

Paper Industries Effluent to CBG/BioCNG for Higher Profitability & Decarbonisation of the Paper Industry

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- The Indian Paper Industry is the 15th largest paper manufacturing hub and 3% of the world's paper production and energy intensive industry.
- Paper and Pulp mills produce enormous quantities of organic waste (High COD) that can be transformed into an energy source as methane.
- Biogas as an energy source can provide a buffer against energy security concerns and can help in reducing the dependency on fossil fuels.
- The Biogas produced by anaerobic digestion can be upgraded & Biogas Upgradation has been relatively new process in the market.
- We are contributing towards Net Carbon Zero efforts by implementing India & Asia's first : Paper Mill Effluent to BioCNG/CBG in Haryana (Case Study)

OVERALL SCHEMATIC PROCESS



- The effluent here we discussed is from wet washing for raw material (wheat straw) and paper machine backwater .
- After treated into Clarifier, passed into Digester. The Anaerobic Digester has design capacity of 18MT COD load and flow of 4500m³/day at COD is 4500 mg/l.
- The COD reduction is in the range of 65-70% for the digester and raw biogas generation is in the range of 6000-7000m³/day with methane content 60-70%.
- Presently, gas is being flared, we have planned to install BioCNG to utilize clean and green energy to contribute towards carbon emission reduction.

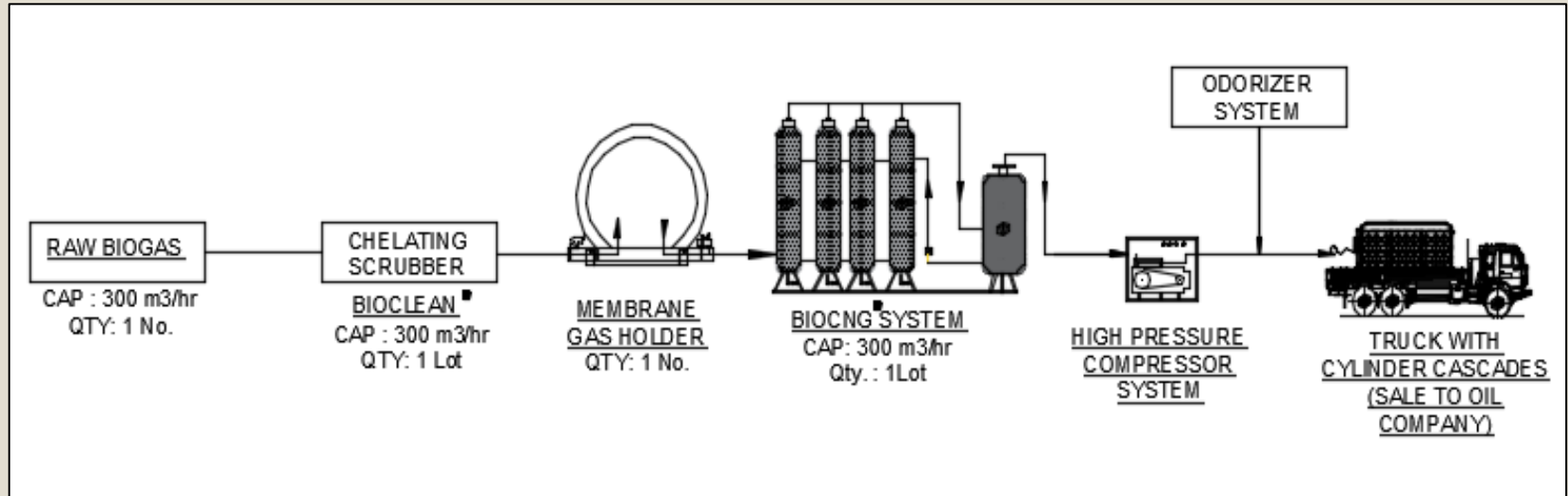
Operational Parameters of the ETP Plant :

Parameters	UOM	Digester Inlet	Digester Outlet	Final Outlet
pH		5.6-5.8	7.2-7.3	6.8-7.0
Temp	°C	37	36	29
TSS	PPM	350-400	450-500	6-8
TDS	PPM	1900-2000	1900-1950	1950-2000
COD	mg/lt	4500-5000	1200-1500	170-180
BOD	mg/lt	1500-1600	700-750	10-15
Calcium	PPM	350-400	350-400	350
Chloride	PPM	800-1000	750-800	600-700
Color	Pt-Co	7000-7500	7000-7500	180-200
VFA	meq/L	31.2	BDL	-
Alkalinity	meq/L	6.78	32.74	-

Inlet Parameters of the Plant/Design Data for BioCNG Plant :

Sr. No.	Parameters	Unit	Value
1.	Biogas Flow Rate	m ³ /day	7200
2.	Pressure	mmwc	<40
3.	Temperature	Deg. C	Amb
4.	CH ₄	%	60-70
5.	H ₂ S of raw Biogas	ppm	20000
6.	CO ₂	%	30-40

ENRICHMENT OF BIOGAS & HANDLING SYSTEM



- The raw biogas from the existing anaerobic digester is transferred to the new Scrubber system for the removal of H₂S Content.
- **Scrubber System** : The scrubbing process is a modified liquid red-ox method to remove H₂S in Biogas using chelated polyvalent metal ions with a stabilizing agent.
- The sulphur present in the H₂S is precipitated as elemental sulphur, which has commercial value as fertilizer.

ENRICHMENT OF BIOGAS & HANDLING SYSTEM

- The cleaned biogas after scrubber is collected in the double membrane gas holder as a buffer before taking into the upgradation system.
- The biogas is entering into the Pressure Swing Adsorption System, passed through different units like Desulphuriser, Moisture Separator, Chiller, Pre-Filter, GDU Units and PSA Towers.
- After passing through all these systems methane is purified to the **purity of 96%** & stored in storage tank.
- Further, the compressor takes the gas from the storage tank stored in Cylinder Cascades to supply BioCNG to the nearby Oil Company.
- The final product specifications will adhere all the quality and safety guidelines as notified by Government (IS 16987:2016).

OUTLET PARAMETERS & EMISSION CAPTURE

- The output after cleaning and upgradation is mentioned below;

Sr. No.	Parameters	Unit	Value
1.	BioCNG	kg/day	3100
2.	CH ₄	%	>96
3.	H ₂ S outlet	ppm	<10
4.	CO ₂	%	<4

- As paper production is projected to increase by 2030, significant efforts must be made to reduce the emissions intensity of production.

This can be accomplished by moving away from fossil fuels and move towards the use of net zero emission alternatives.

- From this BioCNG Project, the carbon emission reduction from methane capture is **25,860 Tonnes/Year** and from fossil fuel replacement is **3012 Tonnes/Year**.

UTILITY REQUIREMENTS & TYPICAL R.O.I

- Below mentioned is the utility requirement for setting up BioCNG Plant;

Sr. No.	Items	Specifications
1.	Power	3336 Kwh/day
2.	Area requirement for BioCNG Plant	800m ² + Cascade shed area
3.	Water Requirement	4m ³ /day DM water 10m ³ /day for cooling Tower & Chiller

- Economics plays a major role in determining the viability of project. In the case of BioCNG, economics is critical as the sector is just emerging.

Biogas	7200 m ³ /day
BioCNG	3.09 Tonnes/day
Capex	7.5 Crores
R.O.I	Less than 2 years

***Note :** The calculations are inductive in nature & may vary depending upon the size & variable parameters.

- The Pulp & Paper Industries growing while achieving net zero emissions and zero waste and improving overall resource efficiency are key drivers of sustainability in the paper industry.
- For Decarbonization and Energy Transition, it's a good opportunity for the pulp & paper industry to make BioCNG from the paper mill effluent.
- The BioCNG project is a beneficial return on investment along with revenue from carbon credits.
- Net Zero is ambitious, but with a BioCNG ecosystem, it is achievable. It will play a key role in transitioning from fossil fuels to green energy.
- In the future, CO₂ can be captured further to use in the industry's purpose.

WINNER - INDIA'S BEST BIOGAS / BIO-CNG[®] PLANT



CONCLUSION & THANK YOU



INDUSTRIAL WASTE WATER



MIXED WASTE

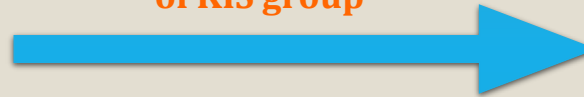


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Expertise & Proven
Track Record
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POWER PLANT



BioCNG® & CO₂



PROFITS

Many Thanks

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