

ZERO LIQUID DISCHARGE IN DISTILLERY PLANTS AND UTILIZATION OF CO₂ FOR GREEN METHANOL PRODUCTION



ALL INDIA DISTILLERS' ASSOCIATION (AIDA)

Technical Seminar

Date : 23.06.2023

Bengaluru, Karnataka.

N.SATHYANARAYANAN

Process and Environment Dept.

Group



Avant-Garde Engineers and Consultants (P) Ltd



Avant-Garde Systems and Controls (P) Ltd



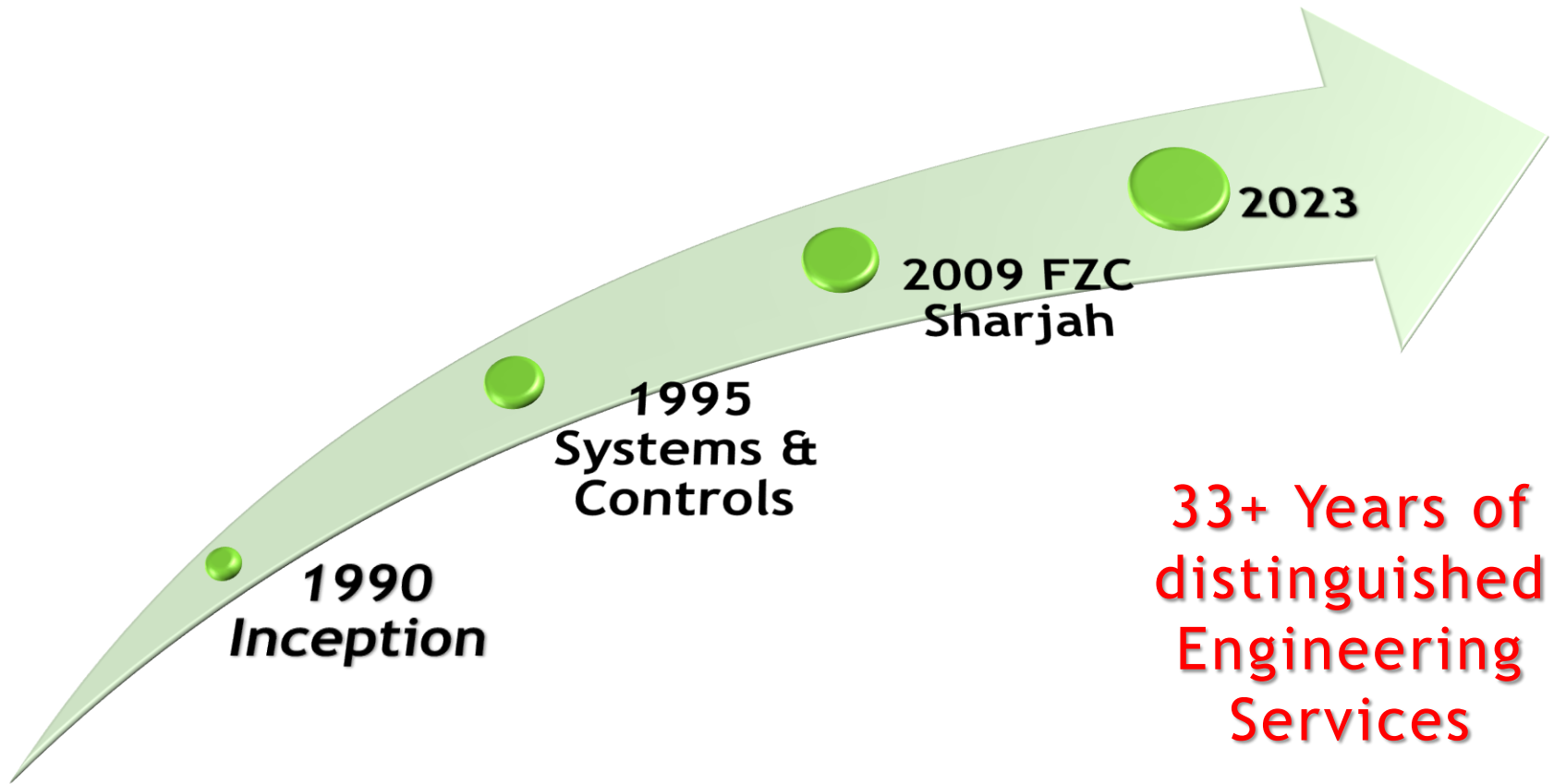
Avant-Garde Engineers & Consultants FZC, Sharjah

Consultancy and
Detailed Engineering
Services &
Supply of Power
Plant Equipment,
Site Services, O&M,
Plant Revamping

Consultancy and Detailed
Engineering Services
for Overseas Projects

AVANT-GARDE

Growth



AVANT-GARDE

Present Area of Business

Power Plants

Co-Gen, IPP, CPP,
Biomass, MSW,
WHRSG, DG, GTG

Sugar Plants

Raw Sugar, Plantation
White, Refined Sugar

CBG Plants

Press mud/Bagasse/ Grain to
CBG MSW / LFG to CBG

Green Hydrogen

Green Methanol / Green
Ammonia/ Electrolysis/
Biomass Gassification

Boiler Design

Grate Boiler, AFBC,
WHRSG, Vinasse Fired

Water, Wastewater Treatment and ZLD Plants

Water Treatment plants
Sea Water Desalination Plants
Effluent Treatment &
Recycling Plants
Condensate Polishing Units
Sewage Treatment Plants

FGD

Detailed engineering

Solar Plants

Ground Mount / Roof Top/
Floating/ BESS

Supply & Services

Supply of Boiler critical
component, Energy Audit,
Boiler revamping &
Capacity upgradation

RE Energy Mix

Assesment & Implementation
Of RE Energy Projects for Energy
Cost Optimization (ISTS/Group Captive for RTC)

Chemical Plants

Chemical Complex Projects
Chlor alkali, Chlorine & Hydrogen
derivatives, Starch, Sorbitol &
CMC Plants

Distillery/Ethanol Plants

Multi-feed & Multi-
Product Distillery,
Zero Liquid
Discharge, Slop
Incineration

AVANT-GARDE

Overall Power Projects

S. No	Description	Commissioned		Under various stages		Total Capacity	Total No. of Plants
		Nos.	Capacity	Nos.	Capacity		
1	Cogeneration Plants	105	2298MW	41	1078MW	3376MW	146
2	Captive Power Plants	93	2862MW	51	1552MW	4414MW	144
3	Biomass Power Plants	53	493MW	7	95MW	588MW	60
4	MSW Plants	3	50MW	8	88MW	138MW	11
5	Solar Power Plants	122	2892MW	8	547 MW	3176MW	130
6	Slop incineration Projects	28	2727 KLPD	26	3088KLPD	5815KLPD	54
7	Distillery Plant with ZLD	21	2835KLPD	48	7239KLPD	10,074KLPD	69
8	Sugar Plants	10	60000TCD	11	68500TCD	128,500TCD	21
9	Flue Gas Desulphurisation	4	180+MW	3	550+MW	730+MW	7
10	Compressed Bio Gas (CBG)	1	6 TPD	1	5 TPD	11 TPD	2

AVANT-GARDE

Quality Assurance and Accreditation



ISO 9001 : 2015



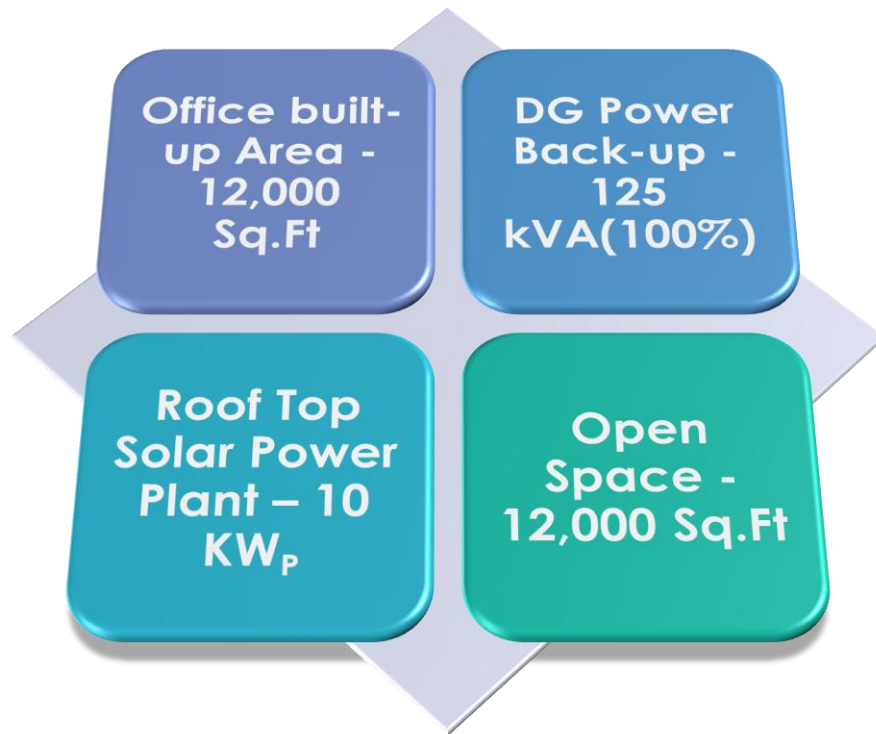
ISO 17020 : 2012



CDC

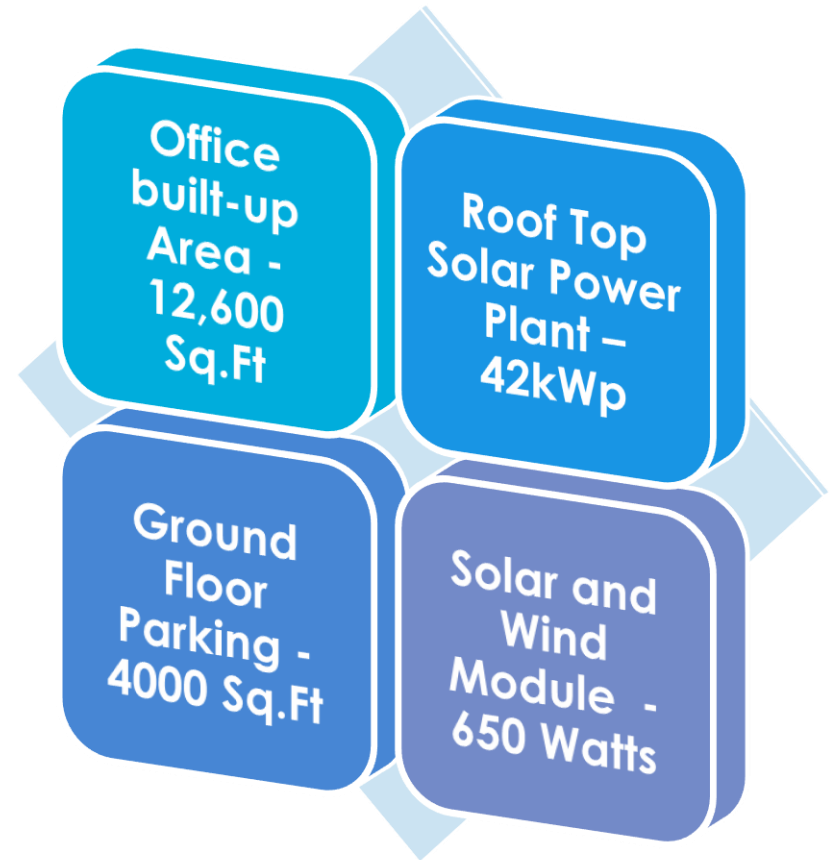
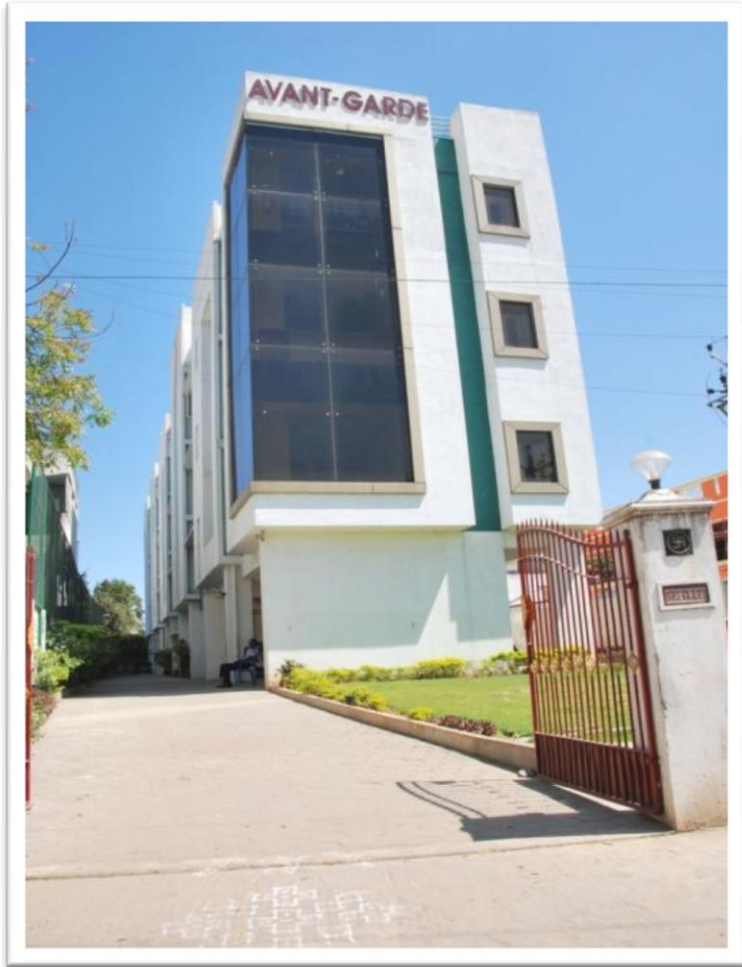
AVANT-GARDE

Home Office Facilities Building - I



AVANT-GARDE

Home Office Facilities Building - II



Computer Hardware Facilities

- Cyberoam Firewall
- Dell R640 Server
- Dell EMC Storage
- HP Proliant Server
- HP LTO6 Ultrium Ext Tape Drive
- HP A5500 Manageable Switches
- Canon IR ADV 4235 Printer
- Canon IRC2220 Color Printer
- A0 HP Plotters
- Life Size Video Conferencing



Licensed Software Package



A AUTODESK®
AUTOCAD® PLANT 3D

I AUTODESK®
INVENTOR®

R AUTODESK®
REVIT®

A | AUTODESK®
ADVANCE STEEL

FOR
N | AUTODESK
NAVISWORKS

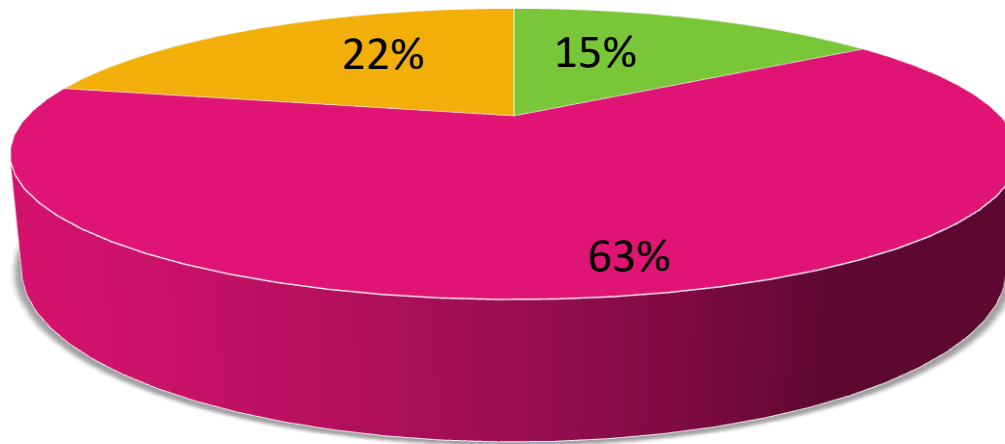


STAAD.Pro



AVANT-GARDE

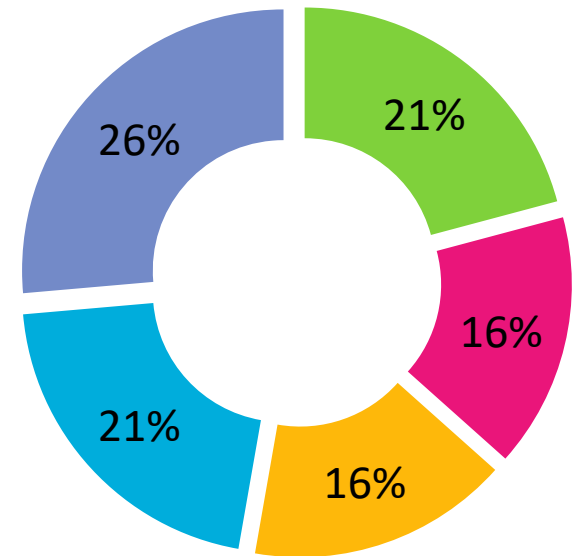
Engineering Manpower



- Post Graduate & Ph.D
- Graduate
- Diploma

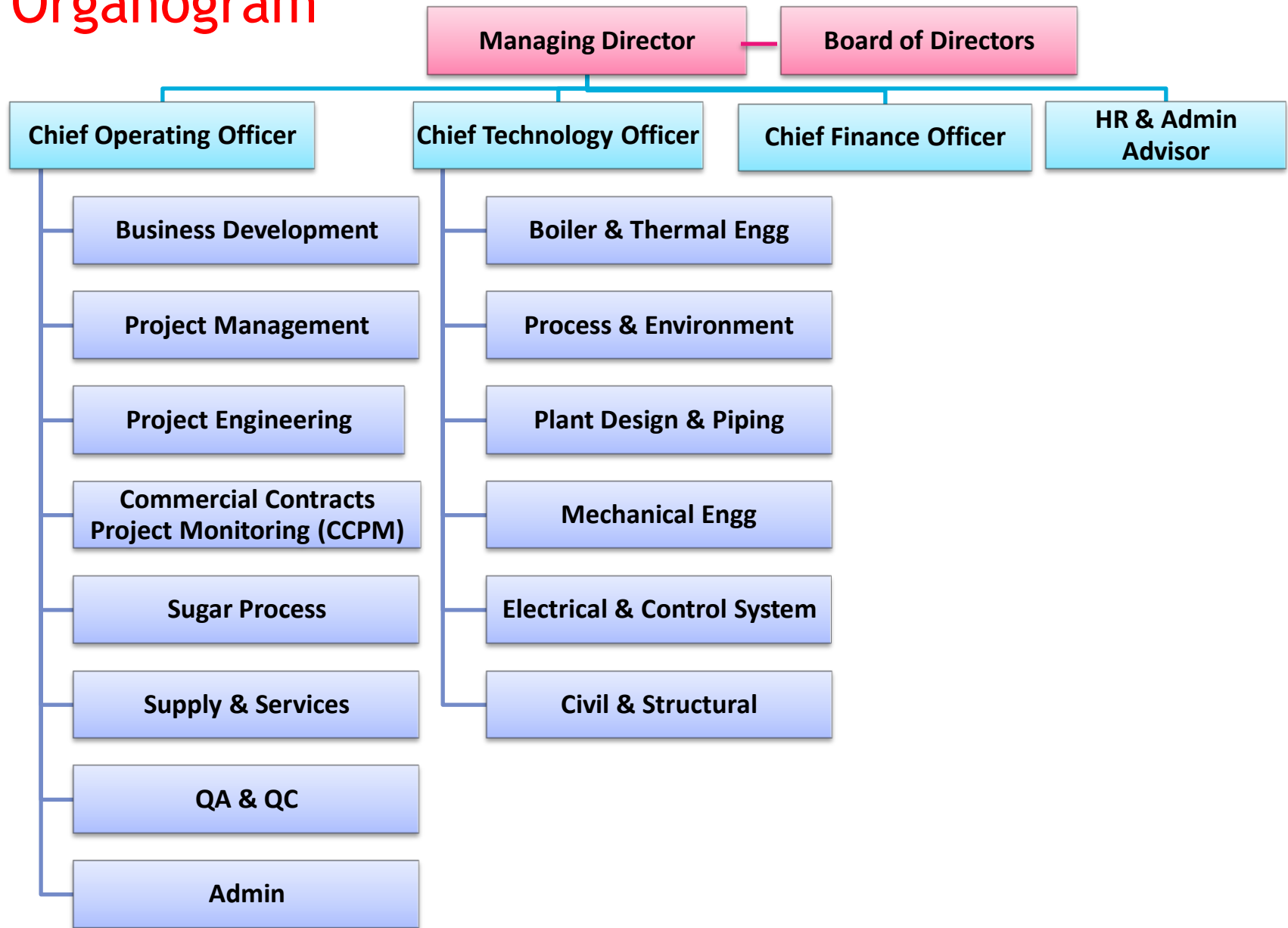
Years of Experience →

- < 5 Years
- 5-10 Years
- 10-15 Years
- 15-20 Years
- Above 20 Years



AVANT-GARDE

Key Organogram



Empanelment & Association



AVANT-GARDE

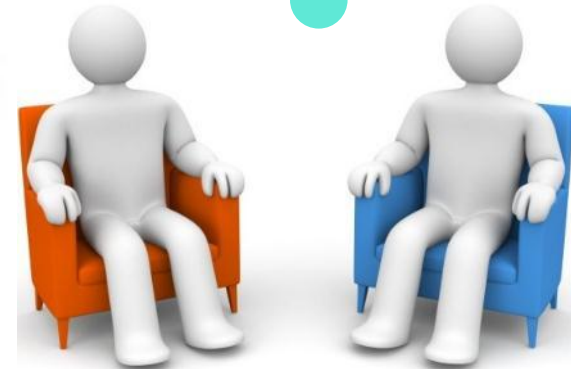
Relationship Forever



2500+
Projects



600+
Clients



AVANT-GARDE

Projects in 40+ Countries



AVANT-GARDE

Concept to Commissioning Consultancy Services

Basic Engineering

- Feasibility Reports
- Detailed Project Reports
- Thermal Cycle Optimisation
- Plant Engineering

Detailed Engineering

- Plant Layout
- Equipment Layout
- Piping
- Electrical
- Switchyard Design
- DCS, PLC, Micro-processor
- Plant Building Design
- Civil works
- Structural design
- Project Management

Detailed Engineering

- Vendor rating
- Preparation of Specification for bought out items
- Evaluation of offers
- Preparation of Draft Purchase Order
- Vendor Drawing Review

Inspection, Erection & Commissioning

- Supervision of Erection and Commissioning
- Performance Testing services
- Inspection Services
- Expediting Services

ZLD IN DISTILLERY PLANT

CLASSIFICATION OF DISTILLERY PLANTS

BASED ON FEED STOCK

MOLASSES BASED DISTILLERY PLANT



GRAIN BASED DISTILLERY PLANT



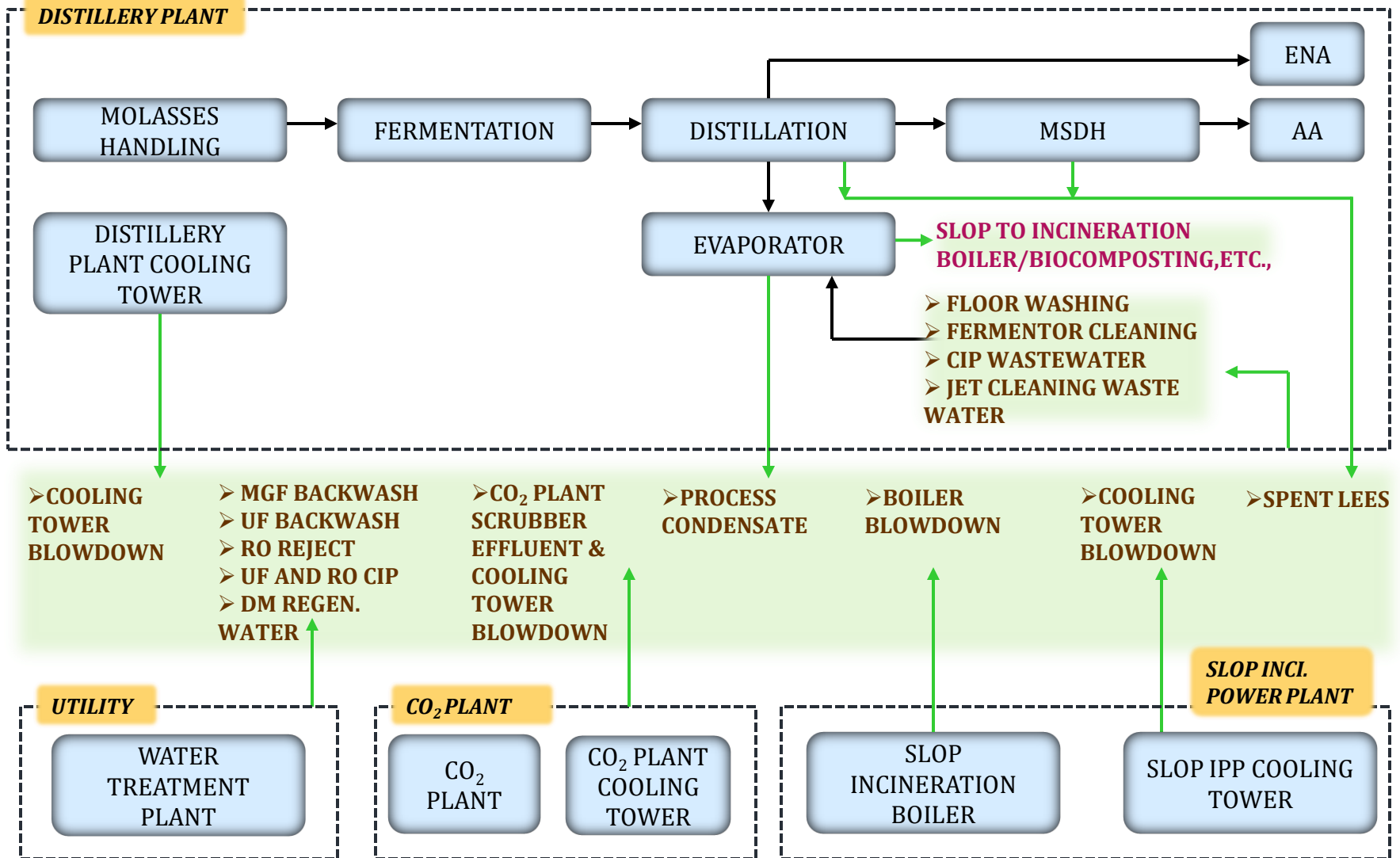
MOLASSES BASED DISTILLERY PLANT

MULTI PRODUCT DISTILLERY WITH SLOP INCINERATION



AVANT-GARDE

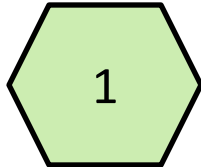
MOLASSES BASED DISTILLERY PLANT OVERALL EFFLUENT GENERATION



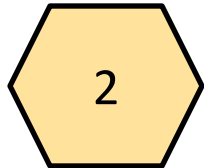
MOLASSES BASED DISTILLERY PLANT

LIST OF EFFLUENT DISPOSED WITHIN DISTILLERY PLANT

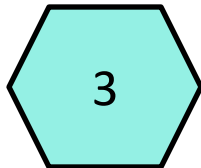
EFFLUENT DISPOSED IN SPENTWASH EVAPORATOR



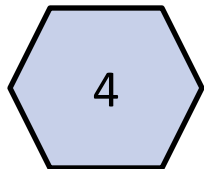
DISTILLERY PLANT FLOOR WASHING



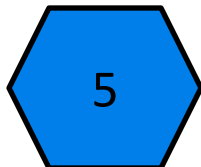
DISTILLERY PLANT FERMENTER CLEANING
WASTE WATER



DISTILLERY PLANT CLEAN-IN-PLACE (CIP)
WASTE WATER



EVAPORATOR JET CLEANING WASTE
WATER



ETRP RO REJECT

MOLASSES BASED DISTILLERY PLANT

SEGREGATION OF BALANCE EFFLUENT TO BE DISPOSED

ORGANIC EFFLUENT

- DISTILLERY PLANT
SPENT WASH
EVAPORATOR PROCESS
CONDENSATE
- DISTILLERY PLANT
SPENTLEES
- CO₂ PLANT
SCRUBBER EFFLUENT

INORGANIC EFFLUENT

- DISTILLERY PLANT COOLING TOWER
BLOWDOWN
- SLOP INCINERATION POWER PLANT BOILER
BLOWDOWN
- SLOP INCINERATION POWER PLANT
COOLING TOWER BLOWDOWN
- CO₂ PLANT COOLING TOWER BLOWDOWN
- WATER TREATMENT PLANT EFFLUENT
 - (A) MGF BACKWASH
 - (B) UF BACKWASH
 - (C) RO REJECT
 - (D) UF AND RO CIP
 - (E) DM REGENERATION WASTE WATER

MOLASSES BASED DISTILLERY PLANT RECENT POLICIES

भारत का राजपत्र
The Gazette of India

असाधारण
EXTRAORDINARY
भाग II—खण्ड 3—उप-खण्ड (i)
PART II—Section 3—Sub-section (i)
प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 457] नई दिल्ली, शुक्रवार, जुलाई 6, 2018/अषाढ़ 15 1940
No. 457] NEW DELHI, FRIDAY, JULY 6, 2018/ASHADHA 15, 1940

1. Molasses based distilleries:

A) All molasses based distilleries including yeast manufacturing units shall achieve zero liquid discharge (ZLD) by:

1. Concentrating and incinerating the spent wash. Raw / Bio-methanated spent wash to be concentrated by MEE and / or RO (minimum 45-60 % solids) and incinerated in boiler; or Concentrating and utilising the spent wash in bio-composting with press mud. Bio-methanated spent wash to be concentrated by MEE and / or RO (minimum 40% by volume with 30% solids) and to be converted into bio compost by mixing with press mud.
2. Other process / non process effluents, RO permeate, MEE condensate etc., shall be suitably treated and reused in the process; and shall not be discharged.

B) New stand alone distilleries (not having sugar unit) or increase in production of standalone distilleries based on molasses shall achieve zero liquid discharge by concentrating and incinerating the spent wash. Raw/Bio-methanated spent wash to be concentrated by MEE and / or R.O. (Min. 45-60 % Solids) and incinerated in boiler.

Other process / non process effluents, R.O permeate, MEE condensate etc, shall be suitably treated and reused in the process; and shall not be discharged.

3. Any other process / industry producing alcohol by distillation:

Any other process / industry producing alcohol by distillation shall achieve zero liquid discharge by adopting suitable treatment methods.

MOLASSES BASED DISTILLERY PLANT

CHARACTERISTICS OF ORGANIC EFFLUENT

S. NO.	DESCRIPTION	UOM	PROCESS CONDENSATE	SPENT LEES	CO ₂ PLANT EFFLUENT
1	pH	-	2.5 to 2.9	2.5	6.50 – 6.70
2	Chemical Oxygen Demand	ppm	5000 to 5500	3500 to 4000	500 to 8000
3	Bio-chemical Oxygen Demand	ppm	3700 to 4500	2000 to 2500	200 to 500
4	Volatile Acids	ppm	3200 to 3900	1800 to 2100	-
5	Total Dissolved Solids	ppm	500 to 550	300	1300 – 1400

MOLASSES BASED DISTILLERY PLANT

CHARACTERISTICS OF INORGANIC EFFLUENT

S. NO.	DESCRIPTION	UOM	BLENDED INORGANIC EFFLUENT QUALITY
1	pH	-	7.5 to 8.5
2	Total Dissolved Solids	ppm	1500 to 2000
3	Reactive Silica as SiO_2	ppm	15 to 25
4	Total hardness as CaCO_3	ppm	750 to 1200

In approximately a decade period of study on Zero Liquid Discharge concept, Thirteen (13) Technologies/Systems have been evaluated till date

- ❖ Direct Brackish Water Spiral Wound RO based system
- ❖ Direct UF system followed by Brackish Water Spiral Wound RO based system
- ❖ Advanced Oxidation system
- ❖ Proprietary -1 Chemical based system
- ❖ Proprietary -2 Chemical based system
- ❖ Proprietary -3 Chemical based system
- ❖ Galvanic Principle Based system
- ❖ Direct sea water spiral wound RO membrane based system
- ❖ Plate & Tube type (Disc type) RO membrane based system
- ❖ Carrier Gas Extraction (CGE)
- ❖ Counter Flow Reverse Osmosis System (CFRO)
- ❖ Forward Osmosis system (FO)
- ❖ Biological treatment system followed by UF & RO based system

MOLASSES BASED DISTILLERY PLANT

SELECTION OF APPROPRIATE TREATMENT SYSTEM

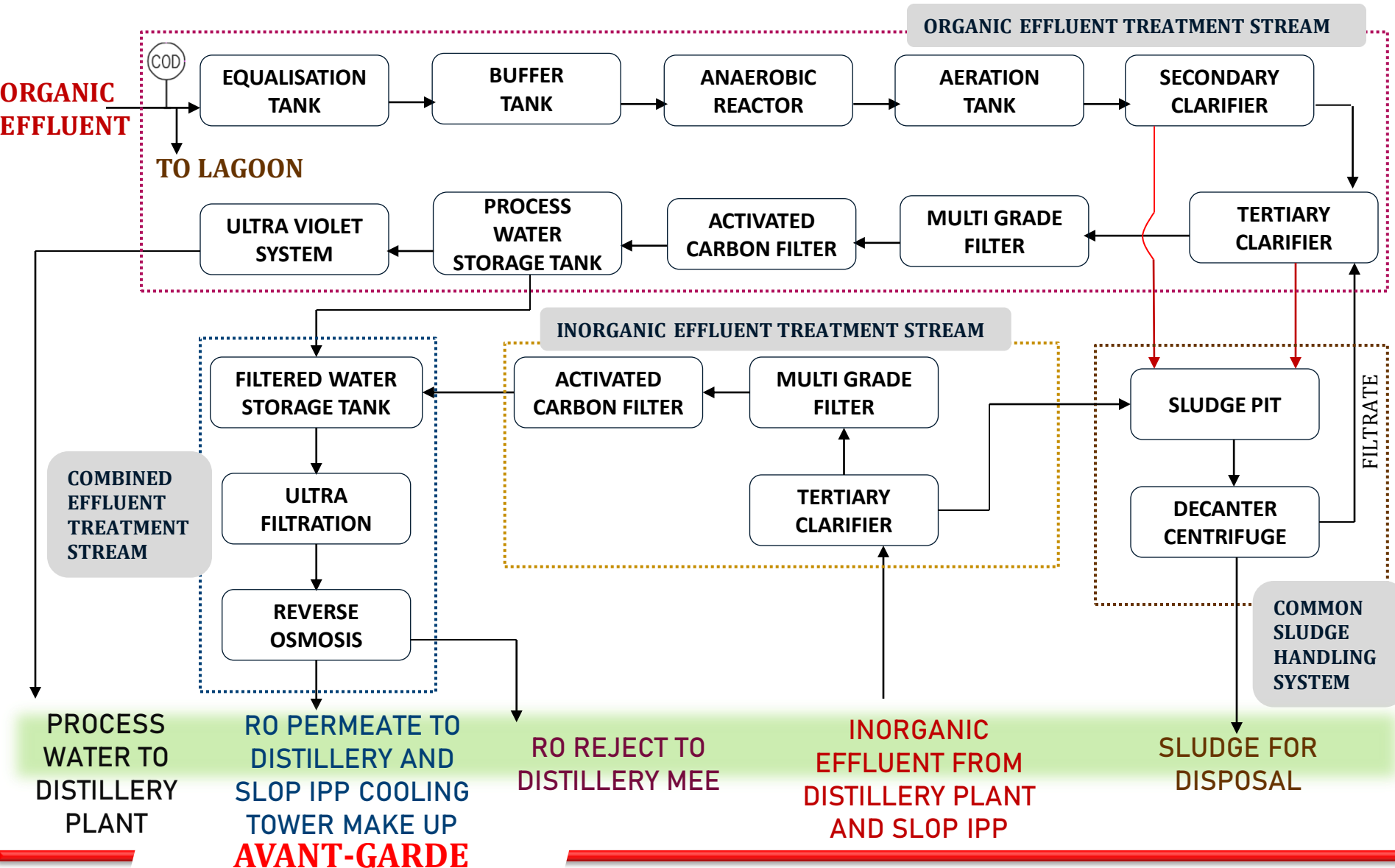


Based on evaluation, 'Biological Treatment System followed by UF and RO based system', which is also identified as 'Effluent Treatment & Recycling Plant (ETRP)' is the recommended system for handling effluent from Distillery plant.

This system consist of the following streams

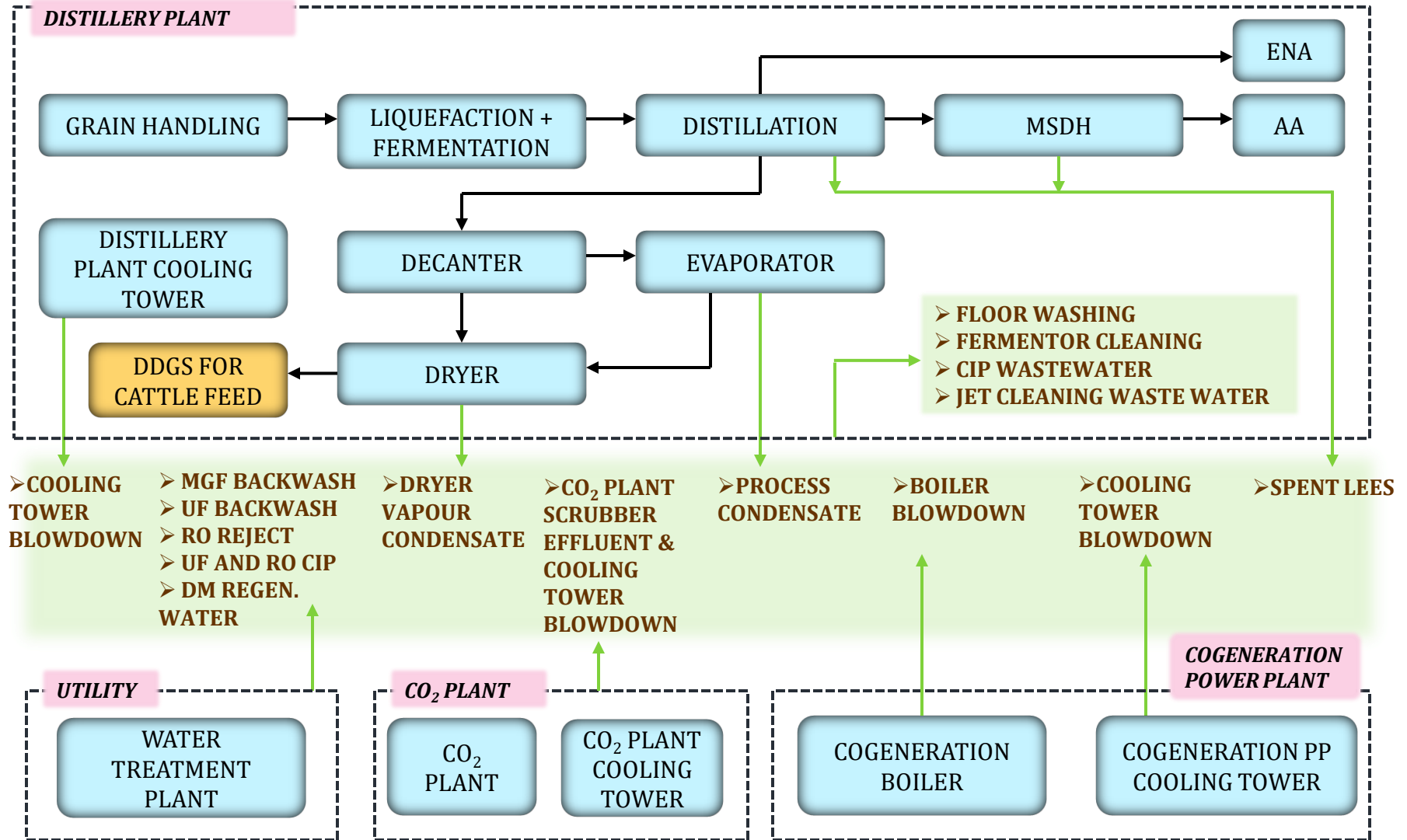
1. Organic Effluent Treatment Stream (Biological based treatment system)
2. Inorganic Effluent Treatment Stream
3. Combined UF and RO Membrane based Treatment Stream
4. Common Sludge handling & disposal system.

MOLASSES BASED DISTILLERY PLANT PROCESS FLOW DIAGRAM - ETRP



GRAIN BASED DISTILLERY PLANT

GRAIN BASED DISTILLERY PLANT OVERALL EFFLUENT GENERATION



GRAIN BASED DISTILLERY PLANT

SEGREGATION OF EFFLUENT TO BE DISPOSED

ORGANIC EFFLUENT

- DISTILLERY PLANT
THIN STILLAGE
EVAPORATOR PROCESS
CONDENSATE
- DISTILLERY PLANT
SPENTLEES
- CO₂ PLANT
SCRUBBER EFFLUENT
- DRYER VAPOUR
CONDENSATE

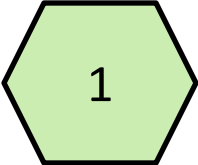
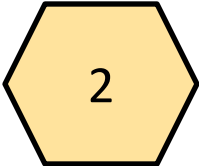
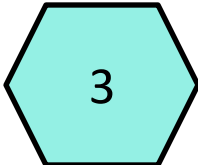
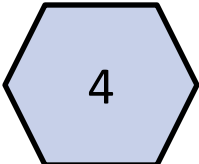
INORGANIC EFFLUENT

- DISTILLERY PLANT COOLING TOWER
BLOWDOWN
- COGENERATION POWER PLANT BOILER
BLOWDOWN
- COGENERATION POWER PLANT COOLING
TOWER BLOWDOWN
- CO₂ PLANT COOLING TOWER BLOWDOWN
- WATER TREATMENT PLANT EFFLUENT
 - (A) MGF BACKWASH
 - (B) UF BACKWASH
 - (C) RO REJECT
 - (D) UF AND RO CIP
 - (E) DM REGENERATION WASTE WATER

GRAIN BASED DISTILLERY PLANT

SEGREGATION OF EFFLUENT TO BE DISPOSED (CONT.)

OTHER EFFLUENT TO DISPOSED FROM DISTILLERY PLANT

- | | |
|---|--|
|  | DISTILLERY PLANT FLOOR WASHING |
|  | DISTILLERY PLANT FERMENTER CLEANING
WASTE WATER |
|  | DISTILLERY PLANT CLEAN-IN-PLACE (CIP)
WASTE WATER |
|  | EVAPORATOR JET CLEANING WASTE
WATER |

GRAIN BASED DISTILLERY PLANT RECENT POLICIES

भारत का राजपत्र
The Gazette of India

असाधारण
EXTRAORDINARY
भाग II—खण्ड 3—उप-खण्ड (i)
PART II—Section 3—Sub-section (i)
प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 4571 नई दिल्ली, शुक्रवार, जुलाई 6, 2018/आषाढ़ 15 1940
No. 4571 NEW DELHI, FRIDAY, JULY 6, 2018/ASHADHA 15, 1940

2. Grain based distilleries:

All grain based distilleries shall achieve zero liquid discharge by decantation, concentration by evaporation and drying. The distilleries shall follow the below route for achieving ZLD

- (i) The whole stillage shall be decanted, thin stillage shall be evaporated and wet cake and syrup shall be mixed and dried in a dryer and converted into Distillers' Dried Grains with Solubles (DDGS). Bio-methanation of any intermediate stream for recovery of bio gas can also be carried out by the industries.
- (ii) The moisture content of DDGS should not be more than 10 %.
- (iii) Other non process effluents, R.O permeate, MEE condensate etc, shall be suitably treated and reused in the process; and shall not be discharged
- (iv) Industries those shall operate on both grain and molasses shall have both the systems for achieving ZLD.

3. Any other process / industry producing alcohol by distillation:

Any other process / industry producing alcohol by distillation shall achieve zero liquid discharge by adopting suitable treatment methods.

GRAIN BASED DISTILLERY PLANT

CHARACTERISTICS OF ORGANIC EFFLUENT

S. NO.	DESCRIPTION	UOM	PROCESS CONDENSATE	SPENT LEES	DRYER VAPOUR CONDENSATE	CO ₂ PLANT EFFLUENT
1	pH	-	2.5 to 2.9	2.5	3 to 5	6.50 – 6.70
2	Chemical Oxygen Demand	ppm	1200 to 2000	800 to 1400	1200 to 6000	500 to 8000
3	Bio-chemical Oxygen Demand	ppm	800 to 1800	500 to 1000	800 to 3500	200 to 500
4	Volatile Acids	ppm	1000 to 2000	1800 to 2500	2000 to 3000	-
5	Total Dissolved Solids	ppm	100 to 400	200 to 900	200 to 500	1300 to 1400

GRAIN BASED DISTILLERY PLANT

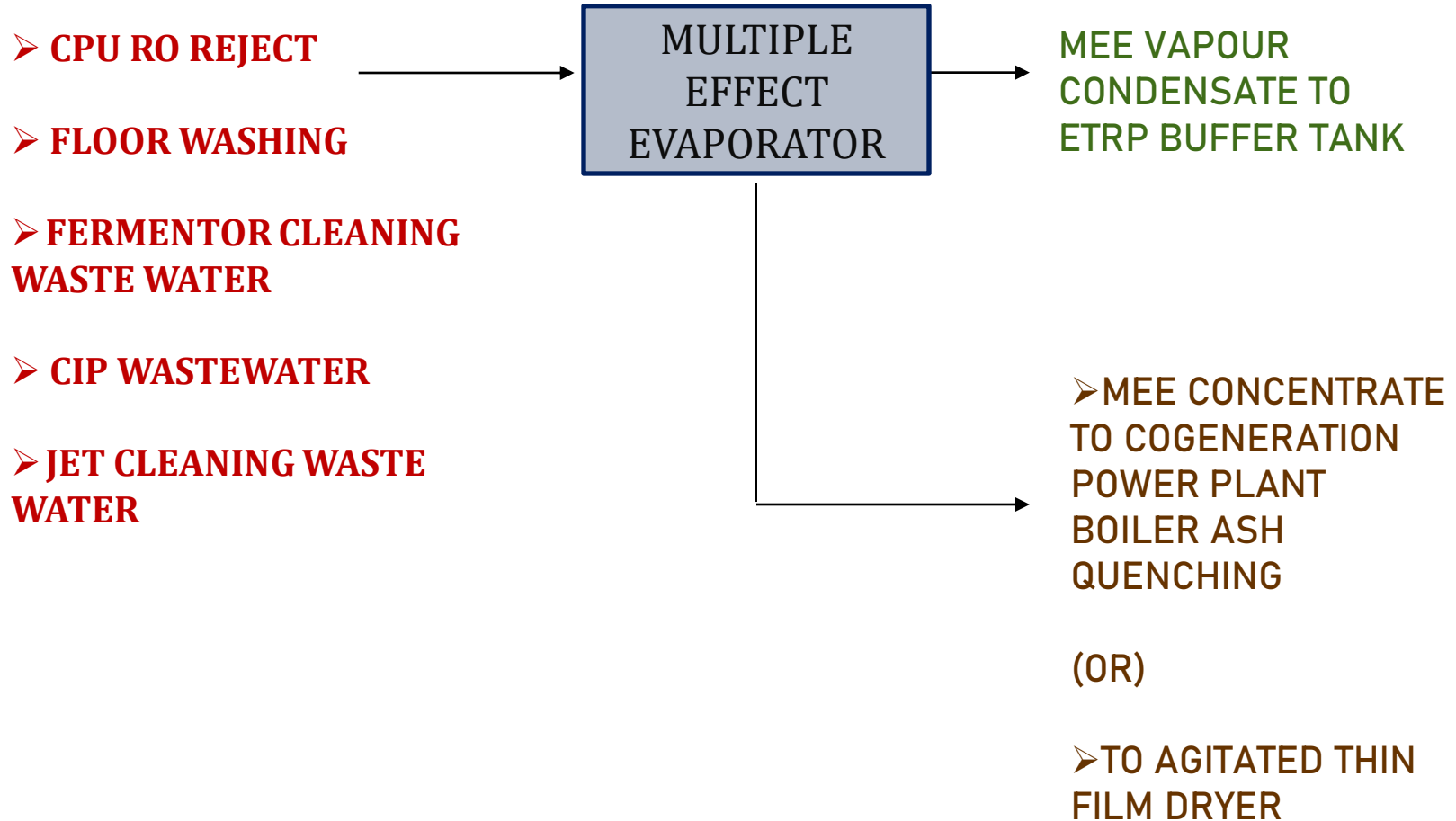
CHARACTERISTICS OF INORGANIC EFFLUENT

S. NO.	DESCRIPTION	UOM	BLENDED INORGANIC EFFLUENT QUALITY
1	pH		7.5 to 8.5
2	Total Dissolved Solids	ppm	1500 to 2000
3	Reactive Silica as SiO_2	ppm	15 to 25
4	Total hardness as CaCO_3	ppm	750 to 1200



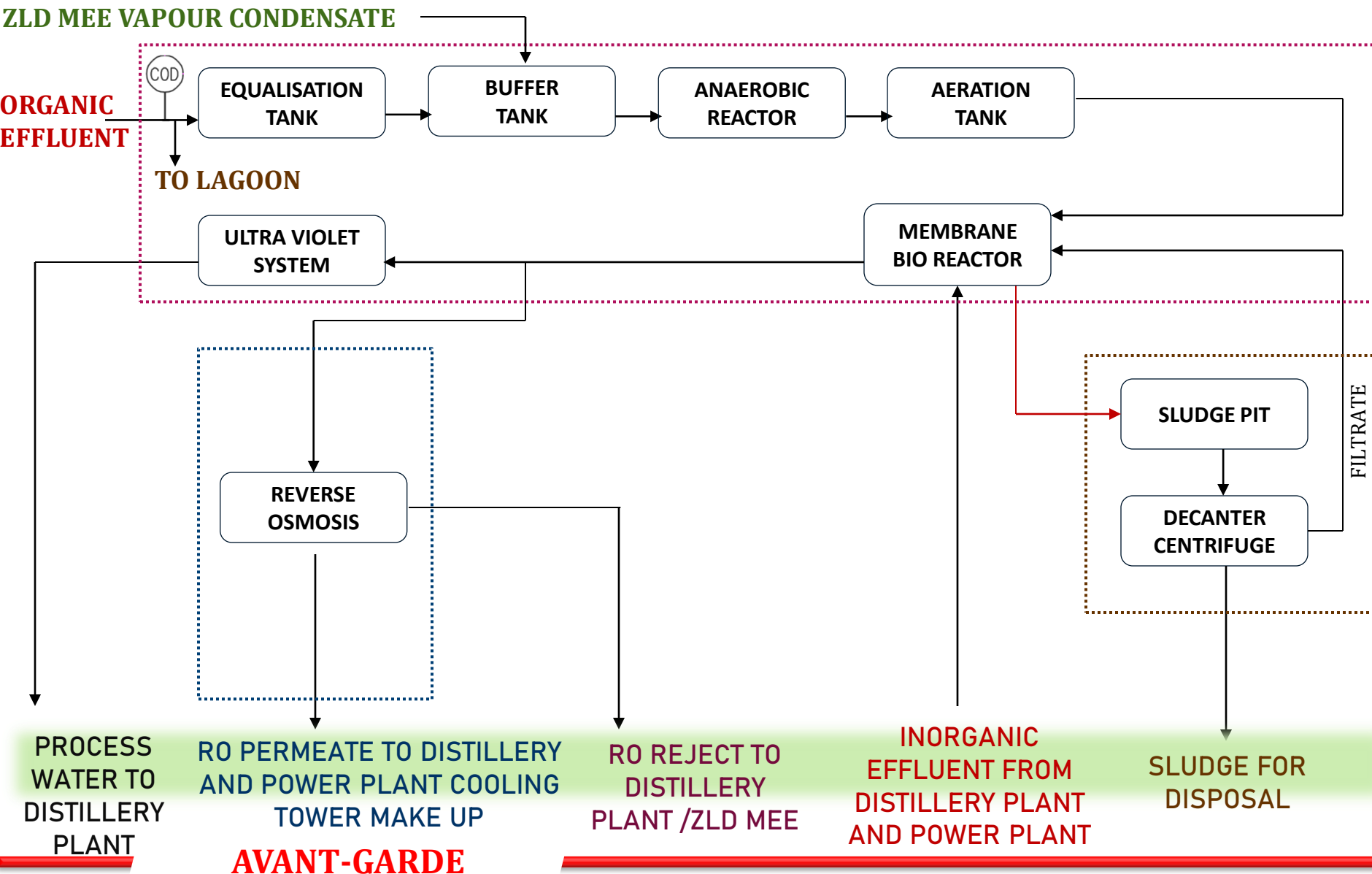
GRAIN BASED DISTILLERY PLANT

ETRP RO REJECT ZLD SYSTEM



DISTILLERY PLANT

PROCESS FLOW DIAGRAM – ETRP WITH MBR



EFFLUENT TREATMENT AND RECYCLING PLANT

Sl.No.	Parameters	Typical 100 KLPD Distillery plant	Typical 330 KLPD distillery plant
1	Operating Cost (Power , Chemical and Consumables)	~ Rs. 38 paise/ litre of Alcohol	~ Rs. 38 paise/ litre of Alcohol
2	Space Required	~ 4500 m ² -5200 m ²	~ 6500 m ² -6900 m ²
3	Power Consumption	~120 -150 kWh	~250kWh

PRODUCTION OF BIOGAS

- ❖ Anaerobic digestion of organic effluent produces **Biogas** during the process of biodegradation of organic matter in the digester.
- ❖ Biogas is collected in the head space of the anaerobic digester (or under the flexible cover)
- ❖ Mixture of Methane (55-60%), Carbon Dioxide (40-45%), Hydrogen, Hydrogen Sulphide (0.3%) and Moisture(1%),
- ❖ Moderate Calorific Value
- ❖ Theoretically 0.5 to 0.6 m³ of methane / kg of COD

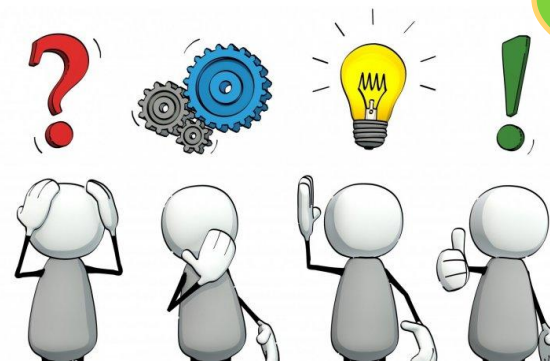
BIOGAS AS ADDITIONAL FUEL

- ❖ Option -1 : Savings on cost of Bagasse
- ❖ Option -2: Revenue from excess power
- ❖ Option -3 : Saving in fuel cost (bagasse) in ash granulation plant

- Start up and Stabilization Period of Anaerobic System
- Higher Recovery in the RO System without compromising the minimum assured life of RO membrane
- One of the major component in the Operating Cost is significant caustic consumption in Anaerobic Feed treatment and resultant TDS increase.
- Upsets in the Upstream Evaporation Plant
- Complications in the Online measurement of COD

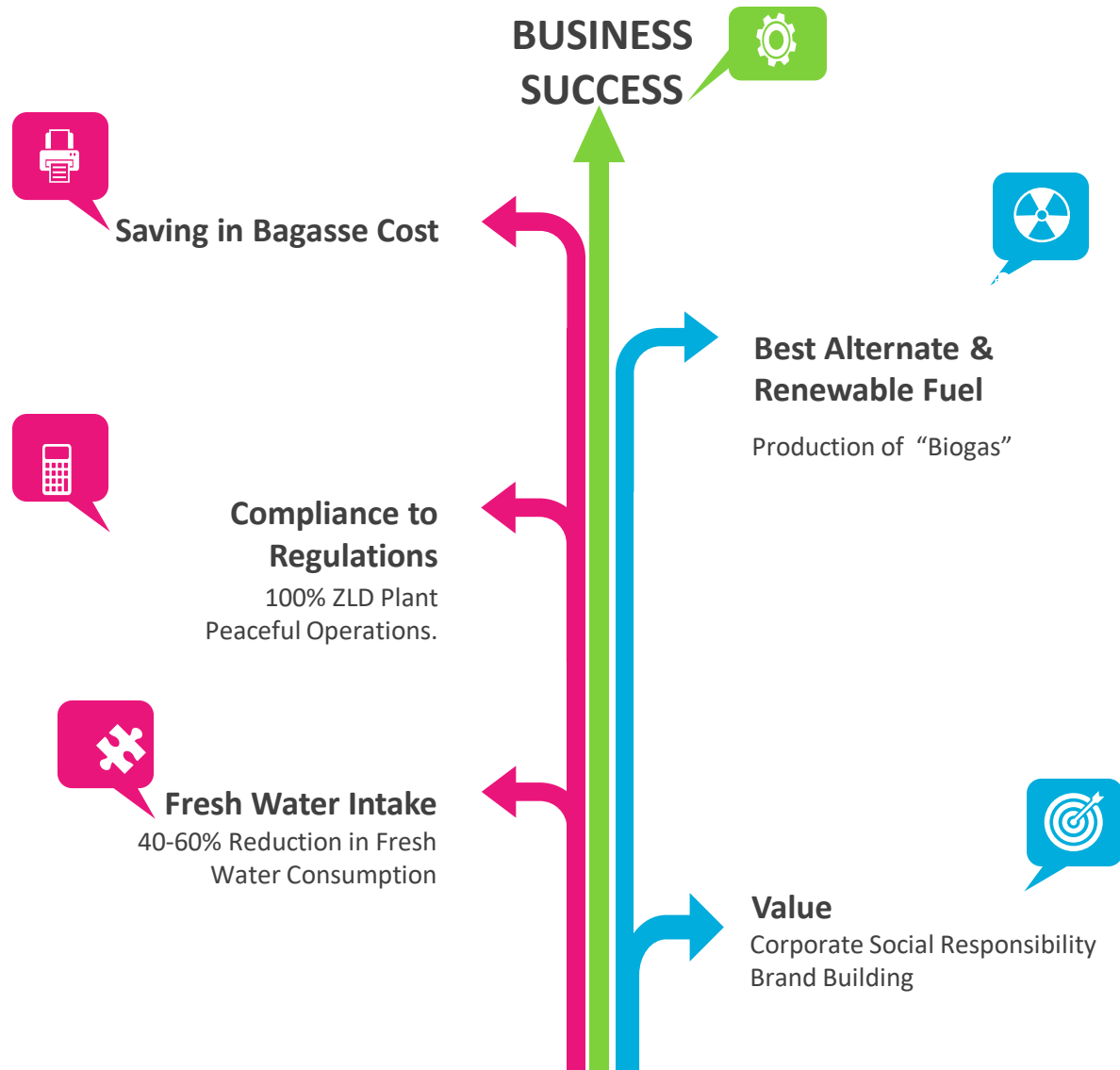
- ❖ The CSR approach is holistic and integrated with the core business strategy for addressing social and environmental impacts of businesses.
- ❖ CSR needs to address the well-being of all stakeholders and not just the company's shareholders.
- ❖ Development that meets the needs of the present without compromising the ability of future generations to meet their own needs

❖ So



What is the
ROI/IRR?

SUMMARY-BENEFITS OF ZLD



160 KLPD Distillery Plant in UP



AVANT-GARDE

Multiproduct Distillery in Kenya



AVANT-GARDE

Bulk Storage Tank



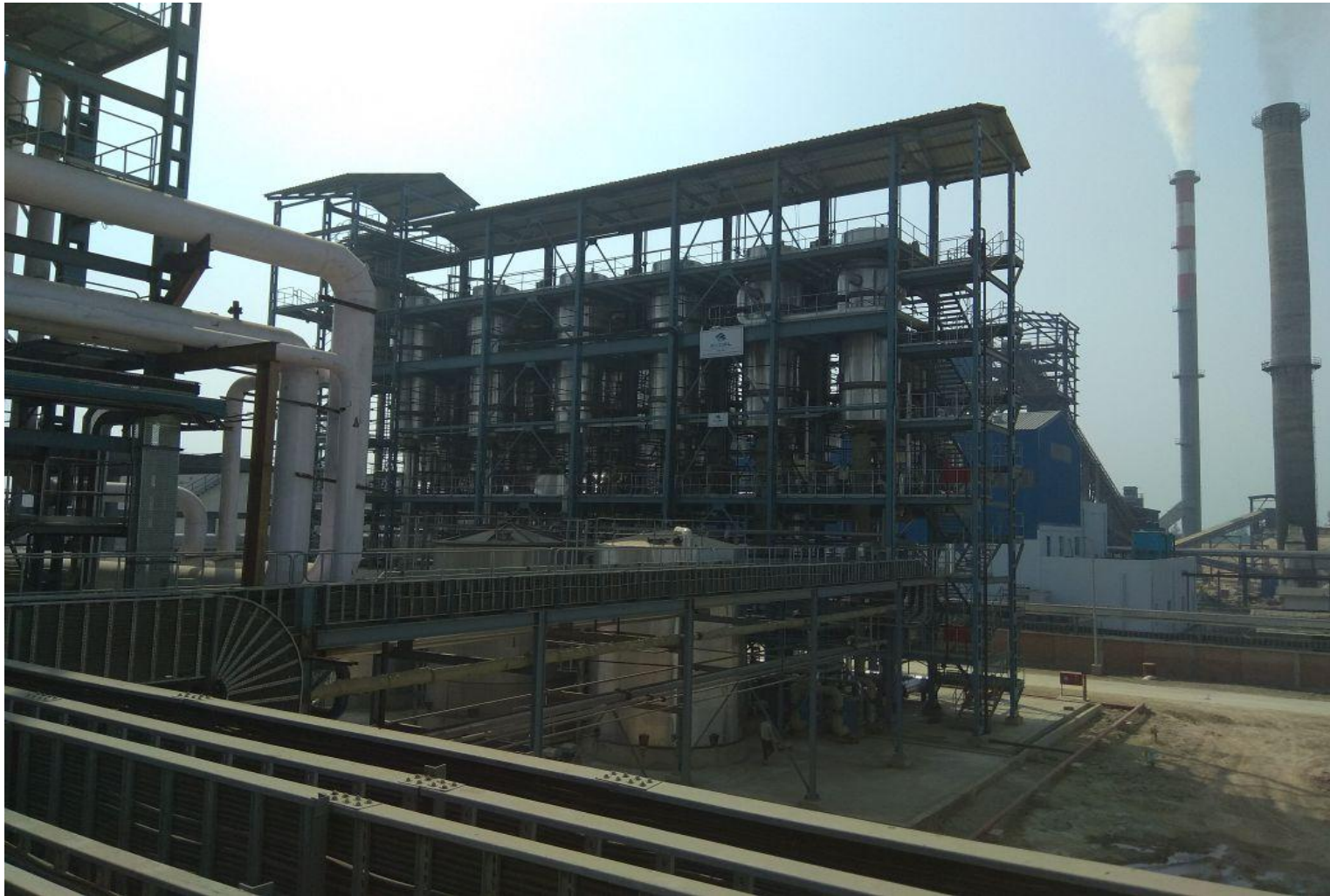
AVANT-GARDE

Fermentation Section



AVANT-GARDE

Evaporator



AVANT-GARDE

SLOP CONCENTRATION (MEE)

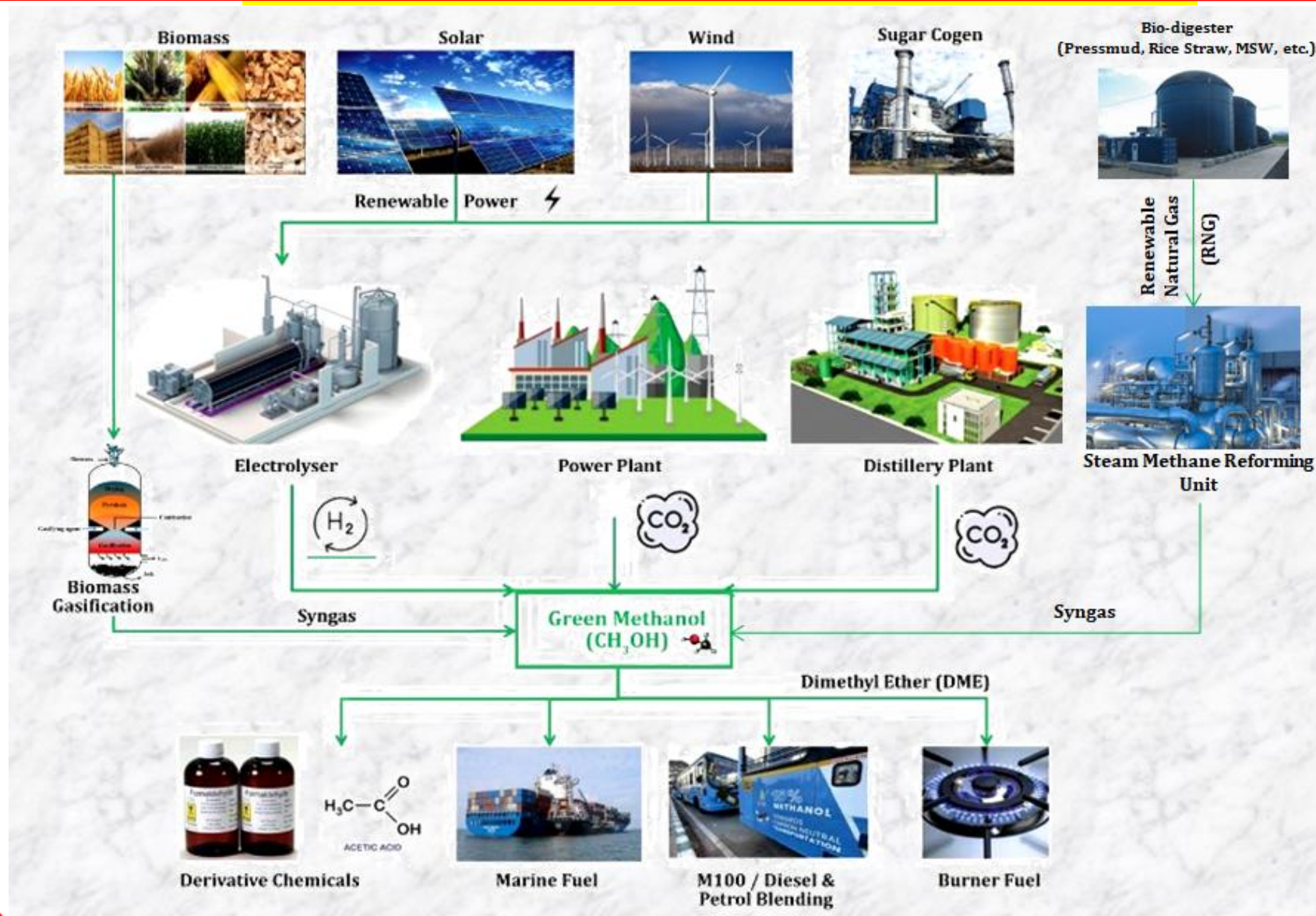


AVANT-GARDE

GREEN METHANOL FROM ETHANOL PLANT'S BIOGENIC CO₂

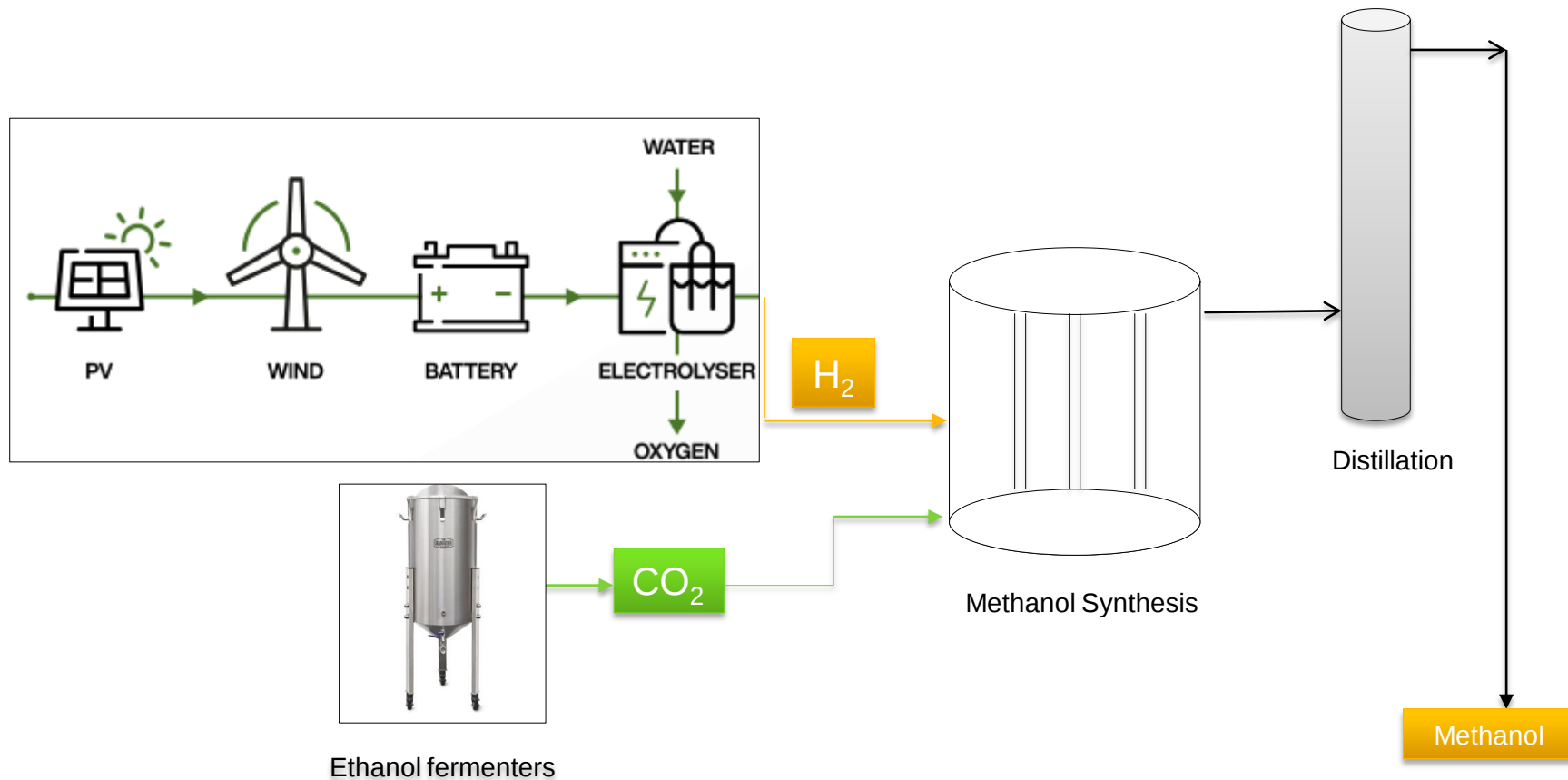
GREEN METHANOL

The Perfect Carrier for Green Hydrogen & It is the Future Fuel

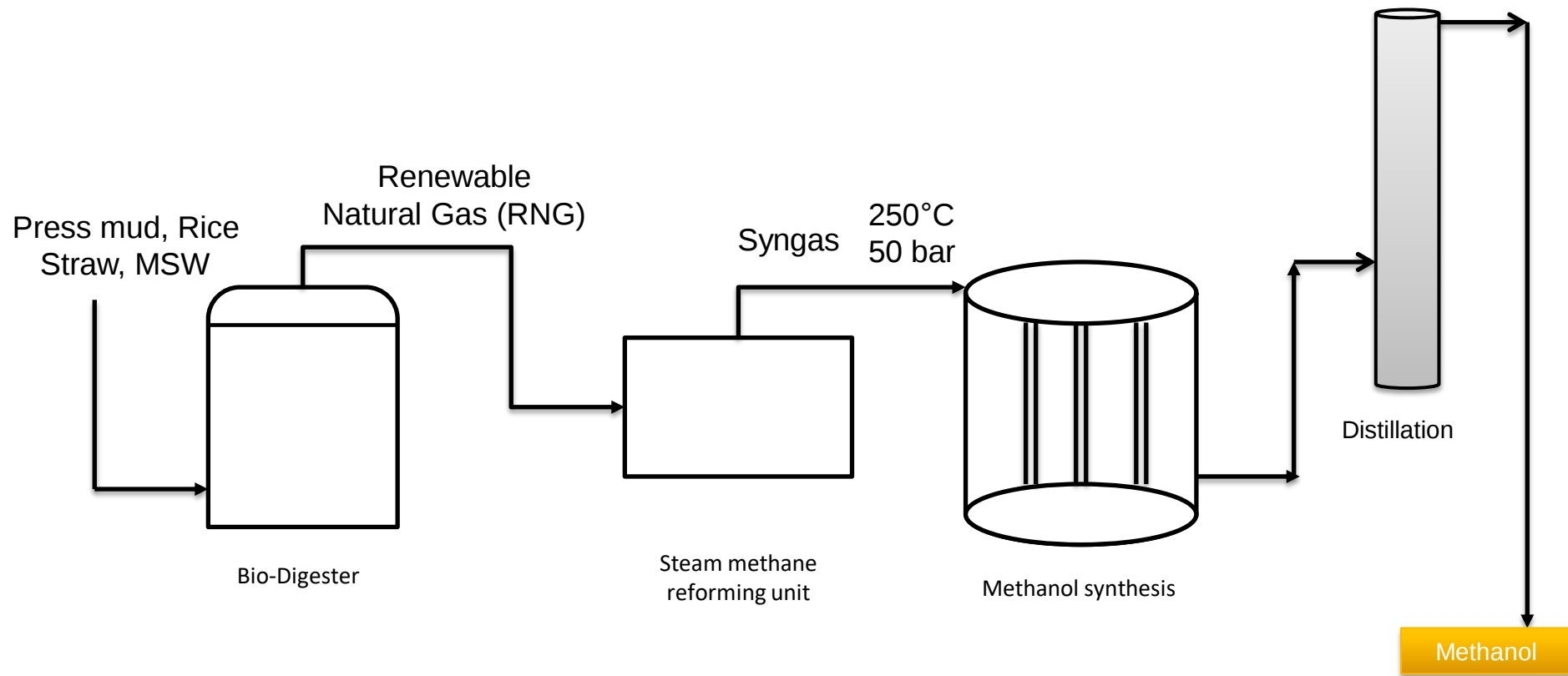


GREEN METHANOL FROM CO₂ HYDROGENATION IN SUGAR COGEN & ETHANOL PLANT

Methanol production – CO₂ from the fermenters in the ethanol plant



GREEN METHANOL FROM RENEWABLE NATURAL GAS



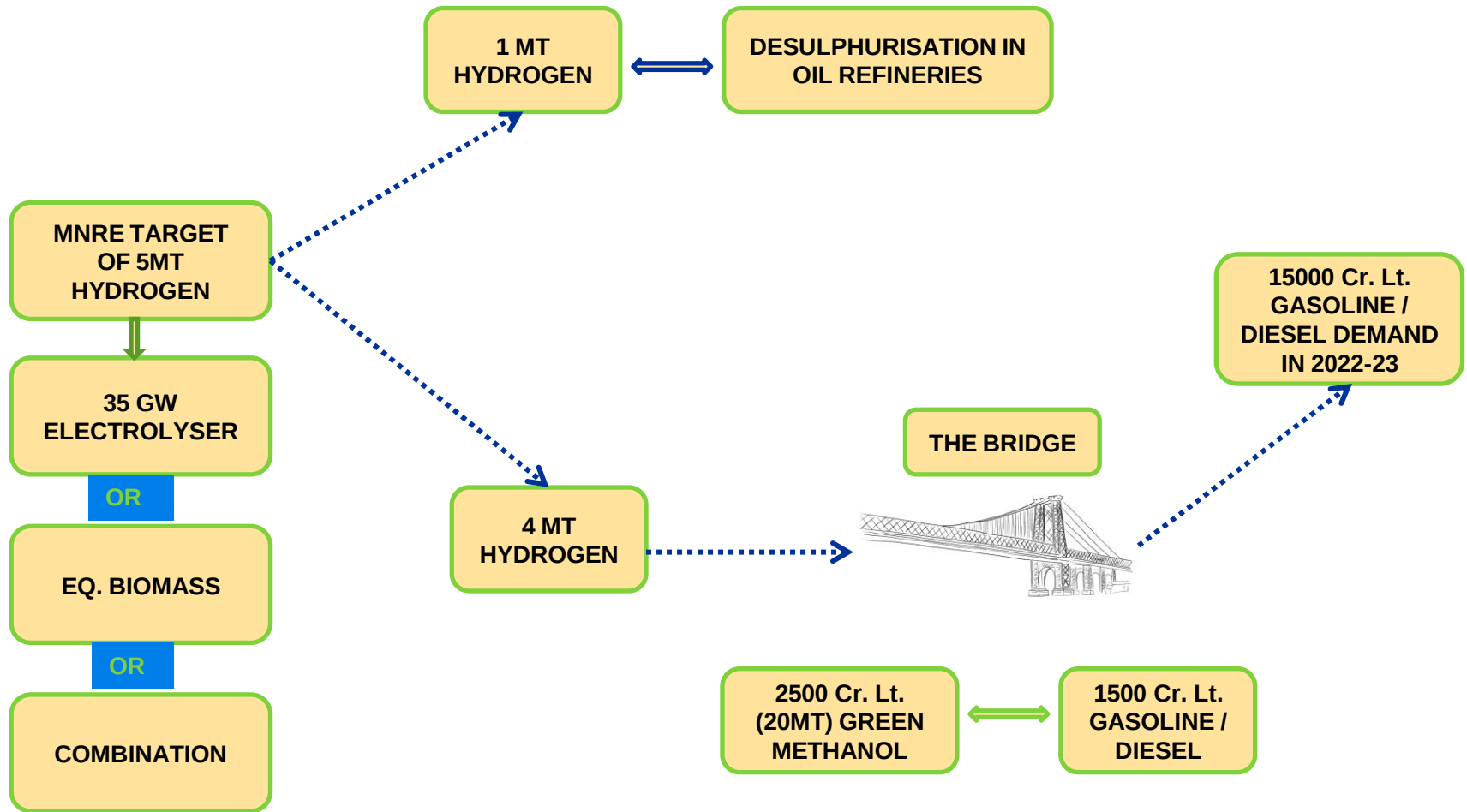
Reaction Chemistry:



POTENTIAL FOR METHANOL PRODUCTION IN ETHANOL PLANTS

1. Typical 100 kLPD Ethanol plant can co-produce 40 kLPD Green Methanol (or eMethanol), by using the Biogenic CO₂ released from the Fermeters. Renewable power (sugar cogen or solar / wind) of about 13.5 MW will be needed methanol production through electrolysis process.
2. About 500 Crore Litres of eMethanol can be produced from the Ethanol Plants in India, by 2025 (corresponding to E20 blending requirement in Gasoline), by using about 5000 MW renewable power.
3. UP Govt provides subsidy upto 60% of Electrolyser cost, for Green Hydrogen production.
4. Green Methanol is being procured in Marine Segment (for meeting IMO-2023 targets) at over Rs.70 per litre.
5. Huge potential for Green Methanol, under Green Hydrogen Mission.

GREEN HYDROGEN SUPPLY CHAIN & DEMAND BY 2030



- a. International Maritime Organisation's IMO-2023 aims to reduce carbon emissions from international shipping by 40% by 2030 and 70% by 2050 from the 2008 levels, by adopting CII (Carbon Intensity Indicator) system with A to E grades to move towards A. Green Methanol perfectly fits into their goals, with more and more new ships switching to Methanol fuel.
- b. Leading shipping companies like AP Moller-Maersk, CMA CGM, COSCO, Methanex Waterfront Shipping and Stena, etc have already chosen marine methanol engines, to achieve low emission levels. When they switch to Green Methanol, it would become carbon neutral.
- c. There is a clear trend of new marine vehicle propulsions being ordered with methanol engines (over 50%), during the last one year.

- d. Bunkering hubs for eMethanol are being planned in the leading ports throughout the globe.
- e. Platts, part of S&P Global Commodity Insights, will launch daily production cost-based renewable methanol prices for North America, Europe and Asia, in response to market feedback and the maritime industry's need for price valuations for sustainable methanol, this June.
- f. IRENA has projected an annual production of 500 million MT by 2050 (current global production is 110 million MT), with 80% as eMethanol or Bio-Methanol. India's share is expected to be 10-20% of global production, in consideration of abundant biomass / renewable energy potential (1million MT=125 Cr Lt) and the progressive goals for Green Hydrogen.

- All technologies like CO₂ hydrogenation, syngas to methanol synthesis, electrolysis, CO₂ purification, reformation & gasification are proven and established systems in the industries, which have been adopted for different applications. Hence there are no technological risks.
- Green Methanol is the next renewable fuel awaiting policy support, like Ethanol! It's the future fuel as well as the ideal Carrier & Bridge for Green Hydrogen!

- As Ethanol being blended with petrol (E20), Green Methanol (bio-methanol as well as eMethanol) can be blended with Diesel (MD15). Being renewable fuel and an excellent Carrier for Green Hydrogen, this will enable attaining the nation's target of 5MT green hydrogen by 2030 and also energy self-sufficiency goal by 2047.
- **Energy self-sufficiency by 2047 will automatically create the pathway for the next goal of NZE by 2070!**
- **Looking forward to AIDA's steps & initiatives in representing the Govt for Green Methanol Blending Policy!**

COMPLETED PROJECTS

Sl. No	Name of Client	Type of Industry & Plant capacity	ETPR / ZLD	
			m ³ /h	m ³ /d
1	Dhanalakshmi Srinivasan Sugars Private Ltd., Tamil Nadu	Sugar plant 3500 TCD	93	2232
2	DCM Shriram Limited, (DSCL Sugar – Hariawan), UP	Sugar plant 5000 TCD	125	3000
3	Twenty One Sugars, Malwati, Maharashtra	Sugar plant 5000 TCD	32	750
4	KPR Sugar mills ltd., Afzalpur, Karnataka	Sugar plant 10000 TCD	83	2000
5	Wave Industries pvt. ltd., Dhanaura, UP	Sugar plant 8300 TCD	83	2000
6	Balrampur Chini mills ltd. Gularia Unit, UP	Sugar Plant 8000 TCD	34	800

CLIENTELE OF ANAEROBIC SYSTEMS (CONTD.)

COMPLETED PROJECTS

Sl. No	Name of Client	Type of Industry & Plant capacity	ETPR / ZLD			
			Organic Effluent capacity		Inorganic Effluent capacity	
			m ³ /h	m ³ /d	m ³ /h	m ³ /d
7	Madhucon Sugars and Power Limited, AP	Distillery 65 KLPD	42	1008	-	-
8	Mankapur Chini Mills Limited, UP	Distillery 115 KLPD	58	1398	-	-
9	DCM Shriram Limited, (DSCL Sugar – Hariawan), UP	Distillery 160 KLPD	89	2131	-	-
10	Triveni Engineering & Industries Limited – Sabitgarh, UP	Distillery 160 KLPD	72	1720	49	1164
11	Gobind Sugar Mills Limited, UP	Distillery 100 KLPD	67	1618	21	494

CLIENTELE OF ANAEROBIC SYSTEMS (CONTD.)

COMPLETED PROJECTS

Sl. No	Name of Client	Type of Industry & Plant capacity	ETPR / ZLD			
			Organic Effluent capacity		Inorganic Effluent capacity	
			m ³ /h	m ³ /d	m ³ /h	m ³ /d
12	DCM Shriram Limited, (DSCL Sugar – Ajbapur), UP	Distillery 225 KLPD	102	2451	33	778
13	Balrampur Chini Mills Limited – Unit Gularia, UP	Distillery 160 KLPD	56	1338	14	336
14	Dalmia Bharat Sugar and Industries Limited, Jawaharpur, UP	Distillery 120 KLPD	42	1000	9	225
15	K.P.R. Sugar Mill Limited – Almel, Karnataka	Distillery 90 KLPD	58	1372	21	496
16	K.M. Sugar Mills Limited, UP	Distillery 40 KLPD	25	603	6.5	150
17	Triveni Engineering and Industries Limited – Muzaffarnagar, UP	Distillery 160 KLPD	60	1424	32	1763

CLIENTELE OF ANAEROBIC SYSTEMS (CONTD.)

COMPLETED PROJECTS

Sl. No	Name of Client	Type of Industry & Plant capacity	ETPR / ZLD			
			Organic Effluent capacity		Inorganic Effluent capacity	
			m ³ /h	m ³ /d	m ³ /h	m ³ /d
18	Triveni Engineering and Industries Limited – Milk Narayanpur, UP	Distillery 160 KLPD	73	1737	18	440
19	Triveni Engineering and Industries Limited – Muzaffarnagar, UP (Phase 2)	Distillery 60 KLPD	17	400	5	128
20	Wave Industries Pvt. Ltd., UP	Distillery 100KLPD	63	1503	9.3	229
21	K.P.R. Sugar Mill Limited – Afzalpur, Karnataka	Distillery 220 KLPD	83	1985	28	671
22	Dalmia Bharat Sugar and Industries Limited, Ramgarh, UP	Distillery 120 KLPD	42	1000	9.5	225
23	Dalmia Bharat Sugar and Industries Limited, Jawaharpur, UP	Distillery 120 KLPD	42	1000	9.50	225

CLIENTELE OF ANAEROBIC SYSTEMS (CONTD.)

ONGOING PROJECTS

Sl. No	Name of Client	Type of Industry & Plant capacity	ETPR / ZLD			
			Organic Effluent capacity		Inorganic Effluent capacity	
			m ³ /h	m ³ /d	m ³ /h	m ³ /d
24	Balrampur Chini mills ltd., Unit : Balrampur, UP	Distillery 330 KLPD	111	2670	45	1041
25	Balrampur Chini mills ltd., Unit : Maizapur, UP	Distillery 323 KLPD	129	3095	38	904
	TOTAL		54584 m³/day			

CLIENTELE OF ANAEROBIC SYSTEMS (CONTD.)

ONGOING PROJECTS

Sl. No	Name of Client	Type of Industry & Plant capacity	ETPR / ZLD			
			Organic Effluent capacity		Inorganic Effluent capacity	
			m ³ /h	m ³ /d	m ³ /h	m ³ /d
1	Inland Green Energy,	Distillery 350 KLPD	115	2770	58	1398
2	Grainfuel Distilleries pvt. ltd., Gujarat	Distillery 250 KLPD	61	1459	55	1309
3	Twenty One Sugars, Unit 1 – Malwati, Maharashtra	Distillery 200 KLPD	52	1241	15	360
4	Twenty One Sugars, Unit 2 – Latur, Maharashtra	Distillery 200 KLPD	52	1241	15	360
5	Kribhco, Bharati Cooperative limited, Hazira, Gujarat	Distillery 250 KLPD	Under Design			
6	Kribhco Bharati Cooperative limited, Krishnapatnam, AP	Distillery 250 KLPD	Under Design			

CLIENTELE OF ANAEROBIC SYSTEMS (CONTD.)

ONGOING PROJECTS

Sl. No	Name of Client	Type of Industry & Plant capacity	ETPR / ZLD			
			Organic Effluent capacity		Inorganic Effluent capacity	
			m ³ /h	m ³ /d	m ³ /h	m ³ /d
7	Majestic Basmati Rice pvt. ltd., Mandideep, MP	Distillery 65 KLPD	Under Design			
8	Assago Industries pvt. Ltd., AP	Distillery 200 KLPD	Under Design			
9	SPAC starch products (I) pvt. ltd., TN	Distillery 160 KLPD	Under Design			
10	Nadahalli Ethanol & Allied Industries ltd., Karnataka	Distillery 220 KLPD	Under Design			
11	Nandadevi Bioenergy LLP, TN	Distillery 160 KLPD	Under Design			
12	ADAS Biofuels, Ahmedabad, Gujarat	Distillery 2 x 250 KLPD	Under Design			

CLIENTELE OF ANAEROBIC SYSTEMS (CONTD.)

ONGOING PROJECTS

Sl. No	Name of Client	Type of Industry & Plant capacity	ETPR / ZLD			
			Organic Effluent capacity		Inorganic Effluent capacity	
			m ³ /h	m ³ /d	m ³ /h	m ³ /d
17	SPAC starch products (I) pvt. ltd., TN	Distillery 160 KLPD	Under Design			
18	Nadahalli Ethanol & Allied Industries ltd., Karnataka	Distillery 220 KLPD	Under Design			
19	Nandadevi Bioenergy LLP, TN	Distillery 160 KLPD	Under Design			
20	ADAS Biofuels, Ahmedabad, Gujarat	Distillery 2 x 250 KLPD	Under Design			
21	Bajaj Hindusthan Sugar ltd.,	Distillery 8000 KLPD (14 PLANTS)	Under Design			

Thank you

Contact:

Ethanol / Distillery – Mr. P.Subramanian – GM-Distillery –
psubramanian@avant-garde.co.in / 9600166664

ZLD/CBG – Mr.N.Sathyanarayanan – Asst.Manager (P&E)
nsathyanarayanan@avant-garde.co.in / 7401208533

Methanol / Hydrogen derivatives – Mr.S.Karthik Kumar – Dy. Mngr (P&E)
skarthikkumar@avant-garde.co.in / 9843601199

Business Enquiries – Mr. Ram Natarajan – Sr. DGM (BD)
ramnatarajan@avant-garde.co.in / 9940346711

Business Enquiries – Mr. G.Srinath – Manager (BD)
gsrinath@avant-garde.co.in / 9840996322