Triveni
ENGINEERING & INDUSTRIES LTD.

Inspiring Change Enriching Lives

February 2023

OUR ESG DRIVEN APPROACH TO BUSINESS

01 Maintaining ecological balance while ensuring business excellence

02 Best-in-class sustainable processes and solutions across our operations and units

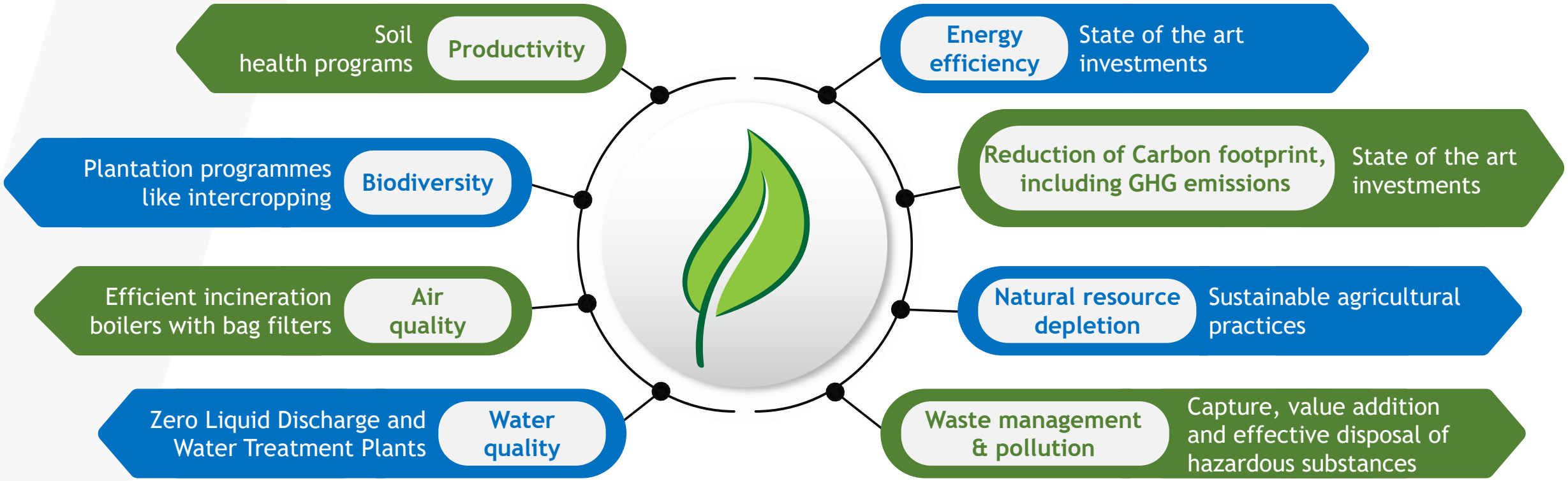
03 Fostering Community Development And Social Empowerment

04 Allocation of capital with focus to reduce carbon footprint and promote energy efficiency

05 Harnessing co-products to become raw materials for other products promoting circular economy

06 Highest level of ethical and corporate governance standards

OUR ENVIRONMENTAL FOCUS



STRIVING TO GO BEYOND COMPLIANCE TO ADDRESS RISKS THAT THREATEN THE ENVIRONMENT

Power generation through bagasse, a renewable source of energy & co-product of sugar operations

Utilising molasses for production of fuel ethanol which lowers dependence on fossil fuels and leads to cleaner environment

Reduction in Effluents across air, water and ground through investments in treatment plants, incineration boilers, etc.

Leading water and waste water treatment company with a nationwide presence

Capture CO2 and Potash rich ash from Distillery operations to extract value and limit impact to environment

Promoting R&D in water and wastewater treatment through CII Triveni Institute

Best practices in recycling and promoting conservation of natural resources

In power transmission, supplying to a multitude of industries that use renewable sources of energy

In power transmission, R&D to promote lower losses and increase efficiencies

COMMUNITY ENGAGEMENT

Continue to look at ways to make a positive societal difference for the community at large

- Farmer relations through continuous communication
- Improving soil health through regular tests
- Engagement with farmer communities
- Customer satisfaction
- Data protection and privacy policies and efforts
- Employee diversity equity and inclusion
- Employee engagement and relations
- Health and safety
- Respect for human rights and compliance to labour principles

FOSTERING SOCIAL EMPOWERMENT

Along with sustained economic performance, Triveni believes in the importance of social stewardship

- Focus on farmers' welfare, promoting socio-economic development through counselling, educating farmers, managing schools, cane development which promotes productivity and higher income, etc.
- Community initiatives such as installations of tube wells, maintenance of ponds, cleaning of drains, etc. along with other financial assistance
- CSR initiatives promoting education, sports & healthcare, ensuring environmental sustainability, making safe drinking water available
- Maintaining health through welfare programmes such as organizing health camps and ensuring safety with comprehensive emergency preparedness plans

SUPPORTING HEALTHCARE PROGRAMMES

Along with sustained economic performance, Triveni believes in the importance of social stewardship

- Supported a **charitable hospital** to prevent coronavirus among the hospital staff as well as provide amenities to patients to prevent the spread of coronavirus within the hospital premises.
- Organised a programme to **promote healthcare in women**, especially of the lower socio-economic strata in Delhi through a charitable hospital where the hospital provided free investigations and medical advice/consultation
- Supported a **mass screening programme for ovarian cancer** & relationship factors of Vitamin D in association with Sahbhagita International Foundation at Sabitgarh.
- Triveni Foundation inaugurated a **mobile dispensary van** for farmers living near the Chandanpur sugar mill under its Triveni Swasthya Chikitsa Pariyojana program. Mobile Dispensary van will provide timely health care consultation and free medicines every week in 15-20 villages and will reach out to 80-100 patients every day.

PROMOTING EDUCATION & WOMEN EMPOWERMENT AND SPORTS

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Education and Women Empowerment

- Support to schools at Khatauli, Deoband and Ramkola through free/subsidised education to children of local communities
- Financial Support to Nursing School to improve teaching standards

Promoting Sports

Supported India Youth Soccer Association, an NGO promoting football among the economically backward section of the society which undertook Josh Rural project and supported boys, girls and coaches in villages and small town Football Academies in North India with kit, footballs & training equipment.

SOUND CORPORATE GOVERNANCE IS THE BACKBONE OF OUR ORGANISATION

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- Diverse Board of Directors with broad-based functional and managerial competencies and experience
- Visionary Company leadership
- Highest ethical standards
- Professionally run organization with highly experienced management team
- Accountability, transparency & fairness in business practices
- Well-structured Enterprise Risk Management (ERM) policy

SUSTAINABLE SOURCING

Sourcing strategy including vendor selection based on sustainable requirements such that performance objectives are aligned with the Company

Extensive and efficient arrangements to lower transportation for movement of raw material and products to lower fuel emissions, pollution, associated costs

Cogeneration plants seamlessly receive supply of bagasse mainly from the own sugar units leading to greater resource efficiency

To avoid staling of cane, the Company employs an extensive and efficient arrangements as well as logistics services to transport cane from cane centers to the mill in a timely and cost effective manner

Leveraging digital tools such as GPS, geofencing, etc. to track movement of raw materials such as sugarcane, molasses, etc. in a timely and cost efficient manner across our facilities

SUSTAINABLE SOURCING

With respect of Alcohol business, raw materials (molasses, sugarcane juice/syrup & grain) is sourced from our own sugar mills or market. The transport arrangement is monitored and ensured for uninterrupted operation of the distilleries.

In Water Business, most of the supplies are engineered-to-order and are outsourced to approved vendors who are entrusted to transport the material directly to the project site after appropriate factory inspection. There is a structured mechanism to develop vendors and to maintain a list of approved vendors for various machineries & components required in project execution.

In Power Transmission Business, based on the criticality and vendor ratings, orders are placed on reliable vendors. The selection of vendor is based on past performance, reliability, adherence to delivery timelines, cost competitiveness, compliance to laws, including the standards set up by the Company towards EHS, quality of products / services and willingness to reduce costs / wastages and increase productivity as a supply chain partner.

AN ENVIRONMENT FRIENDLY INDUSTRY WHERE WHAT WE TAKE WE GIVE BACK

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WATER

SUGARCANE

MILLING

JUICE EXTRACTION

SUGARCANE JUICE

JUICE TREATMENT

BAGASSE

POWER GENERATION

SUGAR PROCESSES

MOLASSES

FERMENTATION

CO2

FLY ASH

ELECTRICITY

PROCESS STEAM

SUGAR

PRESS MUD/FILTER CAKE

WATER

DISTILLATION

ORGANIC MANURE

COMPRESSED BIO GAS (Potential)

FUEL GRADE ETHANOL/ ENA / RS/ SDS

SPENT WASH

EVAPORATION

SLOP

INCINERATION

POTASH RICH ASH

FINAL PRODUCT | PROCESS | CO-PRODUCT | INPUT

SUGAR PRODUCTION PROCESS

SUGARCANE

MILLING

CLARIFICATION

SULPHITATION*

SYRUP BOILING

CENTRIFUGING

WATER

BAGASSE

POWER GENERATION

DISTILLERY PROCESS

MOLASSES

SUGAR

FINAL PRODUCT | PROCESS | CO-PRODUCT | INPUT

*Or - Phosphitation/ Ion Exchange Resin (IER) based Decolourisation

MOLASSES-BASED DISTILLERY PROCESS

MOLASSES/SUGARCANE

YEAST CULTURE PREPARATION

FERMENTATION

CO2

DISTILLATION

WATER

FUEL GRADE ETHANOL/ ENA / RS/ SDS

SPENT WASH

EVAPORATION

SLOP

INCINERATION

POTASH RICH ASH

ENA for Potable purpose (Purity Mininum 96%)

Anhydrous ethanol for fuel blending (99.8%)

Denatured Spirit/Rectified Spirit/SDS for chemical manufacturing (94.68%)

FINAL PRODUCT | PROCESS | CO-PRODUCT | INPUT

GRAIN-BASED DISTILLERY PROCESS

GRAIN → MILLING → LIQUEFACTION → FERMENTATION WITH YEAST → CO2

DISTILLATION

DECANTATION AND EVAPORATION OF EFFLUENT

WATER

ALCOHOL

WET CAKE → DRYER → DDGS

THIN SLOP → EVAPORATION → SYRUP

- ENA for Potable purpose (96%)
- Anhydrous ethanol for fuel blending (99.8%)
- Denatured Spirit/Rectified Spirit/SDS for chemical manufacturing (94.68%)

FINAL PRODUCT | PROCESS | CO-PRODUCT | INPUT

MAXIMIZING VALUE THROUGH CO-PRODUCTS

Bagasse to Power

Captive generation of power from bagasse which is a renewable source of energy. Used for steam & power generation for internal consumption and surplus power exported to state grid

Molasses to Alcohol

Exhausting all molasses generated (after levy obligation) to produce alcohol viz. Ethanol to blend with petrol, ENA for potable purposes and for industrial uses

Potash Rich Ash

Selling potash rich ash, a co-product from incineration of slop in open market to manufacture potash fertilizer and selling through IFFCO, etc. bringing in revenue. This also helps the nation reduce foreign exchange outgo as potash is completely imported to India

Carbon Dioxide (CO_2)

Installed CO_2 plant at Sabitgarh to capture entire CO_2 from fermentation section thereby avoiding green house gas emissions. This is compressed and sold as liquid CO_2 and dry ice

Fly Ash

Fly ash is derived from bagasse during steam & power generation process. Sold in open market for fly ash brick manufacturing/soil enrichment

Press mud/filter cake

Press mud which is the residue left after cane processing is rich in convertible substrates in the form of volatile solids. Anaerobic digestion process converts volatile solids to renewable bio gas which can be used as a substitute to LPG, for the production of electricity or as alternative fuel in IC engines etc. thus generating multiproduct revenue streams. This is a future business opportunity for the Company. Currently sold as organic manure to farmers to enrich soil nutrients

MINIMISING THE EFFLUENTS IN SUGAR & DISTILLERY BUSINESSES

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Types of Effluents	How we are minimizing effluents
Wastewater - Sugar & distillery operations produce wastewater from various processes. Untreated effluent if discharged on land harms soil health, if discharged into water, depletes dissolved oxygen in water and makes the environment unfit for aquatic life	Treating and recycling water for use in sugar & distillery processes to minimize the groundwater extraction
Slop - In the process of converting Molasses / syrup to Ethanol, it generates an effluent called spent wash which when concentrated is known as SLOP which is used as fuel in specially designed Incineration boiler.	Using effective systems and equipment to reduce effluents, also installed & operating incineration boilers along with complete related systems to ensure Zero Liquid Discharge (ZLD) in all distilleries and generating Value Added Products (VAP) like potash rich ash.
Air Pollution - Primarily generated from steam boilers, dust from unpaved access roads and sugar drying or packaging activities also causes air pollution. Has effect on vegetation, causes serious breathing issues & health concerns.	Limiting air pollution well below regulatory norms through installation of well engineered Bag Filters/ Electrostatic precipitators (ESPs)/Wet Scrubbers in its boilers

MAKING SUGARCANE FARMING MORE SUSTAINABLE

Implementing best practices to make sugarcane farming more sustainable for the long-term development of the industry

- Promoting soil health by using soil health cards to analyse ideal nutrients required, reducing unnecessary fertilizers, trash mulching where cane is not burned but rather left on soil, promoting organic content
- Enhancing irrigation efficiency to reduce water/fertilizer consumption. Focus to lower the fertilizer use thereby reducing costs, improving soil health, among other benefits
- Integrated pest management that is both economic and environment-friendly using natural methods and chemicals where necessary
- Intercropping with grain legumes, Mustard, maize, wheat etc.to optimize natural resources, stabilize yield of crops along with enhancing overall productivity and improving socio-economic status of farmers

RESEARCH & DEVELOPMENT FOCUS TO IMPROVE PRODUCTIVITY

Boosting sugarcane productivity, a win-win situation for the Company and the farmers

- Propagating new high sugared, high yielding varieties of sugarcane to lower dependence on the most widely cultivated Co 0238, which has become susceptible to diseases
- Identified new varieties, such as Co 118 & Co 15023, amongst some other existing varieties e.g. Co 98014, Co J88 etc., for propagation at our units
- Identified different sets of varieties to mitigate climatic and topographical challenges specific to different regions where our sugar units are located
- Signed an agreement with Sugarcane Breeding Institute, Coimbatore, for varietal evaluation and selection Trials

POWER TRANSMISSION BUSINESS: SUPPLYING TO INDUSTRIES USING RENEWABLE ENERGY

Triveni has structured its Power Transmission Business (PTB) around the three distinct segments of Gears, Built to Print and Defence, with comprehensive portfolios. Our focus is on innovative, value engineered and reliable products and solutions to variety of technologies and industries such as:

Wind power generation - Gear components are made as Built to Print. Also supplied gear components as replacement to few wind turbine generator sites in the past

Geo thermal Energy - Gearboxes as supplied to drive Steam Turbine driven generators for geo thermal installations in Africa

Hydro Energy - Low head Hydro Power plants use Gearboxes as speed increasers between low speed hydro turbine to a higher speed generator at 750 to 1000 RPM. More than 300 Installations in India and overseas

Flue gas desulfurization (FGD) projects - Gearboxes for oxyblower in a FGD project in thermal plants to reduce sulfur dioxide (SO2) / Nitrogen oxide (NO) pollution

Waste Heat recovery plants - Gearboxes supplied to Cement and Steel plants waste heat to power generation

Waste to Energy plants - Gearboxes to drive Steam Turbine Generators using Municipal Waste

Bio Mass plants - Gearboxes supplied for Rice husk/ Sugarcane bagasse/ Agri waste based power generation

POWER TRANSMISSION BUSINESS: REDUCING CARBON FOOTPRINT

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	Switched to LED lighting in the plant to reduce the energy consumption
	Invested in a Group Captive Wind Project to facilitate to meet 85% of total power consumption from wind energy currently; likely to go up to 95% to 98% in the subsequent years
	Most of the exports and imports are through sea freight to reduce fuel consumption compared to Air Freight. Bulk ordering of bought-outs via sea freight
	Variable frequency drive for heavy duty motors
	Planning to shift to higher efficiency motors for all Steam Turbine Generator (STG) gearboxes
	Diesel Generators are used only for back-up power and used at full load to have better efficiency
	Wastewater: Water is used in the processes and later taken to treatment plant using natural aeration and treated water is used for gardening purposes. Rain water harvesting is carried out and sump capacity is 8 lakh litres, used for cooling and gardening purpose - achieved 100 % internal utilisation. No water is let out of the premises
	Gearbox oil and lubricants used in the plant for manufacturing and testing of gearboxes are collected , stored and sold to the State Pollution Control Board approved vendor for recycling

WATER BUSINESS: TECHNOLOGY USP

Triveni offers wide range of treatment solutions for water, wastewater treatment & recycle & reuse projects with complete in-house capabilities. Triveni's USP is one stop shop for integrated solutions in Water & Wastewater treatment including following:

- **Process Design**
- **Detailed Engineering**
- **Process Management**
- **Commissioning**
- **Operations & Maintenance**
- **Sludge Treatment**
- **Quality Management**
- **Construction & Execution**
- **PG test & trial run**
- **Hybrid Annuity Model/ PPP projects**

WATER BUSINESS: TECHNOLOGIES OFFERED

MUNICIPAL PROJECTS

- Water Treatment – Conventional / Membrane Based
- Bio Gas Handling System For Power Generation
- Sewage Treatment – Conventional / Biological Nutrient Removal
- Activated Sludge Process (ASP)
- A20 Technology
- Sequencing Batch Reactor (SBR)
- Manufacturing of proprietary equipment
- Recycling / Reuse
- Extended Aeration
- Moving Bed Biofilm Reactor (MBBR)
- Membrane Bio-Reactor (MBR)

INDUSTRIAL PROJECTS

- Common Effluent Treatment Plants
- Water Softening Systems
- Condensate Polishing Systems
- Nano Filtration Systems
- Desalination Systems for Brackish Water
- Cooling Water Treatment Systems
- Zero Liquid Discharge (ZLD) – MEE/ MVC/ TVC
- Effluent Treatment Plants
- Demineralization Systems
- Ultrafiltration Systems
- Reverse Osmosis Plants
- Desalination Systems for Sea Water
- Recycle & Reuse Systems

WATER BUSINESS: ADDRESSING THE CHALLENGES AND CONTRIBUTING TO ENVIRONMENT AND SOCIAL WELFARE

Majority of our new STPs are compliant to new NGT surface discharge standards like BOD (<10 ppm), COD (<50 ppm), and TSS (<10) thereby protecting the environment from possible pollution and creating an healthy environment for public at large. Our recycle & reuse projects are minimizing the pollution load and reducing dependence on ground water usage.

210 MLD Water Treatment Plant at Greater Noida - Supplies 40%+ utility water demand of Greater NOIDA. Reduces dependency on fast depleting ground water.
144 MLD Advance Treatment Plant at Sikandra (Agra) - Serving about 40% population of Agra City for drinking water requirement

We use technologies like SBR; ASP with BNR removal and tertiary treatment by Filters/ Membranes and final sterilization by Ultraviolet (UV)/ Chlorination

Sludge is disposed to secured landfills with solid concentration (25%). Our sludge is being used as compost/ organic manure for farming by farmers in enhancing crop yields and reducing dependence on chemical fertilizers

To safeguard environment and adherence to Government policy of Zero Liquid Discharge (ZLD), Triveni uses latest available technologies like MEE/ MVC/ TVC followed by crystallizers for RO reject. Crystallized solids are disposed off in hazardous secured landfill sites as per MoEF & CC norms

Recycled wastewater is used by industries in its process requirements

BOD/ COD levels are maintained/ complied as per discharge norms

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THANK YOU

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GLOSSARY

Term	Definition
Alcohol	Colourless liquid produced by natural fermentation of sugary feedstocks and used as an intoxicating constituent of potable spirits, industrial solvent and as fuel
ASP	Activated Sludge Process
Bagasse	Cane fibre leaving cane mill after extraction of juice
B-Heavy Molasses	These are molasses produced from 2nd stage (B-massecuite) pan boiling during production of sugar
BNR	Biological Nutrient Removal
BOD	Biological oxygen demand
Cane development	Activities for improving quality and quantity of cane in sugarcane command area of factory
Cane yield	Cane produced per acre/hectare.
C-Heavy Molasses	Also known as final molasses, blackstrap molasses, treacle. This is the end by-product of the processing in the sugar factory.
COD	Chemical oxygen demand
Co-product	Products of the sugar industry essentially e.g. bagasse, press cake, molasses, simultaneously produced during sugar production

GLOSSARY

Term	Definition
Co-generation	Production of electricity and usable steam in same plant
CSR	Corporate Social Responsibility
DDGS	Distillers Dried Grain Solubles A co-product of a grain ethanol facility which contains higher protein and is sold as an animal feed, poultry and swine feed.
Denatured spirit	Ethanol that has additives to make it poisonous, bad tasting, foul smelling or nauseating to discourage its recreational consumption.
Distillation	Process of separating alcohol from water via evaporation and condensation
EBP	Ethanol Blended Petrol The EBP programme seeks to achieve blending of ethanol with petrol with a view to reducing pollution, conserve foreign exchange and increase value addition in the sugar industry enabling them to clear cane price arrears of farmers.
EHS	Environment, Health & Safety
ENA	Extra Neutral Alcohol Colourless food grade alcohol without any impurity, used in alcoholic beverages.
Fly ash	Fine solid particles of ashes, dust and soot carried out from burning fuel

GLOSSARY

Term	Definition
Fuel grade ethanol	Ethanol used for blending in low concentration in gasoline
Grain distillery	Distillery producing Ethanol / Alcohol using grain as a feedstock. Starch available in grain is converted with enzymes to sugar and fermented with yeast to produce grain alcohol
MBBR	Moving Bed Biofilm Reactor
MEE	Multi Effect Evaporator
MoEF & CC	Ministry of Environment, Forests & Climate Change
Molasses	A co-product/by-product of sugar manufacturing process used mainly for ethanol production
Multi-feed distillery	Distillery producing Ethanol / Alcohol using various feedstocks such as sugarcane juice/syrup, grains, B-Heavy molasses, C-Heavy molasses
MVC	Mechanical Vapor Compression
NGT	National Green Tribunal
O&M	Operations & Maintenance
Potable alcohol	Highly purified alcohol with very neutral odor and taste
Rectified spirit	Alcohol of 95% concentration which is used for Industrial purpose as well as for manufacturing Potable Alcohol & Ethanol

GLOSSARY

Term	Definition
RO	Reverse Osmosis
SBR	Sequencing Batch Reactor
SLOP	Slop is the concentrated spent-wash which is an effluent generated during alcohol manufacturing in distilleries, which is used as fuel in incineration boilers
Steam cycle	A process in which steam is generated in a boiler, produced steam is expanded through a turbine to extract mechanical work, steam is condensed into water and water is feed to the boiler to produce steam.
STP	Sewage Treatment Plant
Sugarcane juice	Juice obtained from sugarcane after crushing it in mills
Sugarcane syrup	Sugar solutions of higher concentration obtained after evaporating water of juice in evaporators
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TVC	Total Viable Count
WTP	Water Treatment Plant
ZLD	Zero Liquid Discharge

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