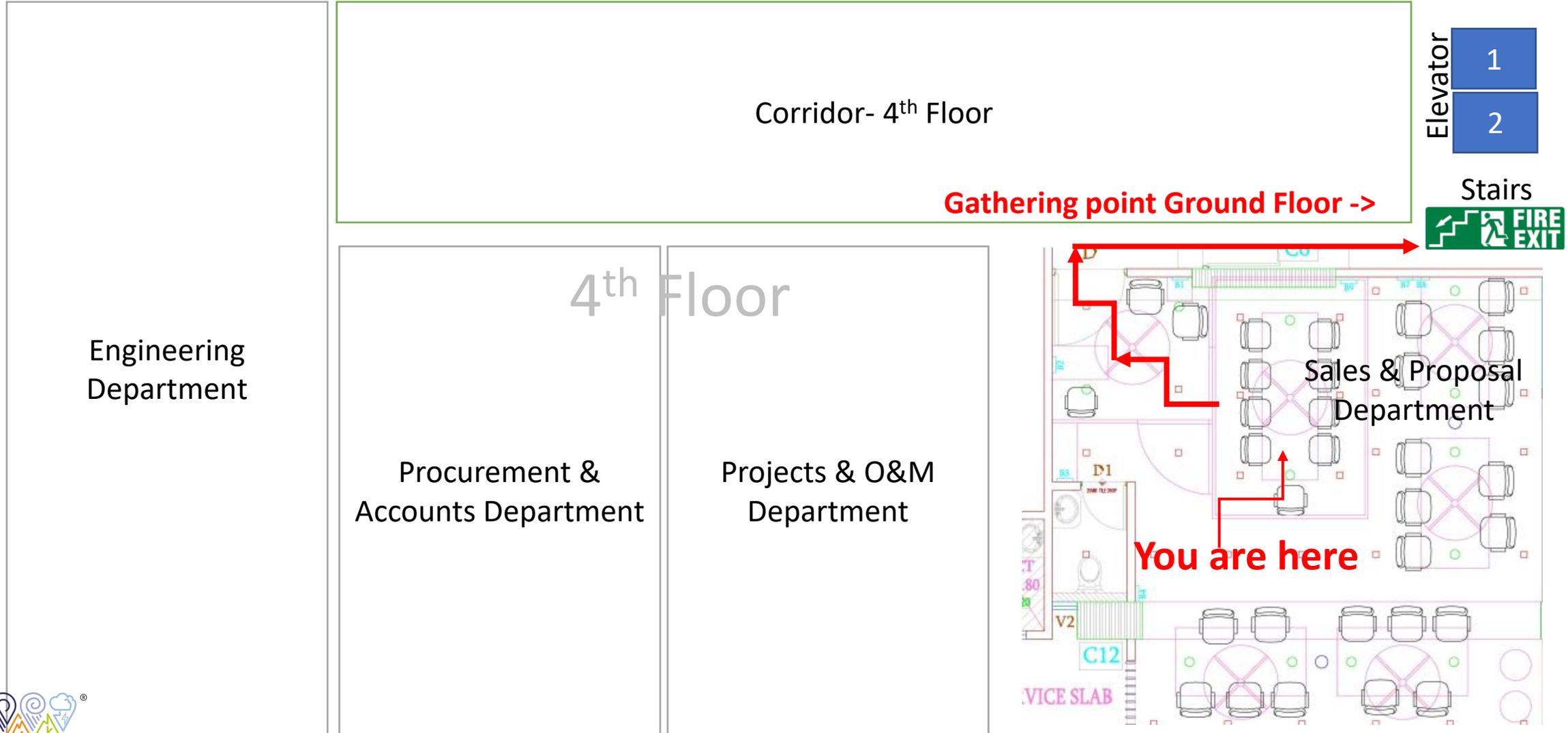


# Nutzen Engineering Solutions

Corporate Presentation- FY 2025 - 26



# Safety First



# Nutzen Engineering Solutions

## Corporate Profile

### What we are



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# Introduction

Nutzen Engineering Solutions (NES) is a full-service project delivery company offering integrated planning, design, engineering and project management services for solid, liquid waste and Industrial effluent management. We are ISO 9001:2015 certified company having created the highest standards for the quality in niche segment of waste management.

Nutzen's vision is to catalyze the transition to a cleaner and more sustainable future by delivering cutting-edge waste-to-energy solutions. The company integrates environmental, social, and economic sustainability into every project it undertakes.

The company is based at Pune which is engineering hub of India and has got working installation reference pan India and overseas clientele as well. We have inhouse team of designing and engineering with cumulative experience of more than 100+ Years, from the expertise of process, electrical, mechanical and civil industry background.

Our wide range of resources and expertise offer comprehensive and single umbrella solutions to technically challenging projects and services from concept to commissioning for local and national governments, private sector owners and public-sector institutions.

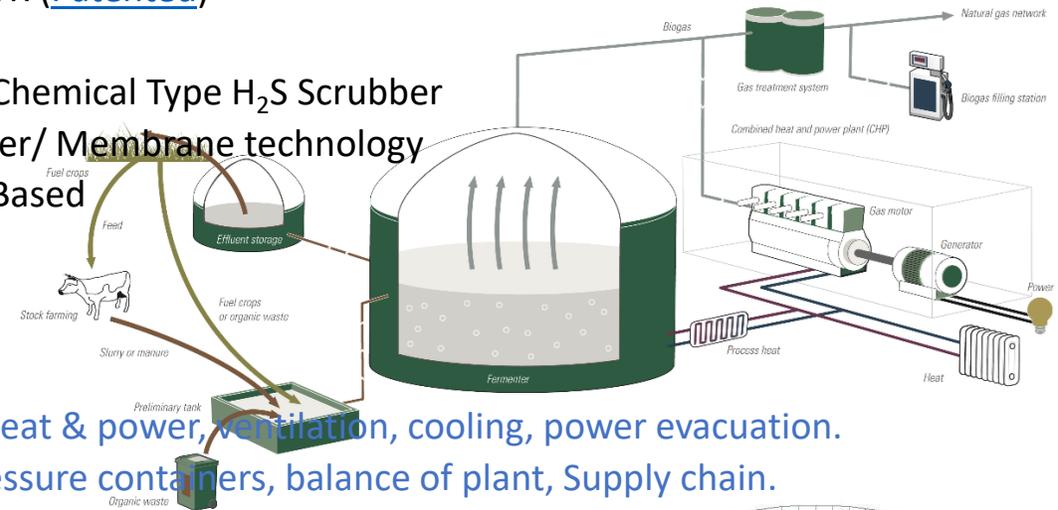
Backed up by strong industry experience, expertise in compliance, HSE requirement and inhouse capabilities of design, engineering critical equipment's, Nutzen Engineering Solutions is the truly one house solution for all your waste management needs.



# Nutzen Engineering Solutions Competency

- **Design & Engineering: (Inhouse technology)**

1. Digester – Ejector based Continuous Stirred Tank Reactor eCSTR ([Patented](#))
2. Organic Manure / PROM / KROM Production
3. Biogas Conditioning System – Bio-Chemical/ Regenerative Chemical Type H<sub>2</sub>S Scrubber
4. Carbon di Oxide (CO<sub>2</sub>) removal – High Pressure Chilled Water/ Membrane technology
5. Gas Drying System – Temperature Swing Adsorption (TSA) Based
6. Nu Bio Alpha – Micro Scale Digester (Patented)

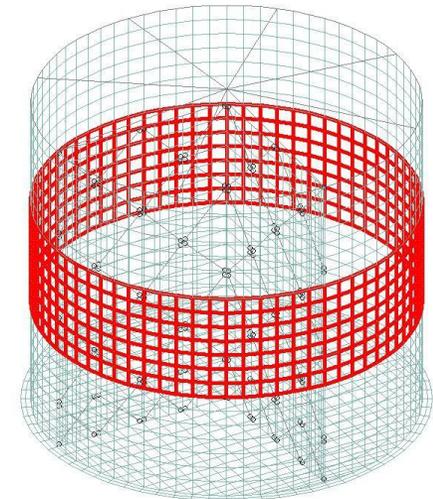


- **Design & Engineering: (Turnkey Solutions)**

1. Effluent to Biogas to Power – Balance of Plant, Combined heat & power, ventilation, cooling, power evacuation.
2. Effluent to Biogas to CBG (Bio CNG) – Compressor, High pressure containers, balance of plant, Supply chain.
3. MSW – Municipal Organic Solid Waste Treatment (Source to Energy)

- **Operation & Maintenance:**

1. Long term operation and maintenance contract for total plant
2. Trained manpower from OEM for critical equipment's
3. Dedicated after sales team
4. IOT – Internet of things , remote monitoring



## Value Added Services Provided by Nutzen

- **MNRE Approvals & Incentives** – Guidance and facilitation for obtaining approvals, certifications, and subsidies under the Ministry of New & Renewable Energy (MNRE).
- **Town Planning & Statutory Clearances** – Assistance in securing required town planning permissions and navigating local regulatory frameworks for project approvals
- **Detailed Project Report (DPR) Preparation** – This policy encourages to financial institutions to offer more favorable lending terms to CBG projects such as lower interest rates and extended repayment periods
- **Fertilizer Guarantee & Lifting Agreements** – Structured agreements ensuring guaranteed offtake and marketing support for bio-fertilizer/manure generated from biogas plants.

## Promoter's Background

Mr. Vikrant Manohar Palyekar & Mr. Vikrant Mahadeo Hiwase are the Promoter's/ Directors of the Nutzen Engineering Solutions. Both bring extensive experience in engineering, project execution, and waste management. They have held senior roles in the renewable energy and power generation sectors, leading multidisciplinary teams on complex waste-to-energy projects.

The promoters have a strong portfolio of executed waste-to-energy and biogas projects across India. Their proven track record includes successful implementation of bio-CNG plants, & biogas to power plants. Reference of the project list is shared separately.

The core leadership team has over 100+ years of cumulative experience in engineering, project delivery, and sustainable waste management solutions.

Nutzen has developed and deployed advanced gas purification technologies and high-efficiency digesters. It emphasizes innovation to maximize methane recovery and energy efficiency while minimizing environmental impact.



## Nutzen's Installation in Nutshell

17 eCSTR digester units (32 number of digesters)

Apart from 16 H<sub>2</sub>S scrubbing units in same complex wherein we installed eCSTR digesters (1 digester is installed for demo purpose only), additional 11 plants installed wherein end user was already generating raw biogas,

Thus total 27 H<sub>2</sub>S scrubbing systems installed,

Energy is been generated in various forms at different installed plants (2 plants are having provision to generate power as well as BioCNG),

1 plant generating hot water (used for bottle washing) as energy,

1 plant generating hot air (used for starch drying) as energy,

1 plant generating steam (used for process) as energy,

1 plant replacing LPG (used for brooding purpose) as energy,

18 plants generating power (used for captive) as energy,

2 plants generating power (exported to grid) as energy,

5 plants generating BioCNG/ RNG (sold in market) as energy.



# Nutzen Engineering Solutions

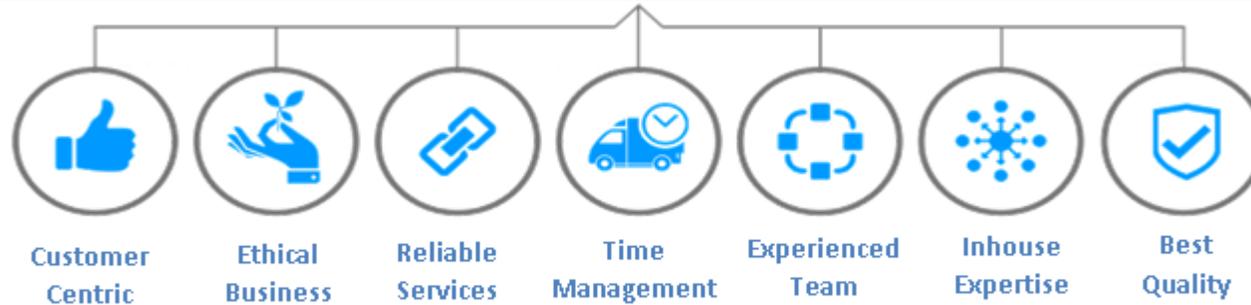
## Organizational Capabilities

### Who we are



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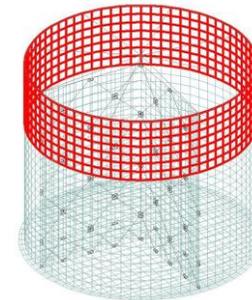
# Capability Statement- Engineering



## Key Differentiator:

- ✓ Own technology for digester and scrubber
- ✓ Inhouse Design and Engineering
- ✓ Strong Supply chain
- ✓ Highest Level of quality inspection
- ✓ Long term operation and maintenance

*We make use of the latest licensed software for the design, engineering & simulation.*



## Values

As an organization Nutzen believes in making technology and innovation as an asset for the company.

We have inhouse and patent applied technologies for the Digester, Biogas Conditioning System, which are core of any waste to energy project.

The inhouse design and engineering team is lead by industry experts with cumulative experience of 50+ Years.

The dedicated project team is well versed for erection and commissioning activities of civil, mechanical and electrical work, always considering the compliance and HSE requirements.

The Operation and Maintenance team is well trained, certified by OEM for critical equipment maintenance.

# Capability Statement – Operation & Maintenance

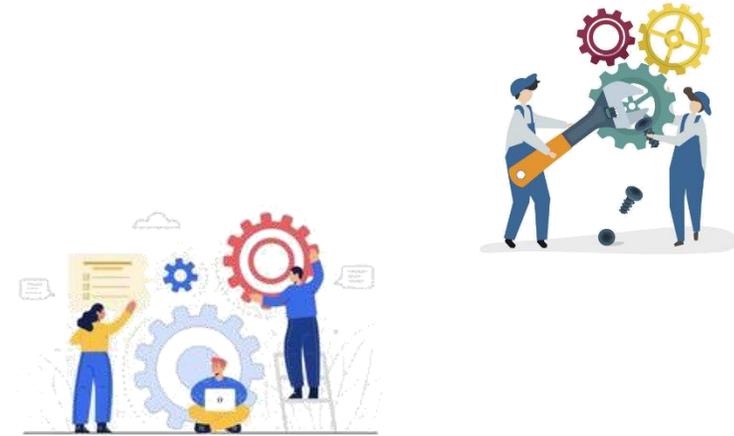
*Effective O&M is one of the most cost-effective methods for ensuring reliability, safety, and energy efficiency.*

*Nutzen Engineering Solutions to its core value believes in end-to-end solutions and thus we offer tailor made solutions for the after sales.*

- Annual maintenance contract
- Comprehensive maintenance contracts
- Total operation and maintenance

*We have inhouse team of managers, supervisions, technician and operators who are qualified to carry out the day-to-day operations, routine services and breakdown support. The manpower is well trained from the variety of OEM who provide the critical equipment's and for our inhouse technologies as well.*

*The four pillars of O&M are defined in our organization are as below*



Training	Tools	Spare Parts	HSE
Our manpower is well trained for the routine and breakdown services support	We keep standard and special tools per site as per the critical equipment requirements	ABC analysis is done for the spare parts stocking as per routine and breakdown	All the manpower takes care of safety first and trained to handle waste generated from plant

## Nutzen Engineering Solutions

Organic Raw Material to Energy Generation overlook

Anything having organic content in it, can be digested



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## Organic Raw Material for Biogas Production

- **Process Industry Effluent-** Dairy, Distillery, Sugar, Palm oil, Paper Mill effluent,
- **Sugar bi-product-** Press Mud,
- **Energy Crop-** Napier Grass,
- **Agro Waste-** Paddy Straw, Rice Straw, Wheat Straw,
- **Natural Organic Sources-** Cowdung, Poultry litter, Animal dung,
- **Manmade Organic Sources-** Municipal segregated organic waste, Sewage Treatment Plant Sludge.

Different feedstocks with different biogas yield can be fed in single digestion system (consisting of either single or separate Hydrolysis & eCSTR tanks) after preparing homogenized slurry of various feedstocks with perfectly engineered pre-digestion electromechanical system.

## Key Aspects to look into – Pre-Digestion Section

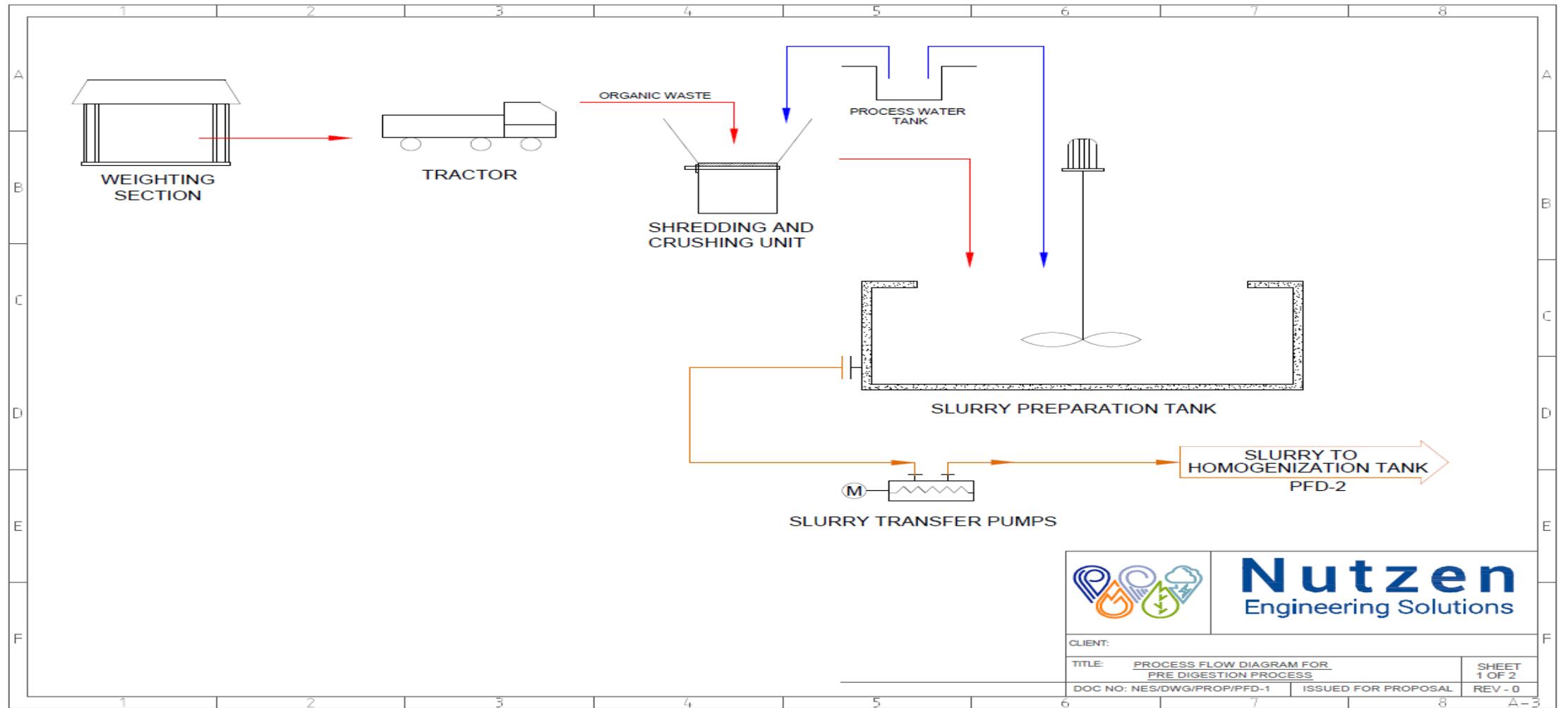
- **Raw Material Detailed Composition with**
  - TS (Total Solids)
  - VS (Volatile Solids)
  - VSS (Volatile Suspended Solids)
  - VDS (Volatile Dissolved Solids)
- **Initial Solids concentration of slurry**
- **Particle size of slurry**
- **Crushing/ Shredding/ pre-treatment machinery needs to be deployed**
- **Separate Hydrolysis requirement-**
  - Thermal
  - Chemical
  - Microbial



## Pre-digestion Section

- The slurry preparation section is an integral part of biogas plant. This process involves the breakdown of feedstock in simplest form which can be easily digested by microorganisms.
- Feedstock is transported to the plant and unloaded at unloading area or at shredder/ crusher hopper to reduce its particle size less than 5 mm, which increases surface area for microbial action and effective food to Microorganisms ratio so as to accelerate the digestion process.
- Process water/ certain amount of digested slurry is added to create a slurry in slurry preparation tank having top entry agitator which ensures consistent composition. In this stage, the pH of the slurry is adjusted, usually towards a slightly acidic to neutral range, to create favourable conditions for microbial growth. Through effective mixing, pH adjustment, and the incorporation of additives, this section optimizes the conditions for anaerobic digestion, resulting in enhanced biogas production.

# Process Flow Diagram – Pre-Digestion Section



CLIENT:		
TITLE: PROCESS FLOW DIAGRAM FOR PRE DIGESTION PROCESS		SHEET 1 OF 2
DOC NO: NES/DWG/PROP/PFD-1	ISSUED FOR PROPOSAL	REV - 0

## Key Aspects to look into – Digestion Section

- **Digester Technology deployed-**
  - CSTR (Continuous Stirred Tank Reactor)
  - UASB (Up-flow Anaerobic Sludge Blanket)
  - eCSTR (ejector Continuous Stirred Tank Reactor)
  - PFR (Plug Flow Reactor)
- **Mechanism deployed- (with an eye on DVTT- Digester Volume Turnover Time/ SSV- Solids Settling Velocity/ GUTV- Gas Upward Travelling Velocity/ PV- Power to Volume ratio)**
  - MA (Mechanical Agitation- either through side entry/ top entry/ throughout mixer)
  - SR (Slurry Recirculation)
  - GR (Gas Recirculation)
- **FTM- Food to Microorganism ratio- with an eye on avoiding dead spots in digester (Digester Construction- Rectangle/ Cylindrical) and having food spread across the digester volume**
- **HRT (Hydraulic Retention Time)/ SRT (Solids Retention Time)/ OLR (Organic Loading Rate)- with attention on CAPEX**
- **Temperature Maintenance- keeping in mind shock loading/ ambient conditions/ energy uses**
  - Mesophilic operation
  - Thermophilic operation

## Digestion Section

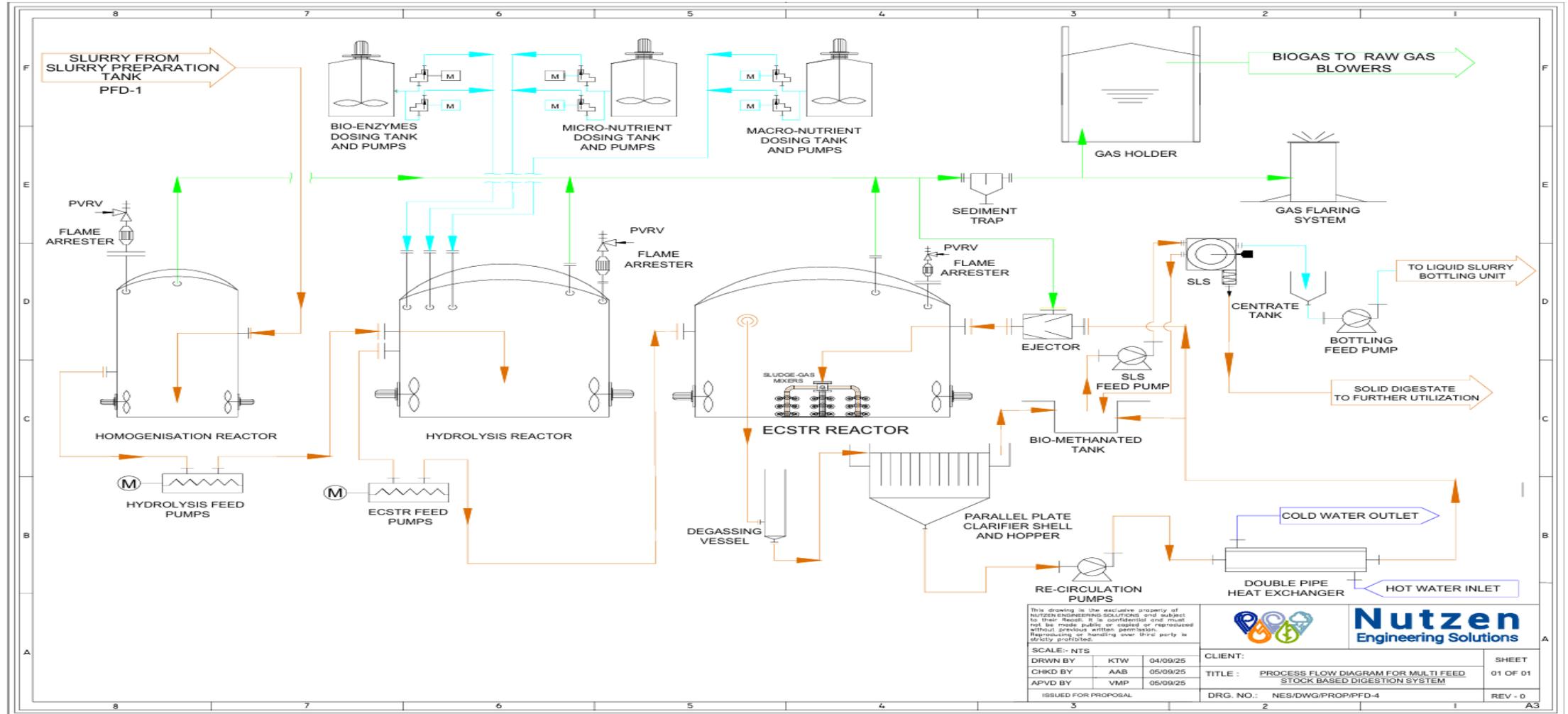
**Homogenization-** Homogenization is the first step in a biogas plant and involves breaking down and mixing organic waste materials to create a uniform feedstock.

**Hydrolysis-** Hydrolysis is the second stage, where complex organic compounds are broken down into simpler molecules by enzymes and bacteria. Organic matter, like carbohydrates, proteins, and lipids, is converted into soluble substances, such as sugars, amino acids, and fatty acids. Microorganisms play a vital role in this process, enzymes catalyse the conversion of complex molecules into soluble substrates.

**Anaerobic Digestion-** After hydrolysis, the soluble substrates enter the anaerobic digester tank, the heart of the biogas plant. This tank enables methanogenesis/ Acetogenesis/ Acidogenesis reaction. The tank is maintained in an oxygen-free (anaerobic) environment to encourage the growth of methanogenic bacteria.

Methanogens metabolize the soluble substrates and produce methane ( $\text{CH}_4$ ) and carbon dioxide ( $\text{CO}_2$ ) as byproducts through anaerobic digestion. The remaining digestate, rich in nutrients, can be used as a valuable organic fertilizer.

# Process Flow Diagram – Digestion Section



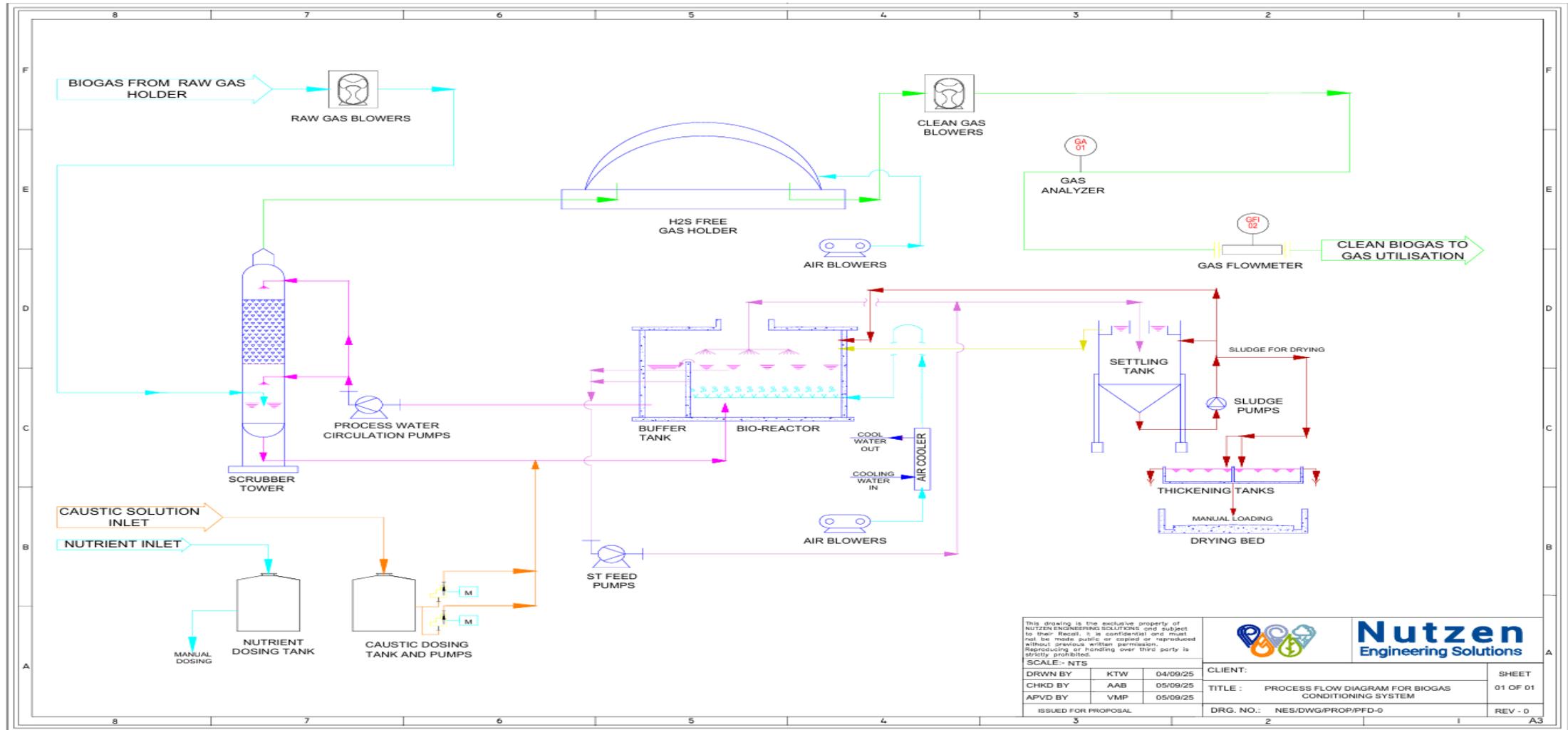
## Key Aspects to look into – Hydrogen Sulfide Scrubbing

- **Initial Hydrogen Sulfide Levels- Please understand 1% is not equal to 10000 ppm**
- **Sulfur removal load- Ask vendor to design on maximum sulfur load for eventual conditions,**
- **Effluent generation- No more comments**
- **O&M- Check consumables, spares & power consumption**
- **Dependency- See for royalties/ patents/ prices for consumables and spares**

## Biogas Conditioning Section- Raw Biogas to Sweet Biogas

- Biogas generated contains around 2000 - 40000 ppm of  $H_2S$  based on feedstock characteristics which needs to reduce up to desired limit based on further biogas application,
- Raw biogas enters from the bottom of the tower, while a caustic solution is sprayed from the top of the Scrubber column packed with inert media. The  $H_2S$  containing gas is contacted in counter current mode with a scrubbing liquid caustic solution. This captures a significant portion of  $H_2S$  from the biogas stream,
- Following the scrubbing process, the cleaned biogas exits the tower from the top, while the residual caustic solution, now containing sodium hydrosulphite, is collected at the bottom of the tower. The caustic solution enriched with Sulphide from the column flows into the bioreactor tank. The tank contains immobilized Thiobacillus bacteria. Thiobacillus bacteria, specifically Sulphur Bacteria, facilitate the breakdown of elemental sulfur present in the slurry. Thiobacillus bacteria convert the Sulphide back to free caustic, regenerating the solution for reuse,
- The bioreactor tank is equipped with an air system that supplies air throughout the reaction process. This air helps facilitate the chemical reactions. As part of the recovery process, the reacted caustic solution, now containing sodium hydroxide (NaOH), is recycled. It is reintroduced into the system by being sprayed back onto the scrubber tower, completing the cycle of caustic utilization and recovery. This system offers a promising approach for  $H_2S$  removal from biogas while recovering sulfur and reducing operating costs. The valuable elemental Sulphur is obtained as byproduct with purity 80 - 90 %. Sulphur will be added in solid fertilizer as an additive to the fertilizers.

# Process Flow Diagram – Biogas Conditioning Section



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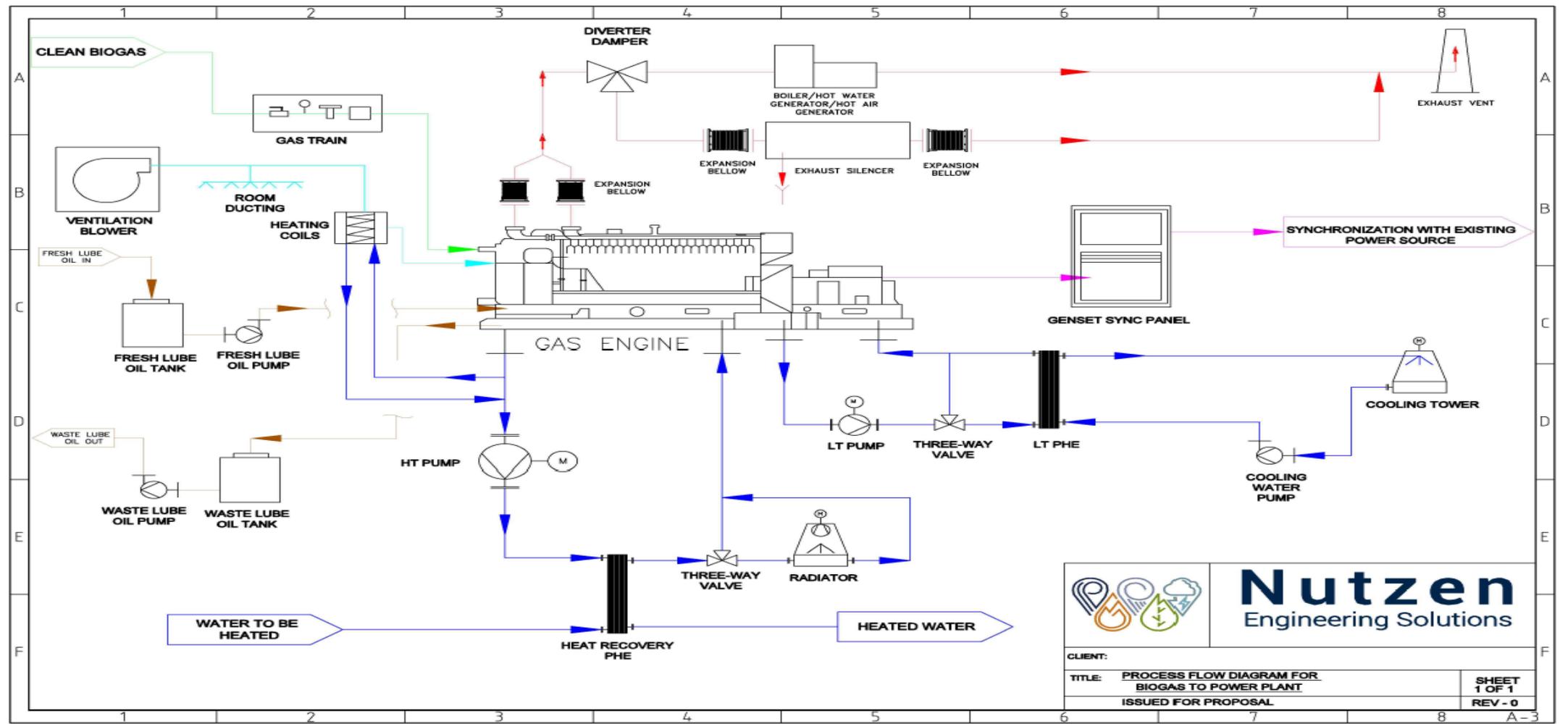
 <b>Nutzen</b> Engineering Solutions		CLIENT:	SHEET
		TITLE : PROCESS FLOW DIAGRAM FOR BIOGAS CONDITIONING SYSTEM	01 OF 01
DRG. NO.:	NES/DWG/PROP/PFD-0		REV - 0

## Sweet Biogas to Power Generation Section

- Biogas generated with less than 150 ppm of H<sub>2</sub>S carries 55% to 65% of methane thus having 4730 kCal/ cubic meter to 5590 kCal/ cubic meter Lower Calorific Value,
- Specific Biogas genset which carries electrical efficiency in the range of 33% to 43% is been deployed for electrical power generation,
- Exhaust heat and HT/LT heat from biogas genset can be translated into thermal energy in terms of Steam/ Hot Water/ Hot Air, Thermal efficiency of genset is in the range of 38% to 45%; thus total efficiency 88% can be achieved at CHP (Combined Heat & Power) complex,
- Since made for continuous application, Genset need to be equipped with carefully designed Balance of Plant such as Ventilation System/ HT & LT cooling System/ Lubrication Oil System/ Exhaust System/ Electrical System, wherein Nutzen has developed most energy efficient BOP systems.



# Process Flow Diagram – Power Generation Section



 <b>Nutzen</b> Engineering Solutions	
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TITLE: <b>PROCESS FLOW DIAGRAM FOR BIOGAS TO POWER PLANT</b>	
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SHEET 1 OF 1 REV - 0	

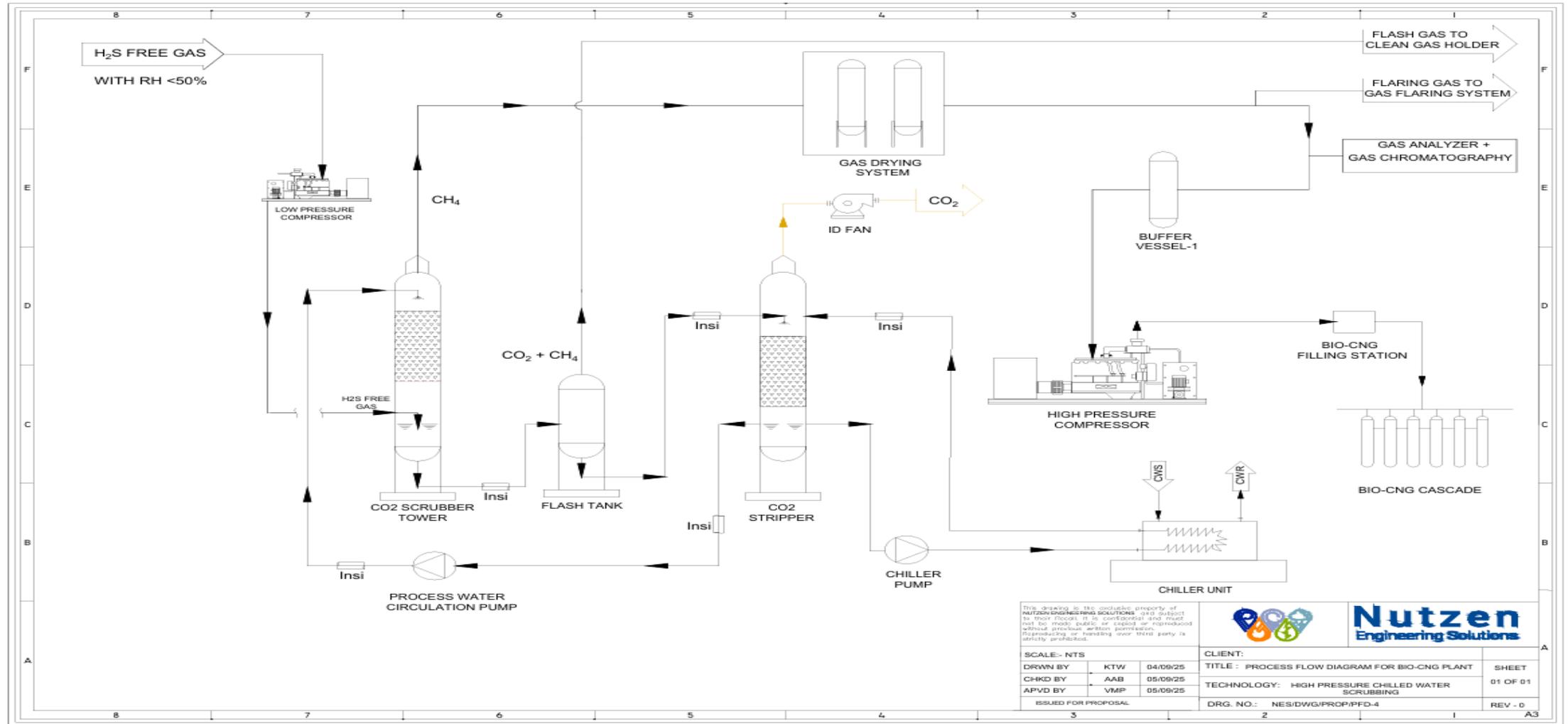
## Key Aspects to look into – Carbon-di-oxide Scrubbing

- **Initial CO<sub>2</sub> Levels & CO<sub>2</sub> removal load- Ask vendor to design on maximum CO<sub>2</sub> load for eventual conditions**
- **O&M- Check consumables, spares & power consumption**
- **Dependency- See for royalties/ patents/ prices for consumables and spares**
- **Effluent generation- No more comments**
- **Methane losses/ Methane slippages- You shall not loose 8% of main revenue stream**
- **Methane purity- OMC rejects batch of BioCNG which has more than 4% CO<sub>2</sub>**

## Sweet Biogas to BioCNG Generation Section

- Biogas generated with less than 3.7 mg/m<sup>3</sup> of H<sub>2</sub>S carries 55% to 65% of methane with remaining CO<sub>2</sub> in it, which needs to be removed so as to produce more than 96% methane,
- The incoming biogas is compressed to 7-8 bar pressure with a reciprocating compressor. The compressed biogas is cooled with the water coming out of a cooling system. After the cooling stage, carbon dioxide is removed in a CO<sub>2</sub> Scrubber / absorber. The Carbon Dioxide scrubber is packed with packing material for increased mass and heat transfer. The CO<sub>2</sub> rich water is fed into stripper column and after CO<sub>2</sub> stripping CO<sub>2</sub> free water is recirculated to scrubber/ absorber column,
- Based on BioCNG sale mode, further equipment such as High Pressure Compressor/ Cascade is been designed
- High pressure chilled water scrubbing technology scores over other technologies in terms of Clean biotechnology/ Low cleaning cost of biogas/ Very high CO<sub>2</sub> removal efficiency- over 99%/ Meets the BioCNG parameters/ Absorption of carbon dioxide thus no expensive catalyst and chemical required/ Operation at ambient temperature.

# Process Flow Diagram – BioCNG Generation Section



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CHKD BY	AAB	05/09/25	TECHNOLOGY: HIGH PRESSURE CHILLED WATER SCRUBBING
APVD BY	VMP	05/09/25	DRG. NO.: NES/DWG/PROP/PPFD-4
ISSUED FOR PROPOSAL			SHEET 01 OF 01
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**Nutzen Engineering Solutions**

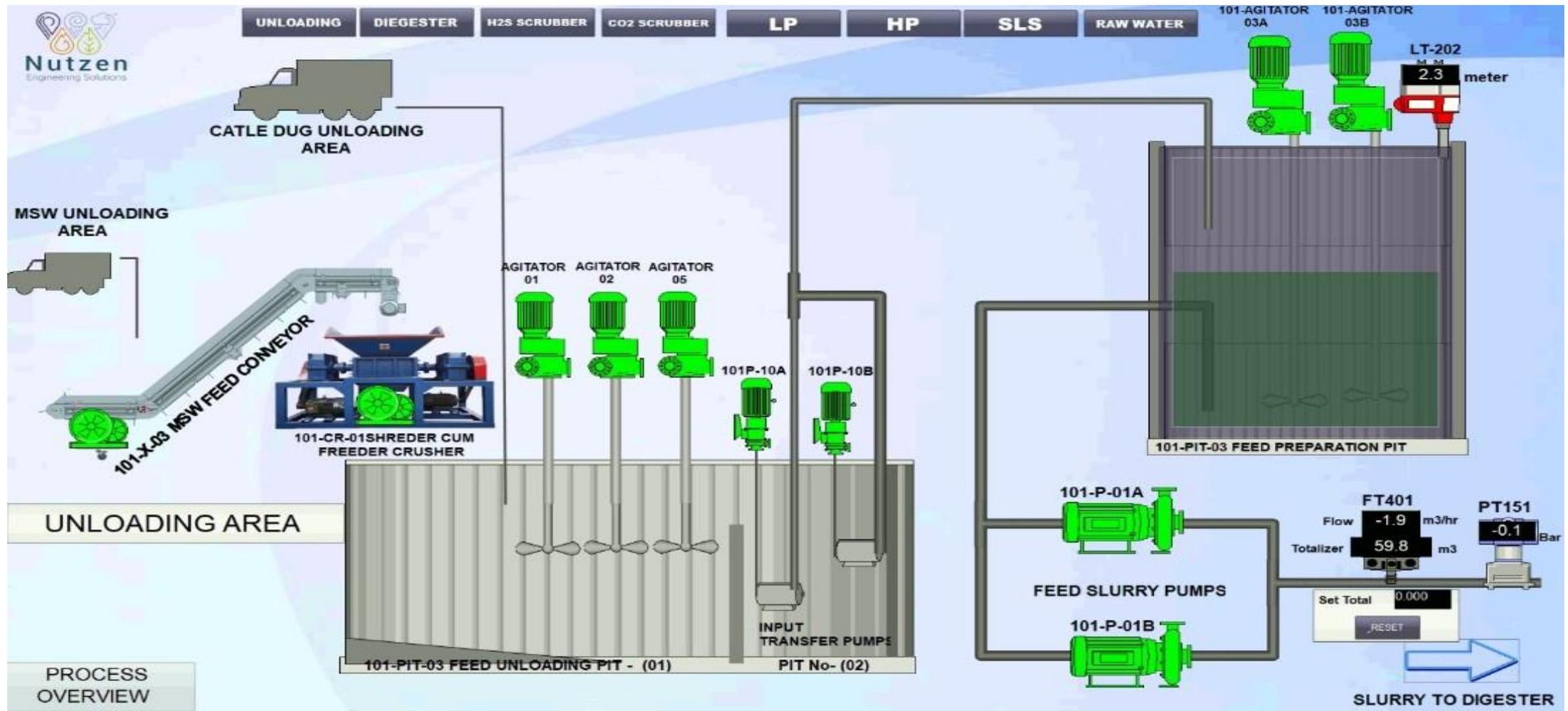
# Nutzen Engineering Solutions

## Remote Monitoring via PLC/SCADA

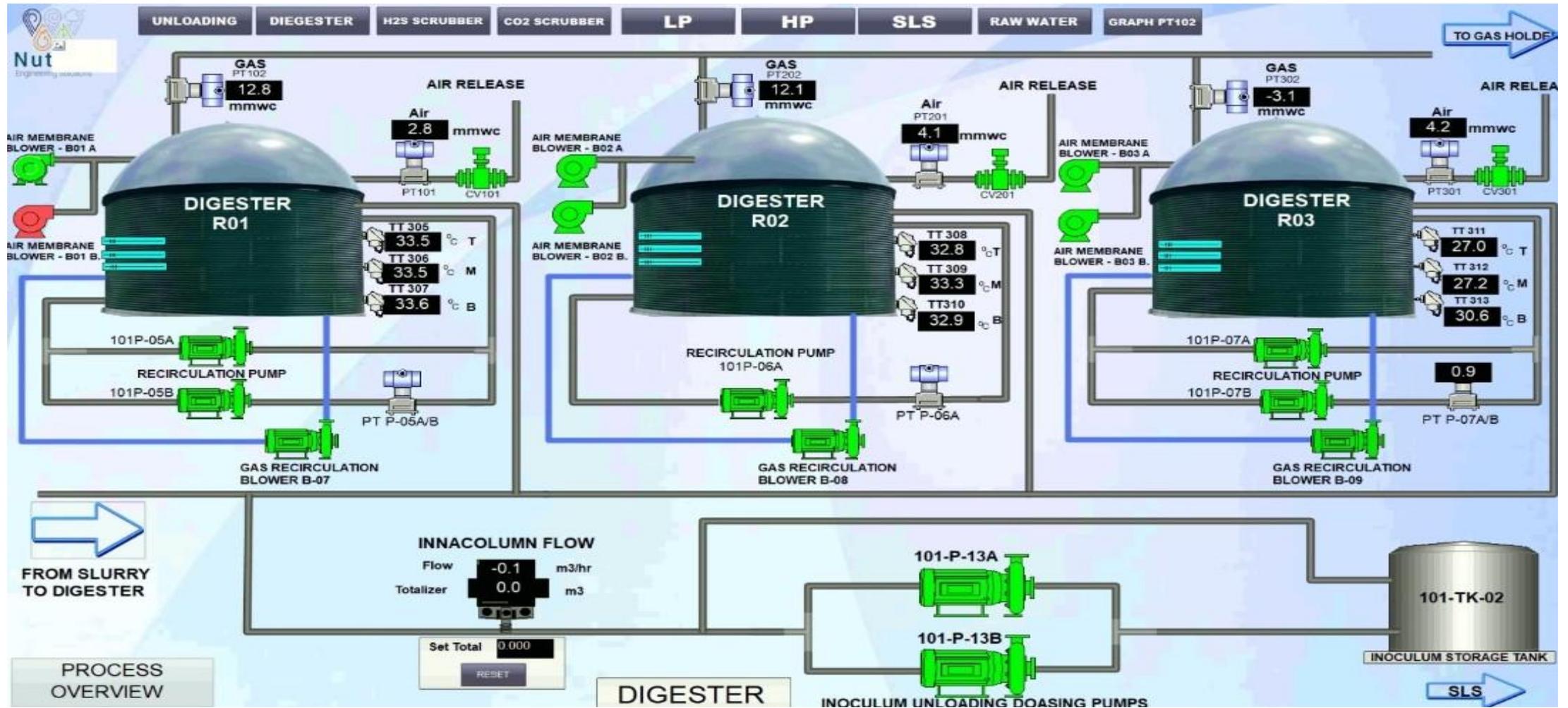


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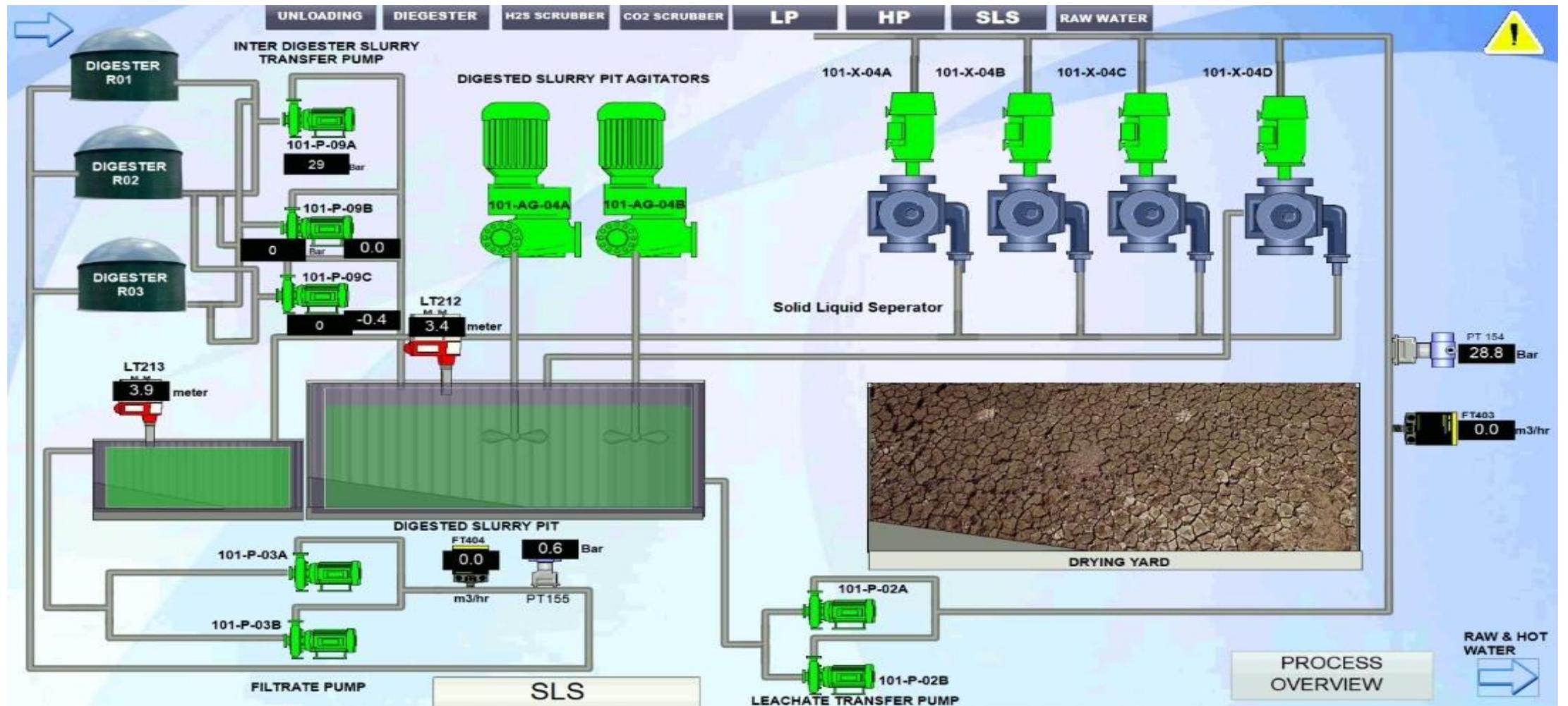
# Feed Unloading Section



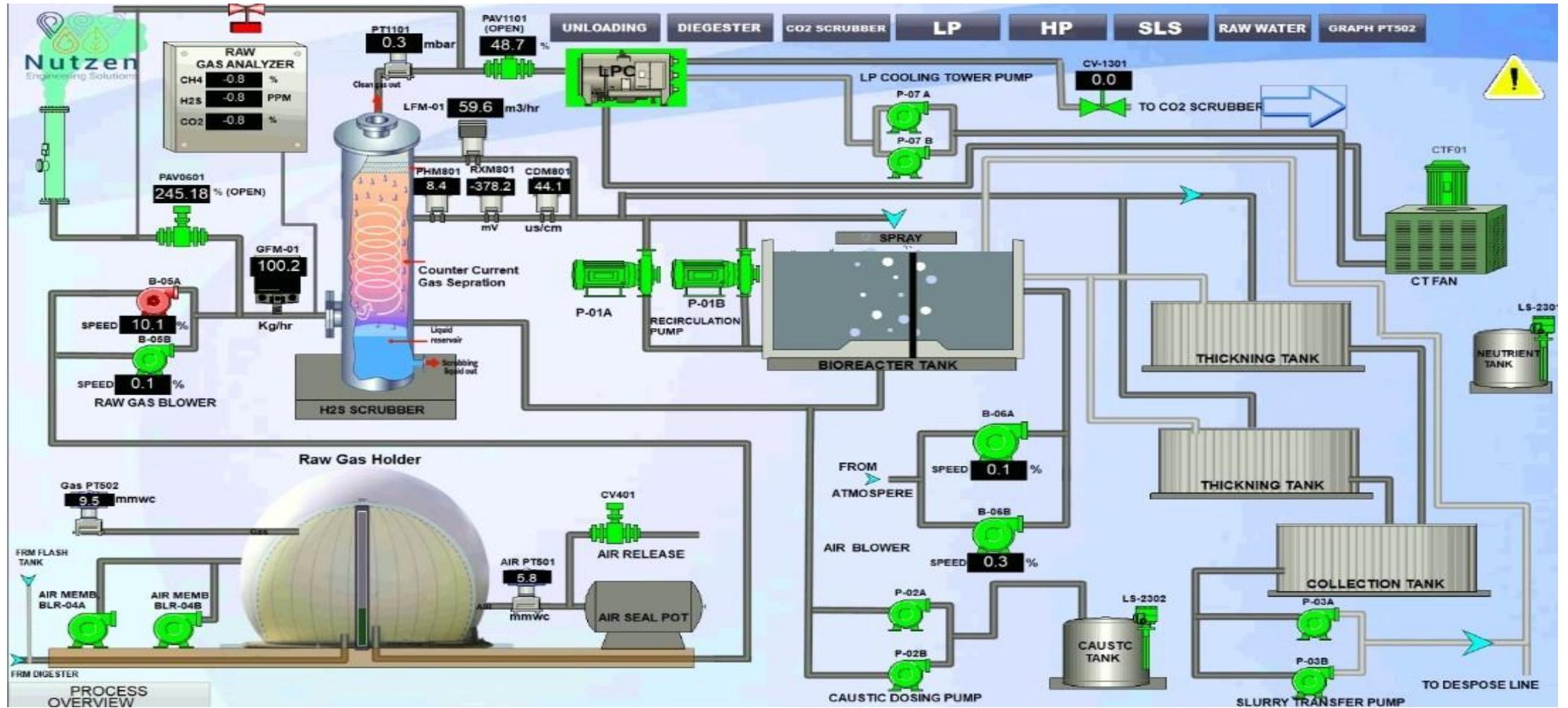
# Digester Section



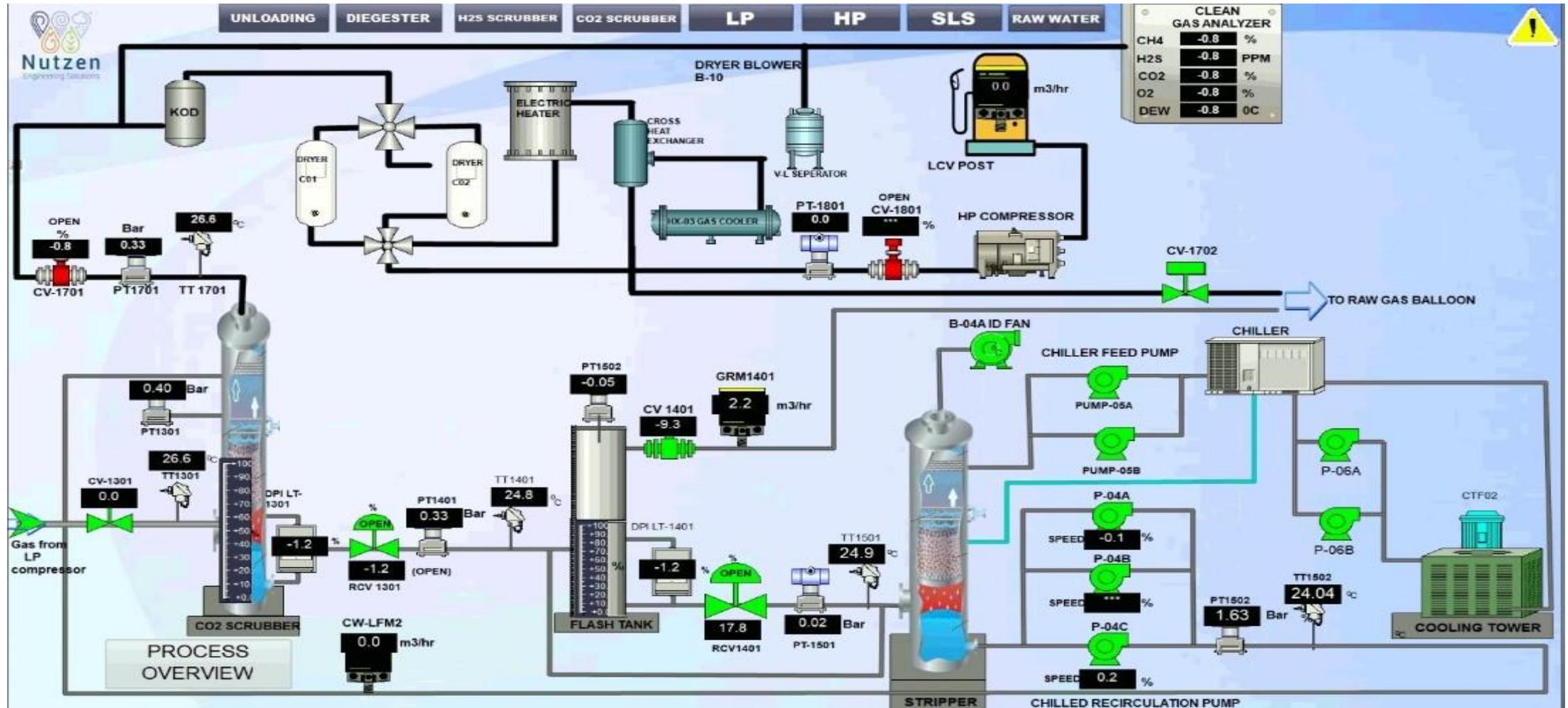
# Solid Liquid Separator Section



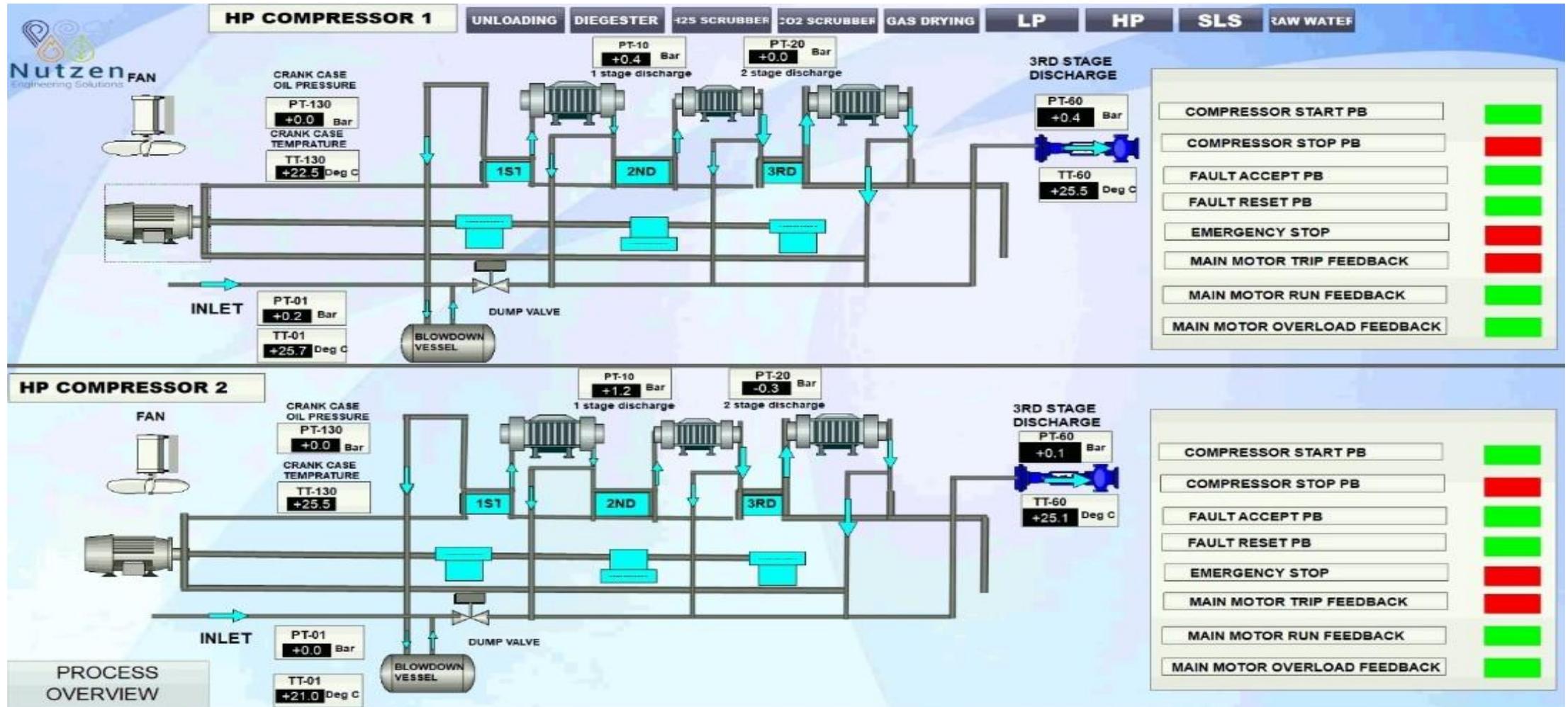
# H<sub>2</sub>S Scrubber Section



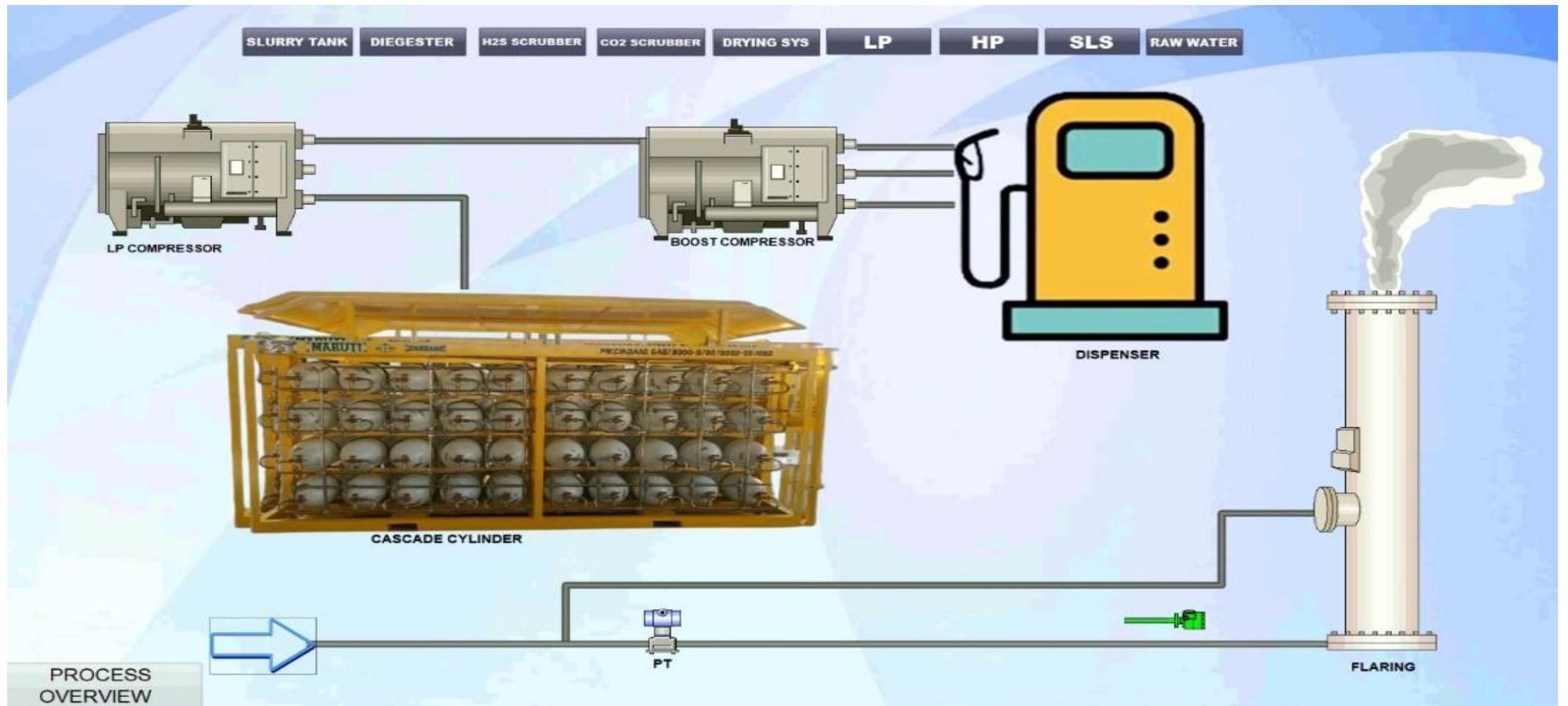
# CO<sub>2</sub> Scrubber Section



# High Pressure Compressor Section



# Bio-CNG Dispensing Section



# Nutzen Engineering Solutions

## Accolades Earned

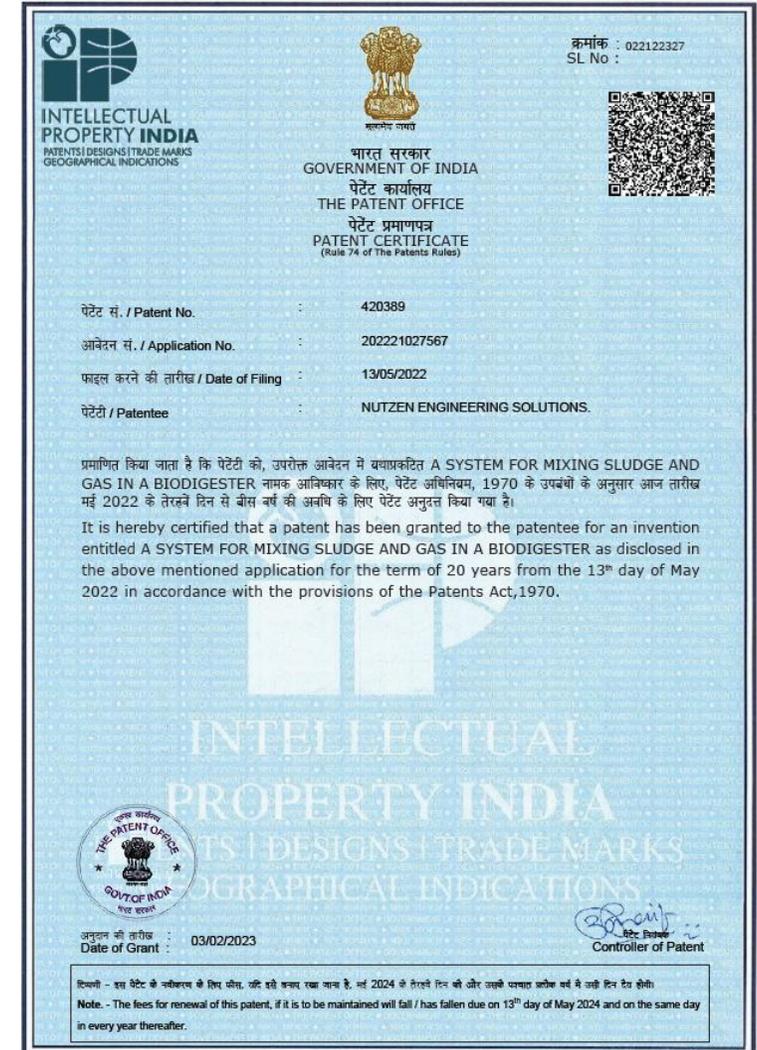
## One Stop Shop for Waste to Energy Complex



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# eCSTR Patent

- Process expert at Nutzen has come up with innovative advanced version of Continuous Stirred Tank Reactor technology, which is been patented,
- This methods combines 3 different mixing methods and thus leading to effectively more food to microorganism ratio and in turn more biogas generation with very minimal solids deposition at bottom of digester tanks.



# Top 10 EPC company in India with Indigenous Technology in Waste To Energy

Nutzen Engineering Solutions has been awarded as the Top 10 EPC Company in India with indigenous technology in Waste to Energy field.

The full story was published in February 2023 edition of Industry Outlook monthly magazine.



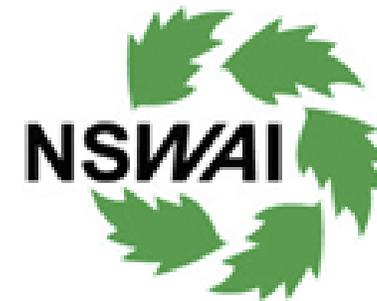
# MOHUA, Government of India initiative 2023

- Ministry of Housing & Urban Affairs conducted Knowledge sharing session for 75 Municipal Corporations wherein MOUHA is planning to set up Municipal Organic Waste to BioCNG plants,
- Mr. Vikrant Palyekar- Director, presented experience and various facets of working in Waste to Energy sector.



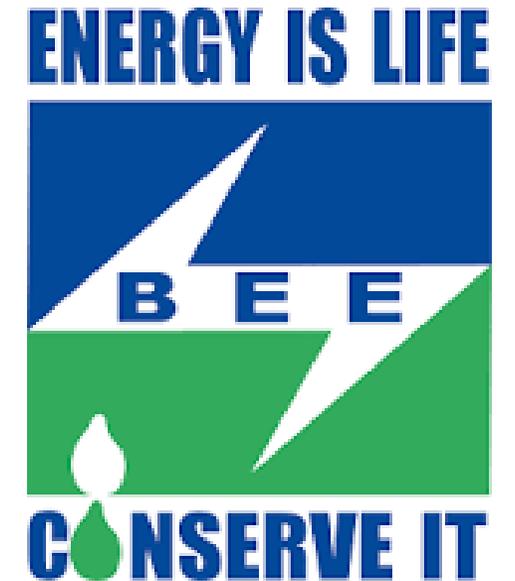
## NSWAI Conference 2023

- NSWAI (National Solid Waste Association of India) conducted seminar on way ahead on Solid Waste Management practices in India
- Seminar was inaugurated by Shri Nitin Gadkari, Honorable Minister of Road Transport & Highways
- Nutzen's out of way solutions was widely discussed from implementation point of view.



## Bureau of Energy Efficiency

- BEE (Bureau of Energy Efficiency) works as an approval agency for energy efficient projects across Indian context,
- BEE also acts as a coordinator between project developer and banking sector,
- Nutzen works closely with BEE so as to fit energy generation projects under energy efficiency Programme.



# Co-generation Association of India- Business Meet on CBG 2025

- The Co-generation Association of India invited Nutzen to share insights on spent wash & press mud-based BioCNG complexes
- Director, Mr. Vikrant Palyekar, shared his vision on "Sustainable Mobility & Clean Energy" and how cutting-edge technologies and practical solutions can drive India's green energy revolution.



# Nutzen Engineering Solutions

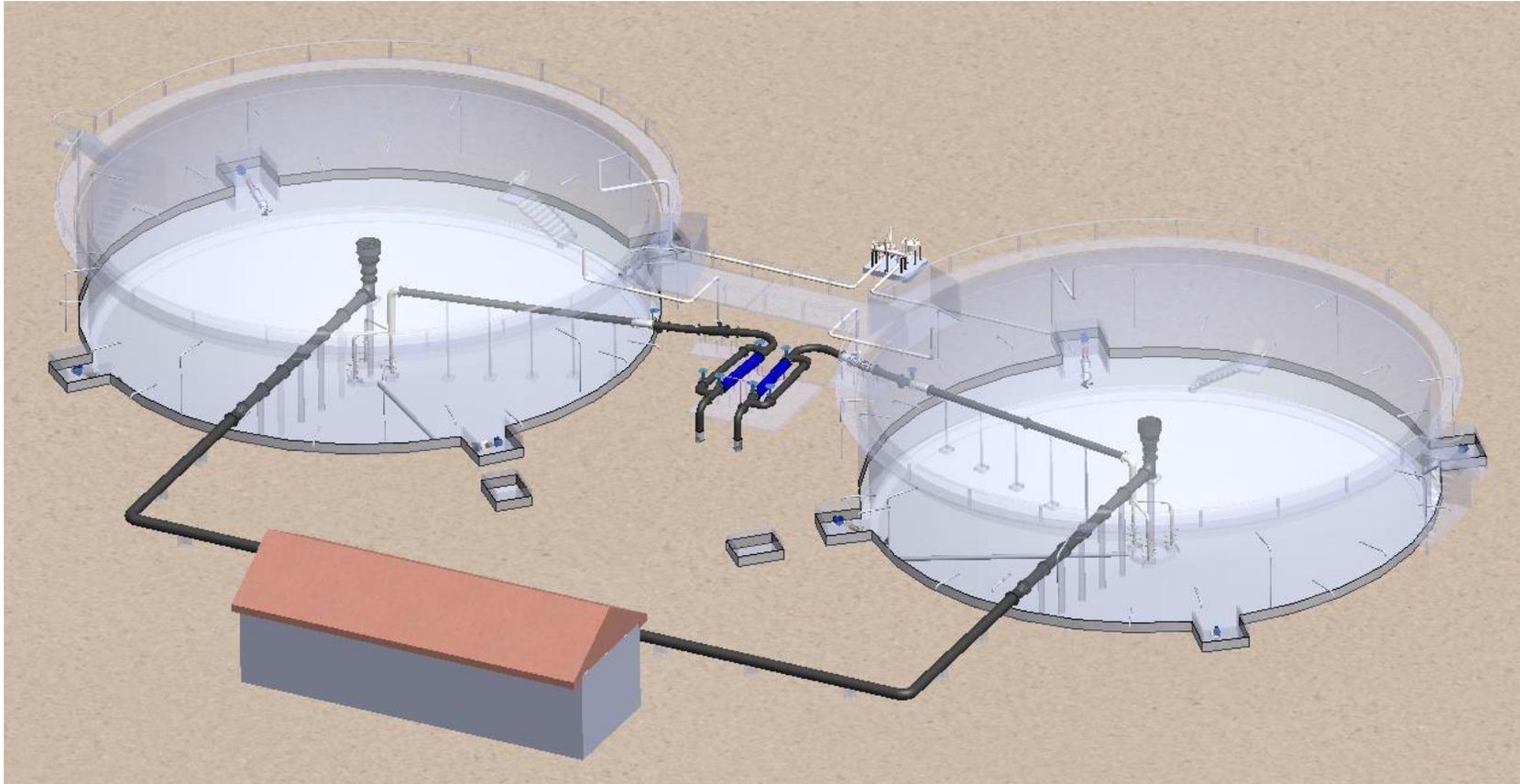
[Installation inhouse 3D Modelling Videos](#)

[Seeing is Believing](#)



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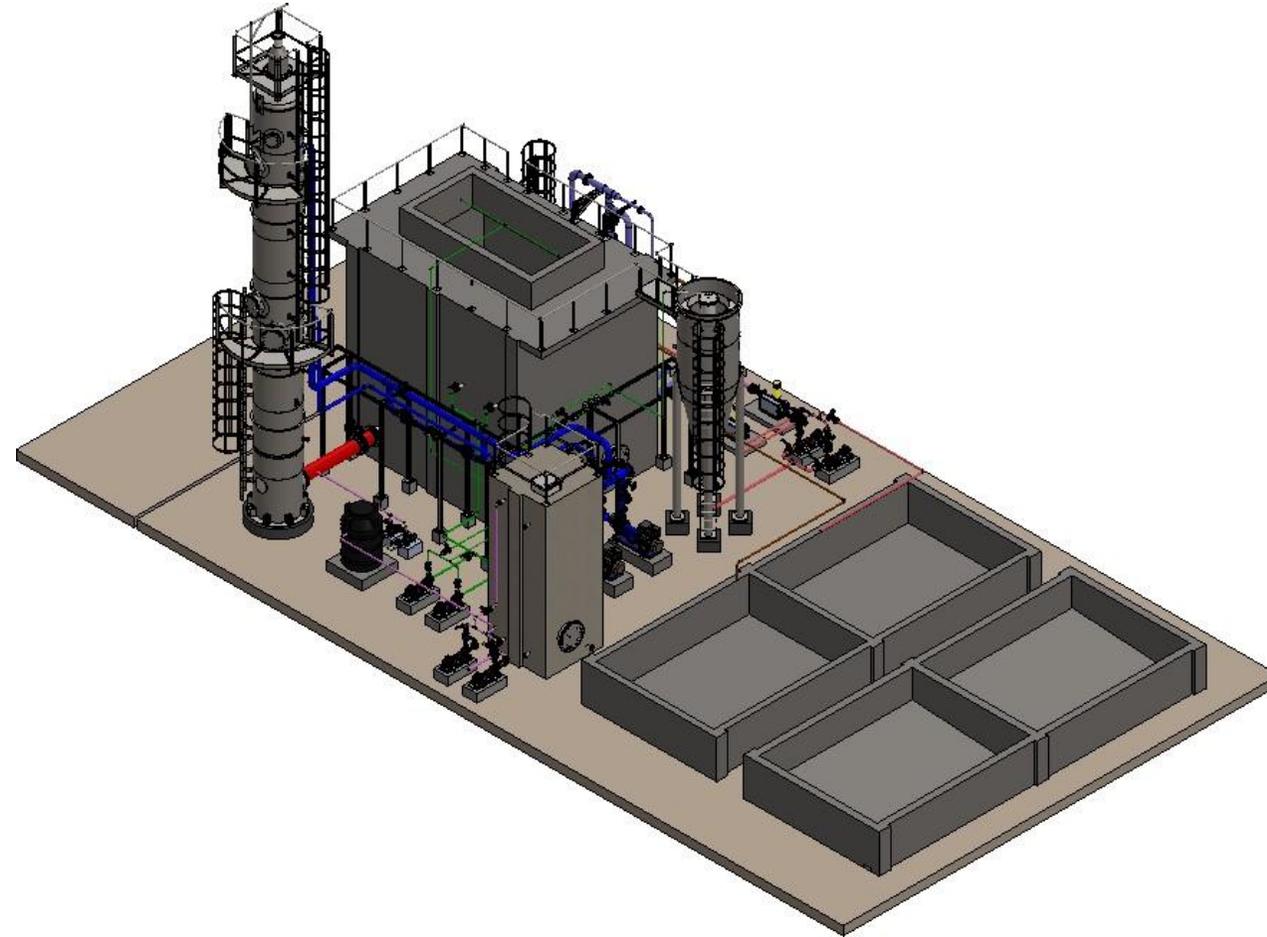
# Executed Plant- Inhouse 3D modelling videos- eCSTR Digestion



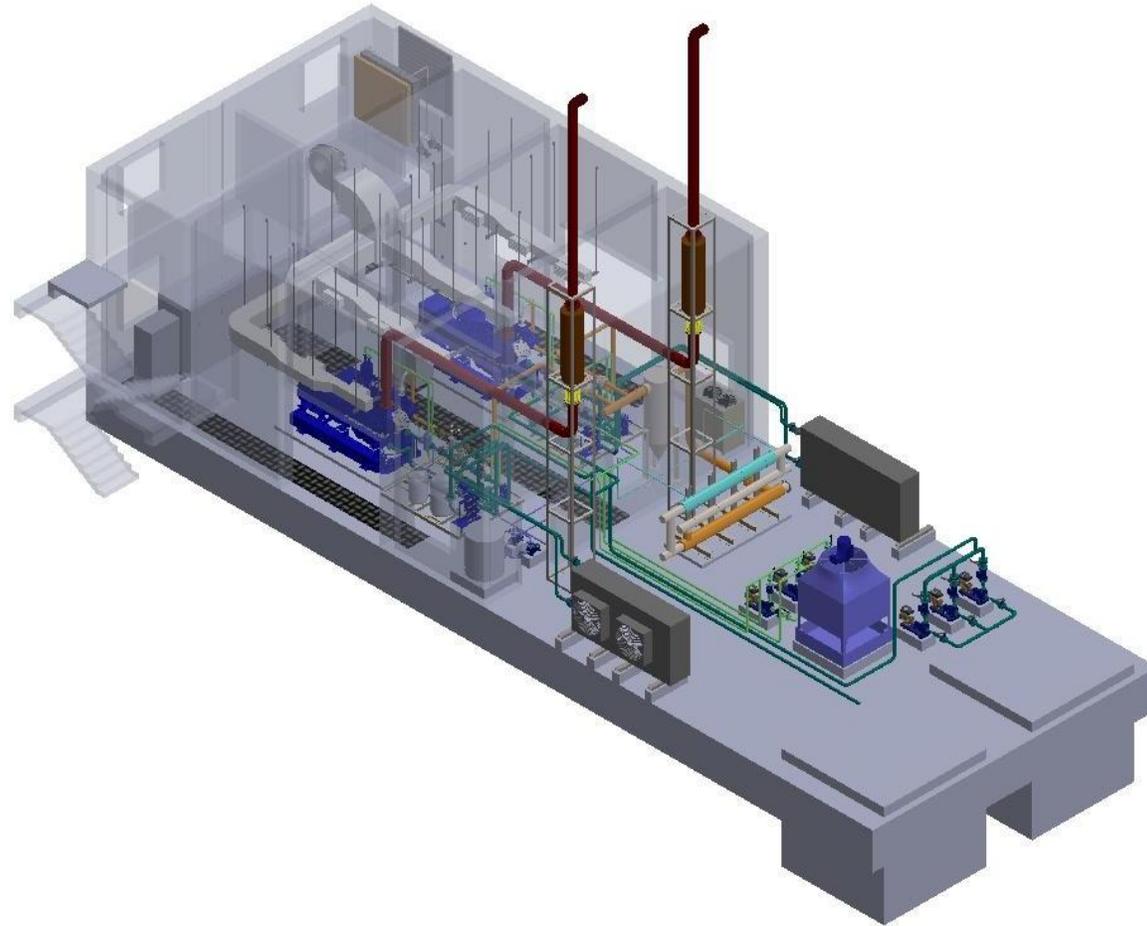
# Executed Plant- Inhouse 3D modelling videos- Biogas Storage



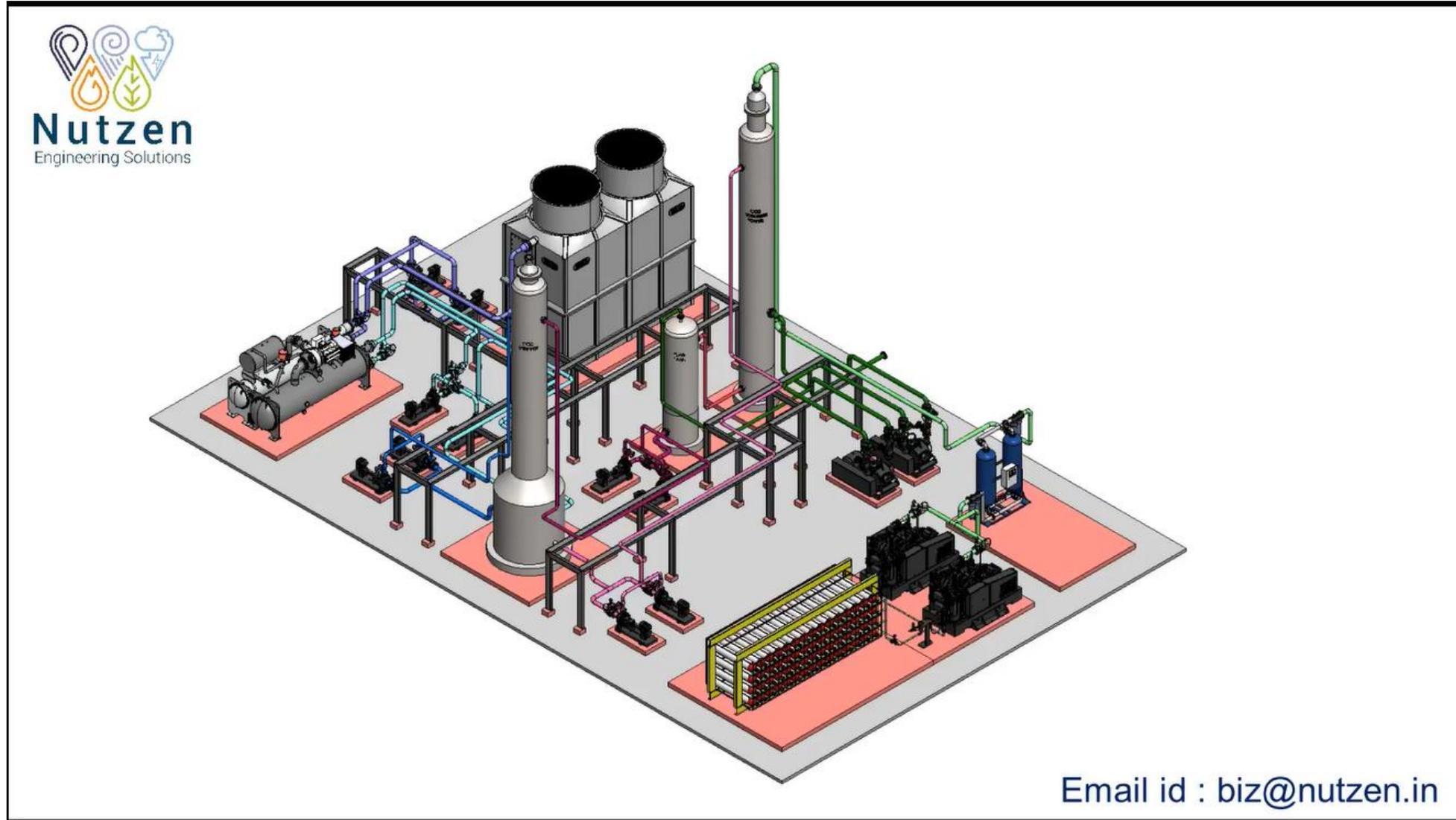
# Executed Plant- Inhouse 3D modelling videos- Hydrogen Sulfide Scrubbing



# Executed Plant- Inhouse 3D modelling videos- Biogas to Power



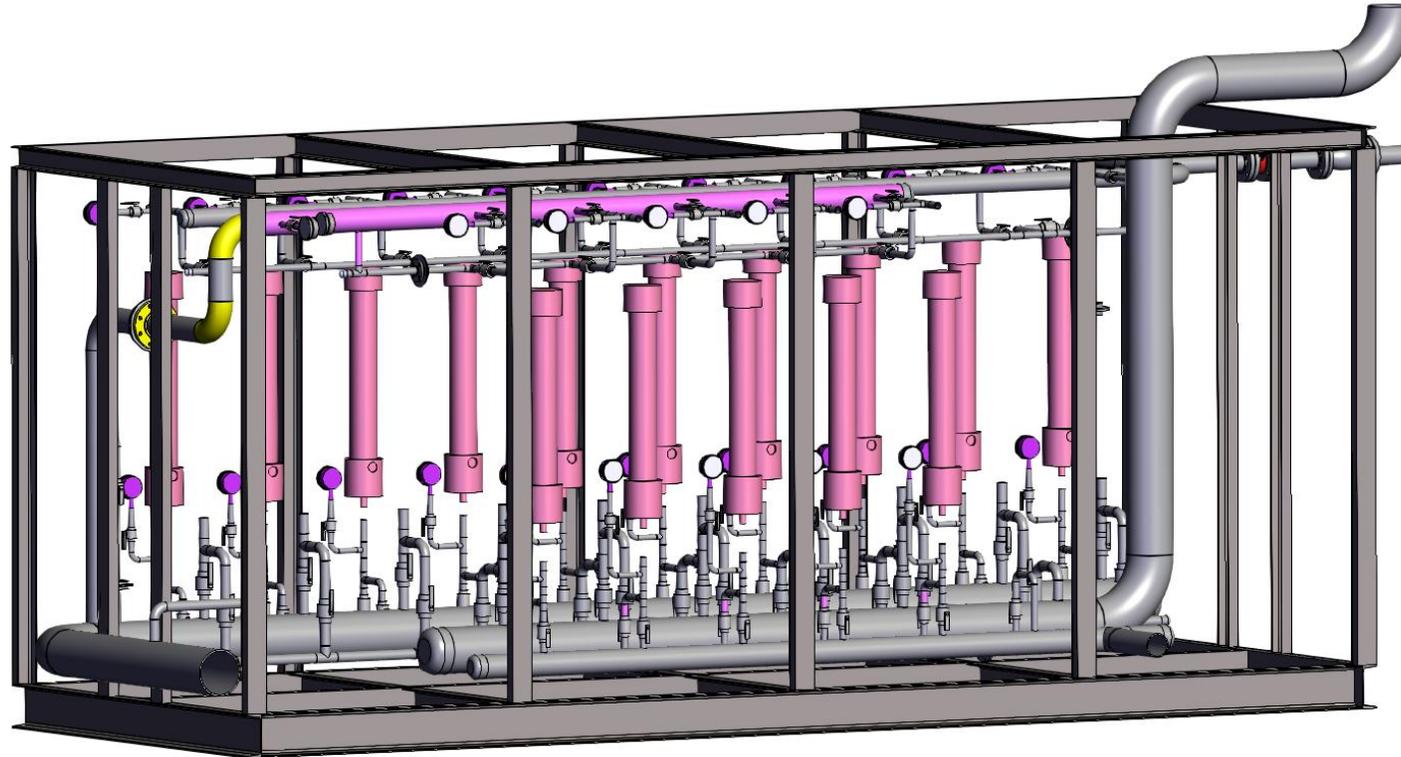
# Executed Plant- Inhouse 3D modelling videos- CO<sub>2</sub> Scrubber (HPCW Scrubber)



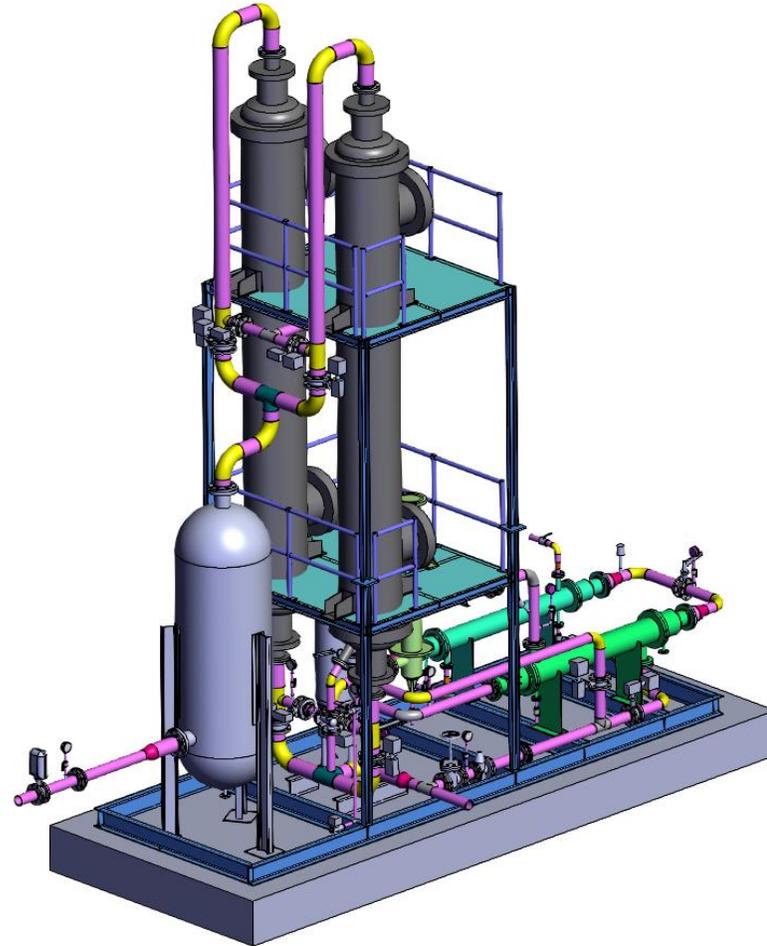
Email id : [biz@nutzen.in](mailto:biz@nutzen.in)



# Executed Plant- Inhouse 3D modelling- CO<sub>2</sub> Scrubber (Membrane Scrubber)



# Executed Plant- Inhouse 3D modelling- Gas Drying System (TSA Based)



## Video Link

Nutzen's Philosophy is always about "Delivering quality project on Turn-key basis and successfully achieving desired performance parameters a notch above", Team Nutzen is happy to showcase recently commissioned Multi-feedstock based BioCNG plant, installed for IOCL (Indian Oil Corporation Limited) at Gwalior, Madhya Pradesh, India. We thank all our stakeholders for actively and passively participating in Nutzen's success.

<https://drive.google.com/file/d/1h7dLn4q6rQFKfza7zcs3Ihv6rWKv2rVF/view?pli=1>



# Your Satisfaction is our Guarantee

## Domestic Client



### SIDDAPUR DISTILLERIES LIMITED



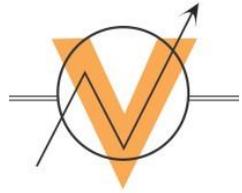
## Overseas Client



& Many More..

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## Domestic Client



**NOVA**

Sampurnanagar  
Cooperative  
Chini Mills



OM CHICKS INDIA PVT.LTD

BHILWARA  
NAGAR NIGAM



Nanpara  
Cooperative  
Chini Mills



Bikaner Nagar Nigam



**DPPL**



**EnPro Envirotech**

**Transpek**  
reative Chemistry

**GAINWELL™**

## Overseas Client

**EBP**



**Kayseri  
Şeker**

Client feedback has been consistently positive, with high satisfaction scores related to project delivery timelines, engineering quality, and post-commissioning support.



**Nutzen**  
Engineering Solutions

**Thank you for your attention!**

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