disturbance to marine life.

**Tourism Impact:** High tourist footfall in the vicinity of the Gateway of India can put additional pressure on the local environment. Proper waste management and conservation efforts are essential to mitigate the environmental impact of tourism in this historically significant area.

**Coastal Erosion:** Like many coastal areas, Mumbai faces challenges related to coastal erosion. Protecting the shoreline and preserving the Gateway of India's structural integrity are vital considerations for local authorities.

Efforts are made by local authorities and environmental organizations to balance the preservation of the Gateway of India's historical and architectural heritage with eco-sensitive practices. This includes initiatives to manage tourism sustainably, control pollution in the harbor, and protect the surrounding marine environment. Balancing historical preservation and ecological conservation is crucial to ensure that this iconic landmark continues to be a symbol of Mumbai's heritage for future generations.







## **ECO FRIENDLY BUSINESSES IN INDIA AND ITS POTENTIAL SUCCESS**

Eco-friendly businesses in India have significant potential for success due to the growing awareness of environmental issues, increasing government support, and changing consumer preferences. Here are some eco-friendly business ideas and sectors in India that have the potential for success:

**Renewable Energy:** India has ambitious renewable energy targets, and the government is actively promoting solar, wind, and other renewable energy sources. Starting a solar panel installation or wind energy consultancy business can be lucrative.

**Organic Farming:** Organic farming and the production of organic food products have gained popularity. Starting an organic farm, selling organic produce, or manufacturing organic food products can be profitable.

**Waste Management:** India generates a vast amount of waste, and there is a growing need for efficient waste management solutions. Businesses related to waste collection, recycling, and composting can thrive.

**Water Purification:** Water pollution is a significant concern in India. Businesses that offer water purification solutions, such as water filters or water treatment plants, are in high demand.

**Electric Vehicles (EVs):** With the push for electric mobility, there is a growing market for electric vehicles, charging infrastructure, and related services.

**Green Building and Sustainable Architecture:** Building and construction companies that focus on eco-friendly and sustainable practices are in demand. This includes using renewable materials and energy-efficient designs.

**Eco-friendly Products:** Manufacturing and selling eco-friendly products, such as biodegradable packaging, bamboo products, and organic clothing, can be profitable as consumers become more conscious of their choices.

**Environmental Consulting:** Offering consultancy services related to environmental compliance, sustainability, and green certifications can be a lucrative business.

**Eco-Tourism:** India's diverse ecosystems and natural beauty make it an ideal destination for eco-tourism. Starting an eco-friendly resort, adventure tourism, or wildlife conservation-related businesses can be successful.

**Green Technology:** Developing and selling green technologies like energy-efficient appliances, smart energy management systems, and pollution control devices can be profitable.

**Eco-friendly Transportation:** Providing eco-friendly transportation options such as electric rickshaws, bicycles, or carpooling services can cater to urban mobility needs.

**Eco-friendly Cosmetics and Personal Care Products:** Manufacturing and selling organic and chemical-free cosmetics and personal care products are gaining popularity.

To succeed in the eco-friendly business space in India, consider the following factors:

**Market Research:** Understand the local market demand, competition, and consumer preferences.

**Regulatory Compliance:** Ensure compliance with environmental regulations and certifications, such as ISO 14001 or Green Labeling.

**Innovation:** Explore innovative and sustainable solutions to stand out in the market.

**Sustainability:** Practice what you preach. Operate your business with sustainability in mind to set an example for your customers.

**Marketing:** Highlight your eco-friendly practices and products in your marketing efforts, as this can attract environmentally conscious consumers.

**Partnerships:** Collaborate with environmental organizations, NGOs, or government initiatives to gain support and credibility.

The eco-friendly business sector in India is poised for growth as environmental awareness continues to rise, making it a promising space for entrepreneurs and investors alike.

## **LIST OF ECOFRIENDLY PRODUCTS BUSINESSES AND DESCRIPTION IN INDIA FOR GOOD FOR ENVIRONMENT AND PUBLIC**

Starting an eco-friendly products business in India that benefits both the environment and people can be a fulfilling endeavor. Here is a list of eco-friendly product ideas and a brief description of each:

**Biodegradable Packaging:** Offer sustainable packaging solutions made from materials like biodegradable plastics, plant-based materials, or recycled paper to reduce plastic waste.

**Organic Skincare and Cosmetics:** Manufacture and sell organic and chemical-free skincare and cosmetic products that are safe for both the skin and the environment.

**Reusable Shopping Bags:** Produce reusable shopping bags made from jute, cotton, or other eco-friendly materials to reduce single-use plastic bag consumption.

**Bamboo Products:** Create a range of products using bamboo, such as toothbrushes, cutlery, and kitchenware, which are biodegradable and sustainable.

**Recycled Paper Products:** Make paper products like notebooks, stationery, and packaging materials from recycled paper to reduce deforestation.

**Solar-Powered Products:** Develop and sell solar-powered gadgets and appliances like solar lanterns, chargers, and water heaters to promote renewable energy usage.

**Upcycled Fashion:** Create fashionable clothing and accessories from upcycled materials, reducing textile waste and promoting sustainable fashion.

**Natural Cleaning Products:** Manufacture and sell eco-friendly cleaning products, such as biodegradable detergents and non-toxic cleaners that are safe for the environment and people.

**Eco-Friendly Footwear:** Design and sell sustainable and biodegradable footwear made from materials like organic cotton, cork, or recycled rubber.

**Water Conservation Devices:** Offer water-saving devices like low-flow faucets, showerheads, and rainwater harvesting systems to promote water conservation.

**Organic Food Products:** Produce and sell organic food items, including fruits, vegetables, grains, and dairy products, which are grown without synthetic chemicals.

**Compostable Tableware:** Create and market compostable plates, cups, and utensils made from materials like cornstarch or sugarcane fiber for eco-friendly dining.

**Energy-Efficient Appliances:** Sell energy-efficient appliances like LED lighting, energy-efficient air conditioners, and smart thermostats to reduce energy consumption.

**Reusable Water Bottles:** Offer reusable and durable water bottles made from stainless steel or glass to encourage people to reduce single-use plastic bottles.

**Natural Fiber Clothing:** Manufacture clothing made from natural and sustainable fibers like organic cotton, hemp, or bamboo.

**Beeswax Wraps:** Produce reusable food wraps made from organic cotton and beeswax as a sustainable alternative to plastic wrap.

**Eco-Friendly Pet Products:** Create eco-friendly pet supplies, such as biodegradable pet waste bags, organic pet food, and natural grooming products.

**Electric Bicycles:** Promote eco-friendly transportation by selling electric bicycles that reduce carbon emissions and promote a healthier lifestyle.

**Sustainable Home Decor:** Offer home decor items made from recycled or sustainable materials, such as reclaimed wood furniture or recycled glass art.

**Zero-Waste Stores:** Establish zero-waste stores that sell bulk groceries, personal care products, and household items with minimal packaging to reduce waste.

To succeed in the eco-friendly products business in India, prioritize transparency, sustainability, and quality. Communicate the environmental benefits of your products clearly to attract environmentally conscious consumers, and consider obtaining eco-certifications to enhance credibility. Additionally, align your business with eco-friendly practices in sourcing, manufacturing, and distribution to make a positive impact on both the environment and people.



## **Important GO / Amendments of Statutory (CPCB/SPCB/MOEF &CC, MNES etc.) Energy & Environmental Policies**

### **CPCB**

**POLLUTION CONTROL ACTS, RULES & NOTIFICATIONS ISSUED THEREUNDER - The seventh edition of Pollution Control Law Series**

<https://cpcb.nic.in/7thEditionPollutionControlLawSeries2021.pdf>

**Charter for Zero Liquid Discharge (ZLD) in Molasses Based Distilleries**

[https://cpcb.nic.in/ngrba/charter\\_distillery.pdf](https://cpcb.nic.in/ngrba/charter_distillery.pdf)

### **TNPCB**

**1 MoEF & CC notification G.S.R.724(E) dated 04.10.2021 regarding Regulation on Appropriate Use of Reverse Osmosis Based Water Purification System in the States/UTs.**

[https://tnpcb.gov.in/pdf\\_2023/GazetteNotificationOsmosisWPS1623.pdf](https://tnpcb.gov.in/pdf_2023/GazetteNotificationOsmosisWPS1623.pdf)

**2 MoEF & CC notification G.S.R.143(E) dated 22.02.2022 regarding brick kilns stack monitoring, siting criteria, ash collection etc.**

[https://tnpcb.gov.in/pdf\\_2022/NotificationBrickkilns11522.pdf](https://tnpcb.gov.in/pdf_2022/NotificationBrickkilns11522.pdf)

**3 MoEF & CC notification G.S.R.48(E) dated 24.01.2020 regarding Coffee industry standards under E(P) Rules 1986.**

[https://tnpcb.gov.in/pdf\\_2020/moefcoffeeindstandards7720.pdf](https://tnpcb.gov.in/pdf_2020/moefcoffeeindstandards7720.pdf)

### **KSPCB**

**Accepting CFE / CFExp application for the projects attracting EIA Notification,2006 -reg**

<https://kspcb.karnataka.gov.in/sites/default/files/inline-files/CFE%20and%20CFExp%20application%20Addendum.pdf>

**Regulation on" Appropriate use of Reverse Osmosis based Water Purification System" in the status/UTS notification regarding.**

No.KSPCB/17/COC/2022-23/1553 Dated: 27.06.2023

[https://kspcb.karnataka.gov.in/sites/default/files/inline-files/Reverse\\_Osmosis\\_1553\\_27062023.pdf](https://kspcb.karnataka.gov.in/sites/default/files/inline-files/Reverse_Osmosis_1553_27062023.pdf)

**Procedure for issuing No Increase in Pollution Load Certificate-reg**

<https://kspcb.karnataka.gov.in/sites/default/files/inline-files/No%20increase%20in%20pollution%20load.pdf>

**Office Memorandum on withdrawing the Guidelines for Design and location of Sewage Treatment Plant**

<https://kspcb.karnataka.gov.in/sites/default/files/inline-files/OM-dated-30042022.pdf>

**Environmental Guidelines for compressed Biogas Plant (CBG)/ Bio-CNG Plants**

<https://kspcb.karnataka.gov.in/sites/default/files/inline-files/Environmental%20Guideline%20For%20CBG%20.pdf>