PARASON

Engineered Trust

BIO CNG FROM RECYCLED - BASED PAPER MILL WASTE

Trash to Treasure

Presentation by

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CHALLENGES IN THE PAPER INDUSTRY

- Highlight the growing issue of odour in the kraft paper industry Suffering to cut down the production/plant closures and reduced paper quality.
- Mill owner can’t export their paper because of Foul smell.
- Leading to financial losses and environmental concerns.

THE SOLUTION - ETP WITH ANAEROBIC DIGESTER

- Mitigating Odour Issues in Kraft Paper Industry through ETP with Anaerobic Digesters and Bio-CNG.
- Transforming ETP into valuable asset.
- Trusted source of Treasure – ROI with in 3 years

WORK ON -TWO PHASES

- ANAEROBIC DIGESTER
- CBG/BIO CNG

CHARACTERISTICS OF INFFLUENT

SR.NO	PARTICULARS	UNIT	VALUE
1.	pH	-	6.5 – 7.5
2.	BOD	mg/l	2000
3.	COD	mg/l	6000
4.	TSS	mg/l	3000

CHARACTERISTICS OF FINAL TREATED EFFLUENT

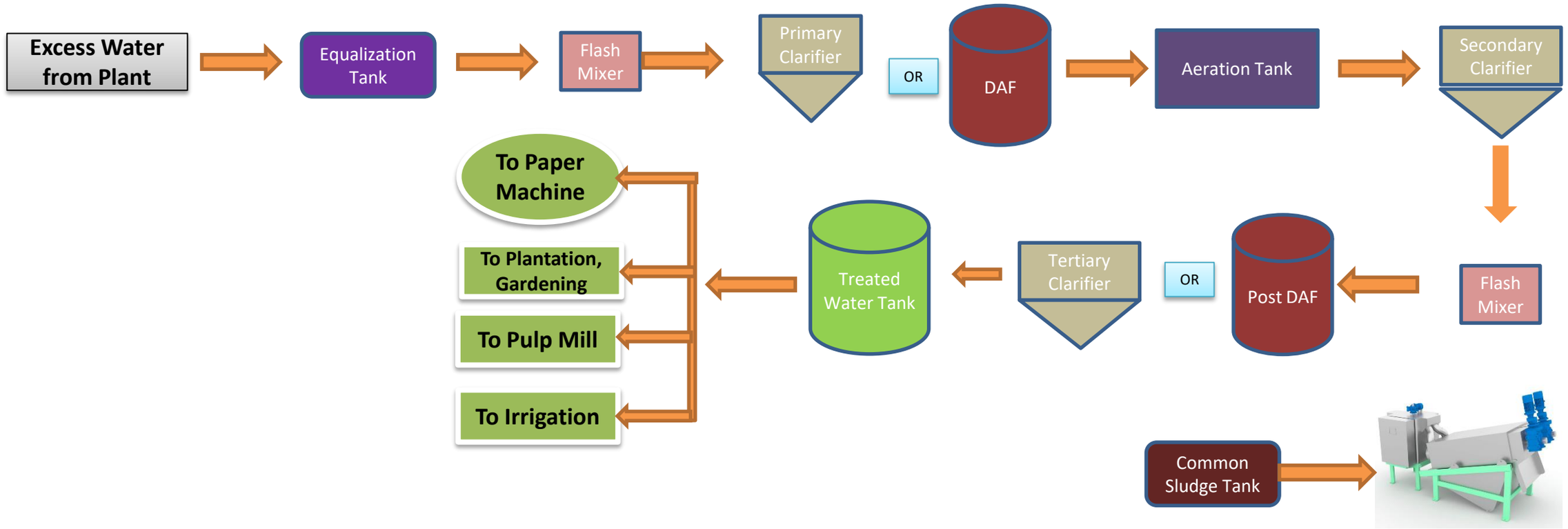
SR.NO	PARTICULARS	UNIT	VALUE
1.	pH	-	6.5 – 8
2.	BOD	mg/l	<30
3.	COD	mg/l	<250
4.	TSS	mg/l	<50

***The above parameters are considered as per avg parameters of mill.**

ETP PROCESS

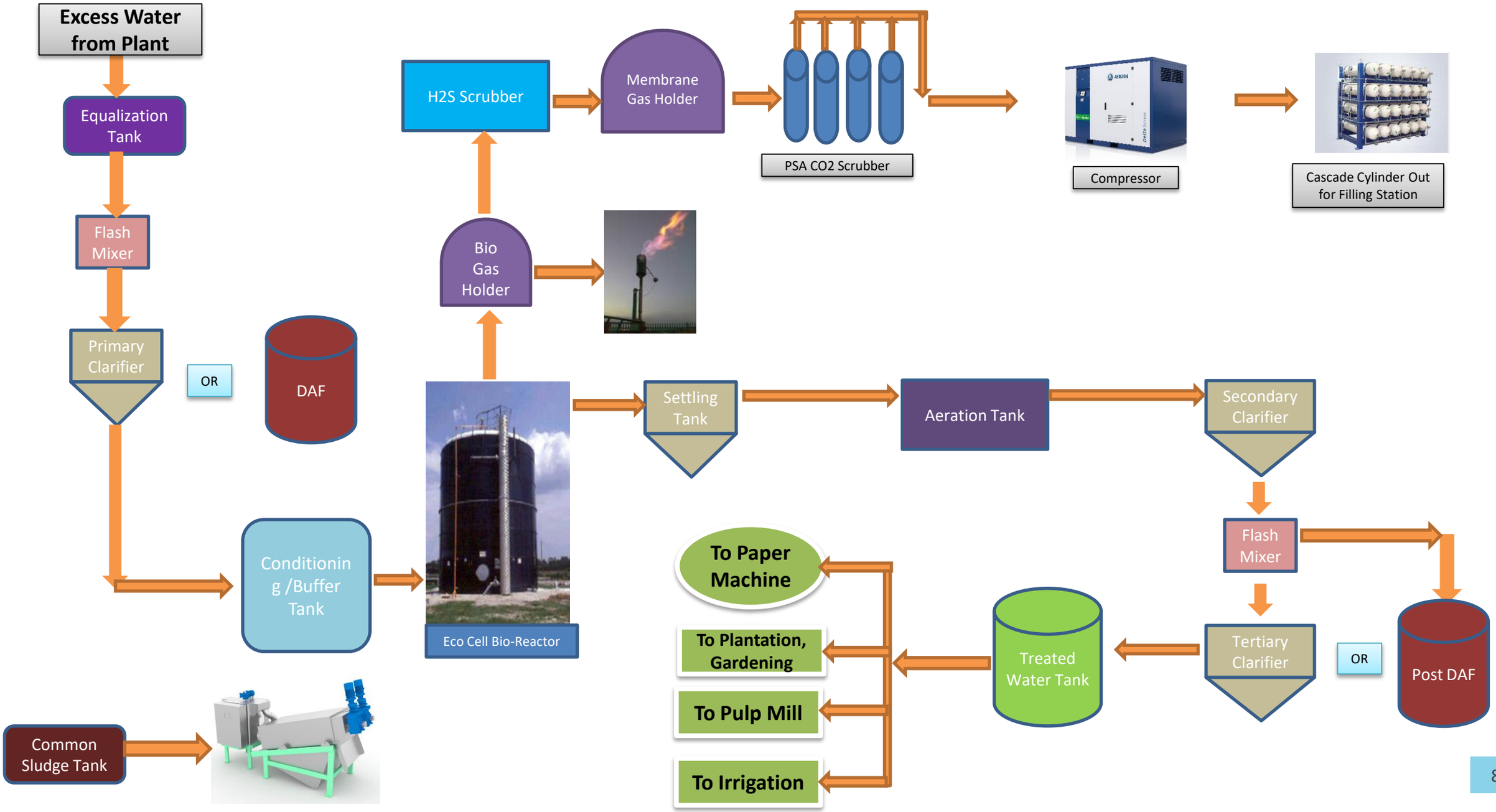
- Primary Treatment – Physio-chemical Treatment
- Secondary Treatment – Biological Treatment
- Anaerobic process
- Bio gas production
- Bio-CNG production
- Aerobic process
- Tertiary Treatment- water polishing
- Sludge Handling

ETP PROCESS FLOW DIAGRAM WITHOUT CBG PLANT



- We have to treat this Effluent as per government norms and to achieve those legal compliances we require lot of investment from our side.
- Now implanting Bio gas Unit we can counter this capital cost and get positive ROI.
- It will additionally provide reduction of load to secondary & tertiary treatment, as example without CBG plant we have to need reduction of COD from 5000 to 250 where as with CBG 1500 to 250
- Smell free paper.

ETP PROCESS FLOW DIAGRAM WITH CBG PLANT



ANAEROBIC TREATMENT

- Compressed Bio Gas (CBG)

- From Paper mill Effluent as trash to treasure
- Conditioning Tank for Homogenize water characteristics
- Nutrients –Phosphoric Acid, Urea

- A new generation high rated solid separation anaerobic reactor and consist of two separators. which is the conversion process of organic matter in the waste (liquid or solid) to bio-methane and manure by microbial action in the absence of air.

- 70 % Reduction In COD.

BIOGAS HOLDER & FLARE SYSTEM

- There is circular tank for Biogas holding.

- The generated biogas from the anaerobic reactor being stored to safeguard the reactor & being purified in CBG plant and in case of any shut down in CBG plant the raw bio gas being flared for safety point of view.

BIO-CNG PRODUCTION STEPS AND SPECIFICATIONS

Feedstock aggregation/ segregation → **Pre-Treatment** → **Anaerobic digestion** → **Up-gradation** → **Bio-CNG bottling/ Power**

Any organic matter can ferment to give biogas before:

Elimination of plastic rapper, Foreign particle from influent.

Elimination TSS up-to 90 to 95 %

Organic matter to be digested by a consortium of micro-organisms:

- Hydrolysis
- Acidogenesis
- Acetogenesis
- Methogenesis

Raw biogas produced

Methane – 55 – 70%

CO_2 – 30 – 45%

H_2S – 0.1 – 4%

Ammonia – 0.1%

N_2 – 1 – 3%

O_2 – 0.1 – 2%

Moisture – 1 – 2%

Removal of all impurities to get Bio-CNG/ Bio- Methane/ CBG.

Composition:

Methane > 90%

CO_2 - < 4%

H_2S – < 10 ppm

Ammonia – ND

N_2 < 0.5%

O_2 < 0.5%

Power Generation:

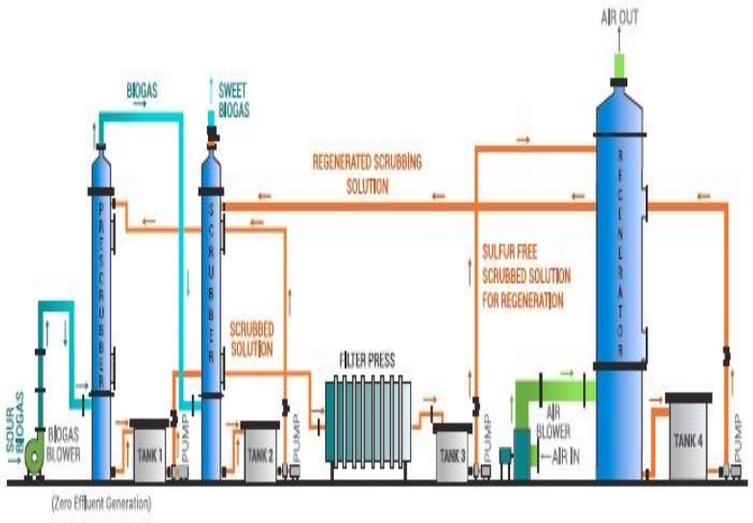
•Bio-CNG after removal of H2S Generates 2.0 – 2.2 KWH/m3

Transport fuel (BIO CNG) Generates 0.4 – 0.45 kg /m3

SCRUBBER

Technology are available for H2S scrubbing

- Wet Scrubber - Simple system for less H_2S contents
- Bio Chemical Scrubbing- Caustic will be used to prepare alkaline solution
- Chelating Agent Scrubbing



Technology are available for CO2 scrubbing

- Pressure Swing Adsorption (PSA)
- Water Scrubber
- Membrane Separation
- Amine Scrubbers

But we are proposing PSA (4 tower) technology because it is user friendly.

- > 96% Methane Purity
- Ease of Operation

BIOGAS BALLOON

- The Purified biogas after scrubber is collected in the Double membrane gas holder as a buffer before taking into the Biogas up gradation System.

CBG (Bio-CNG) GENERATION (PSA)

- The biogas is entering into the Pressure Swing Adsorption system.

- The purified biogas is passed through different units like, desulfurizer, moisture separator, pre-filters, GDU Units & PSA Towers (4 Tower).

- After passing through all these systems, methane is purified to the purity of <**96%.**

HIGH PRESSURE COMPRESSOR SYSTEM

- Here we compress the pure CBG from **0.3 kg/cm2 to 250 kg/cm2** and finally gas being filled in the Cascades.

CYLINDER CASCADES FILLING SYSTEM

- These cascades used to transport the CBG to Bio CNG pump station and there it is being dispensed to vehicles as fuel.

FILLING STATION

ROI FOR ANAEROBIC DIGESTER & BIO CNG PROJECT

Flow rate	4500	M3/day
COD of effluent	6000	mg/lt
Total load	27	MT/Day
COD reduction in Anaerobic digester	70	%
COD reduction	4200	mg/lt
Reactor outlet COD	1800	mg/lt
COD reduction	18.9	MT/Day
Raw bio gas generation	0.45	M3/kg COD reduction
Total Raw Bio gas generation	8505	m3/Day
Raw Bio Gas flow rate	**8505**	**M3/Day**
Running hrs	24	Hrs
	354	M3/Hr
Methane	65.00	%
Methane content	230	M3/hr
System Methane Losses	8.00	%
Final Product Methane	212	M3/hr
Methane Density	0.69	
Methane	146	Kg/Hr
	3509	Kg/Day
	3.51	MT/day
Working days	330	
Investment (excluding land cost)	**18,00,00,000**	**(Anaerobic digester, H2S scrubber, CO2 removal, compressor, cascades) including Civil**
	18	Cr
Opex for CBG plant		
Power, man power, chemicals, spares etc	2,50,00,000	
	2.50	Cr
Revenue of sale to Govt (present Rate)	67	Rs/Kg
Revenue /year	77591355	Rs/Year
	7.76	Cr
Net Profit	52591355	Rs
	5.26	Cr
Capex	18,00,00,000	
ROI (excluding interest and depreciation)	**3.5 - 4**	**Years**

if go with own CBG pump		
Sale price (Present)	90	Rs/kg
Revenue	104227193.1	Rs/Year
	10.42	Cr
Extra expenditure for pump station	2,00,00,000	(For compressor, dispenser, land etc)
	2	Cr
Total expenditure	200000000	
	20	Cr
Total revenue	104227193.1	Rp
Opex for pump (power, manpower, repair and maint)	5500000	Rp
	0.55	Cr
Total Opex	30500000	Rp
	3.05	Cr
Net Profit	73727193.07	
	7.372719307	Cr
ROI	**3.0**	**Years**
Other benefits		
MNRE subsidy (New and Renewable Energy)	7500000	Rs/MT CBG
Govt Subsidy	26319998.25	
	2.63	Cr
Carbon Credit	8000000	
	0.8	Cr
Net Investment	165680001.8	
	16.6	Cr
Payback	**2.5 - 3**	**Years**

ROI FOR BIO CNG PROJECT

Flow rate	4500	M3/day
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Methane Density	0.69	
Methane	146	Kg/Hr
	3509	Kg/Day
	3.51	MT/day
Working days	330	
Investment (excluding land cost)	**10,00,00,000**	**H2S scrubber, CO2 removal, compressor, cascades) including Civil**
	10	Cr
Opex for CBG plant		
Power, man power, chemicals, spares etc	2,00,00,000	
	2.00	Cr
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ROI (excluding interest and depreciation)	**2 - 2.5**	**Years**

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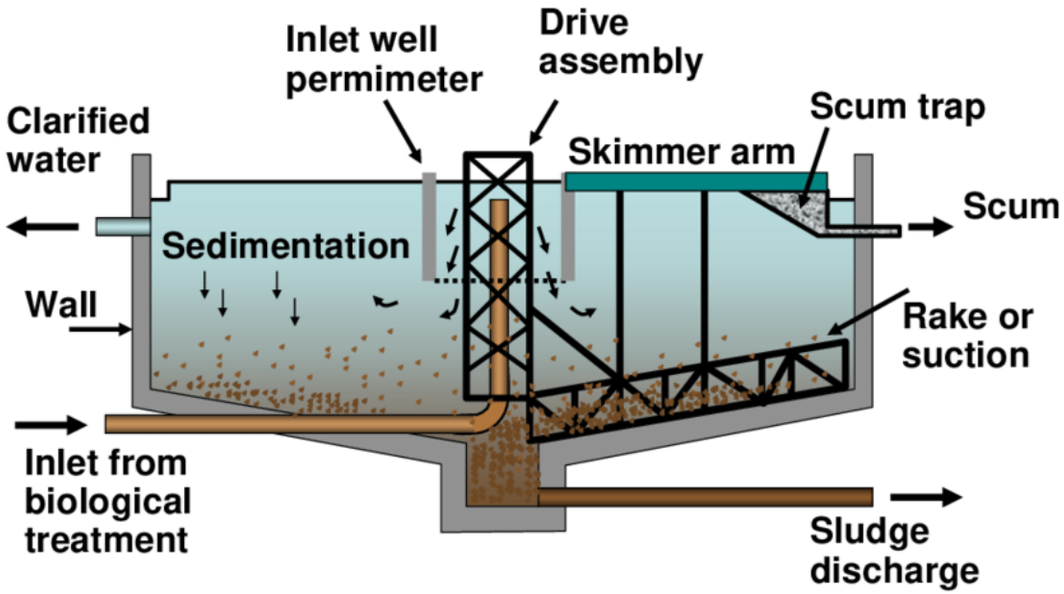
Revenue	104227193.1	Rs/Year
	10.42	Cr
Extra expenditure for pump station	2,00,00,000	(For compressor, dispenser, land etc)
	2	Cr
Total expenditure	120000000	
	12	Cr
Total revenue	104227193.1	Rp
Opex for pump (power, manpower, repair and maint)	5500000	Rp
	0.55	Cr
Total Opex	25500000	Rp
	2.55	Cr
Net Profit	78727193.07	
	7.872719307	Cr
ROI	**1.5 - 2**	**Years**
Other benefits		
MNRE subsidy (New and Renewable Energy)	7500000	Rs/MT CBG
Govt Subsidy	26319998.25	
	2.63	Cr
Carbon Credit	8000000	
	0.8	Cr
Net Investment	85680001.75	
	8.6	Cr
Payback	**1.5**	**Years**

AEROBIC SYSTEM

- Biological Process
- Activated sludge
- Role of Urea
- Role of Phosphoric Acid
- Role of Diffusers



SECONDARY CLARIFIER

- Clarifier for Activated sludge settling which come from Aerobic system.
- Sludge recirculation
- Sludge waste in sludge holding tank to reduce the load of MLSS (Mixed Liquor Suspended Solid)

TERTIARY TREATMENT

- Pressure sand Filter
- Activated Carbon Filter

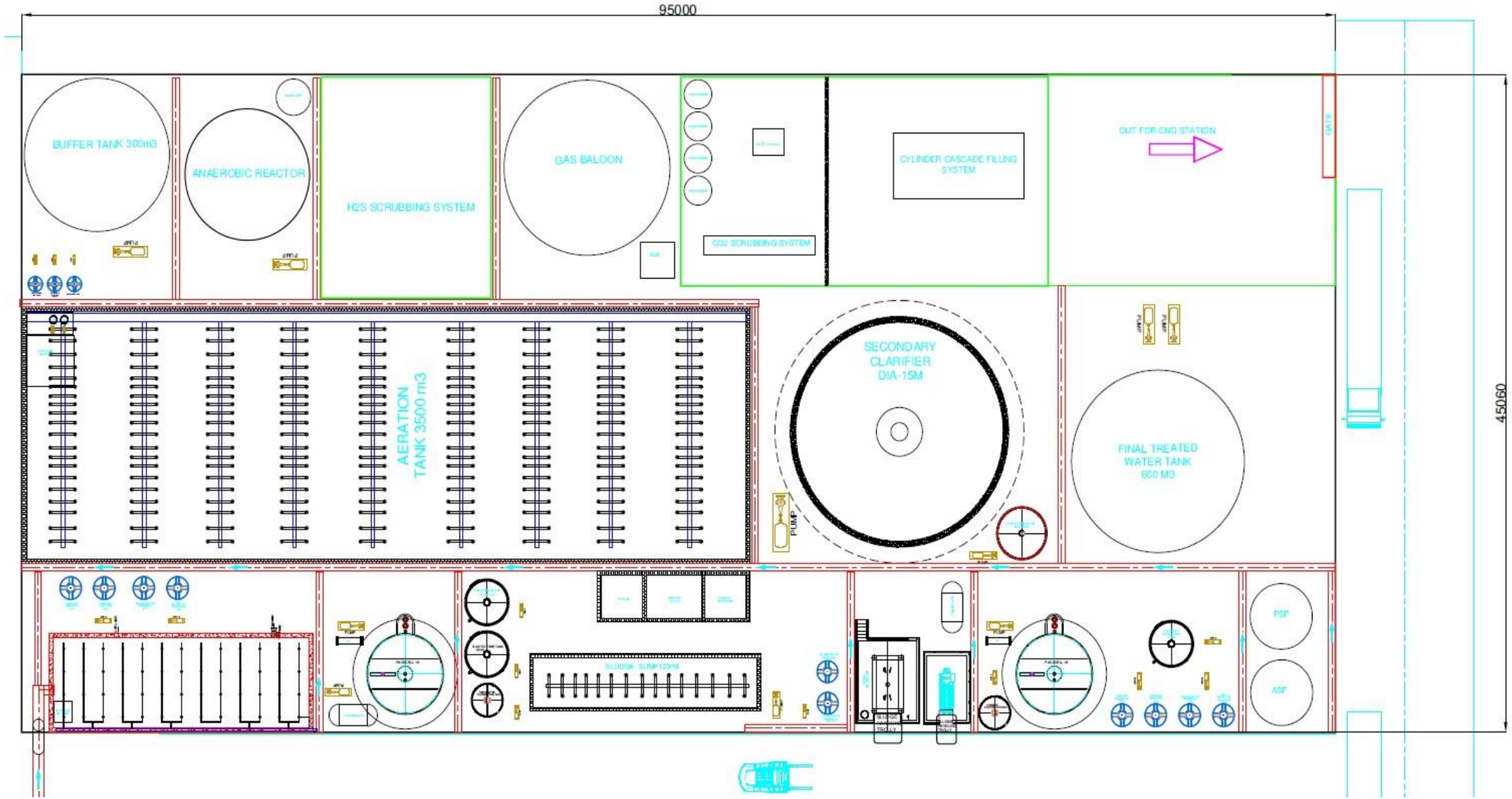
SLUDGE HANDLING

- **Belt Filter Press**
- **Sludge Screw Press**

Sludge handling for Chemical and biological/Activated sludge

- Inlet CY – 2 to 3%
- Outlet CY – 27 ± 2 %

LAYOUT


95000
45060
BUFFER TANK 300m3
ANAEROBIC REACTOR
H2S SCRUBBING SYSTEM
GAS BALOON
CO2 SCRUBBING SYSTEM
CYLINDER CASCADE FILLING SYSTEM
OUT FOR CNG STATION
GATE
AERATION TANK 3500 m3
SECONDARY CLARIFIER DIA-15M
PUMP
FINAL TREATED WATER TANK 600 M3
PUMP
PUMP
PSF
ASF

ETP:
FROM OBLIGATION TO VALUABLE ASSET

- ETP with Bio-CBG Project eliminates foul smells.
- Enhances paper quality and financial viability.
- Transforms ETP from an obligation into a trusted source of treasure.
- Improves consumer experience by eliminating Foul smell from corrugated boxes.

360 Solution Provider

PARASON

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THANK YOU