

INNOVATIVE ENVIRONMENTAL TECHNOLOGIES PVT. LTD.

An ISO 9001:2008 company



Presentation at IIT Delhi - Workshop on “Promotion of Biogas Upgrading and Bottling

WHO ARE WE?

- Biogas cleaning and up-gradation technology provider
- EPC / Turnkey Service Provider for Bio CNG
- Mr. Ashish V. Nawade- CEO, MBA- London Business School
- 25 Years of international EPC experience in UAE, Japan, UK, Italy
- **Returned to India in 2012 to work in Renewable Energy sector.**

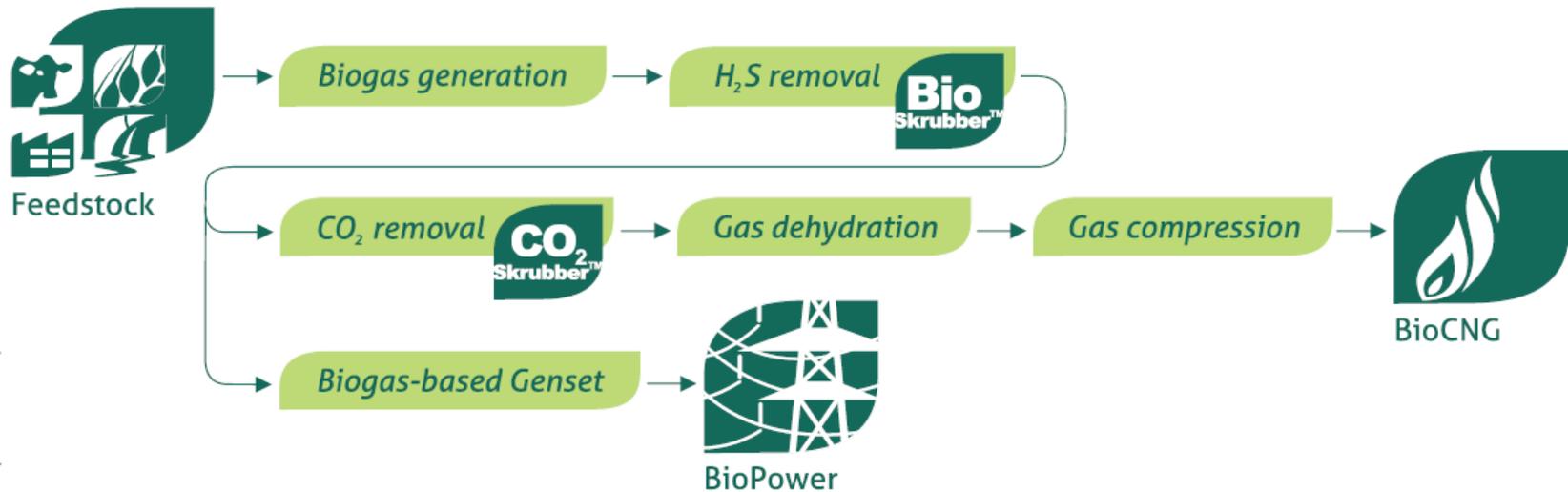
WHAT DO WE OFFER ?

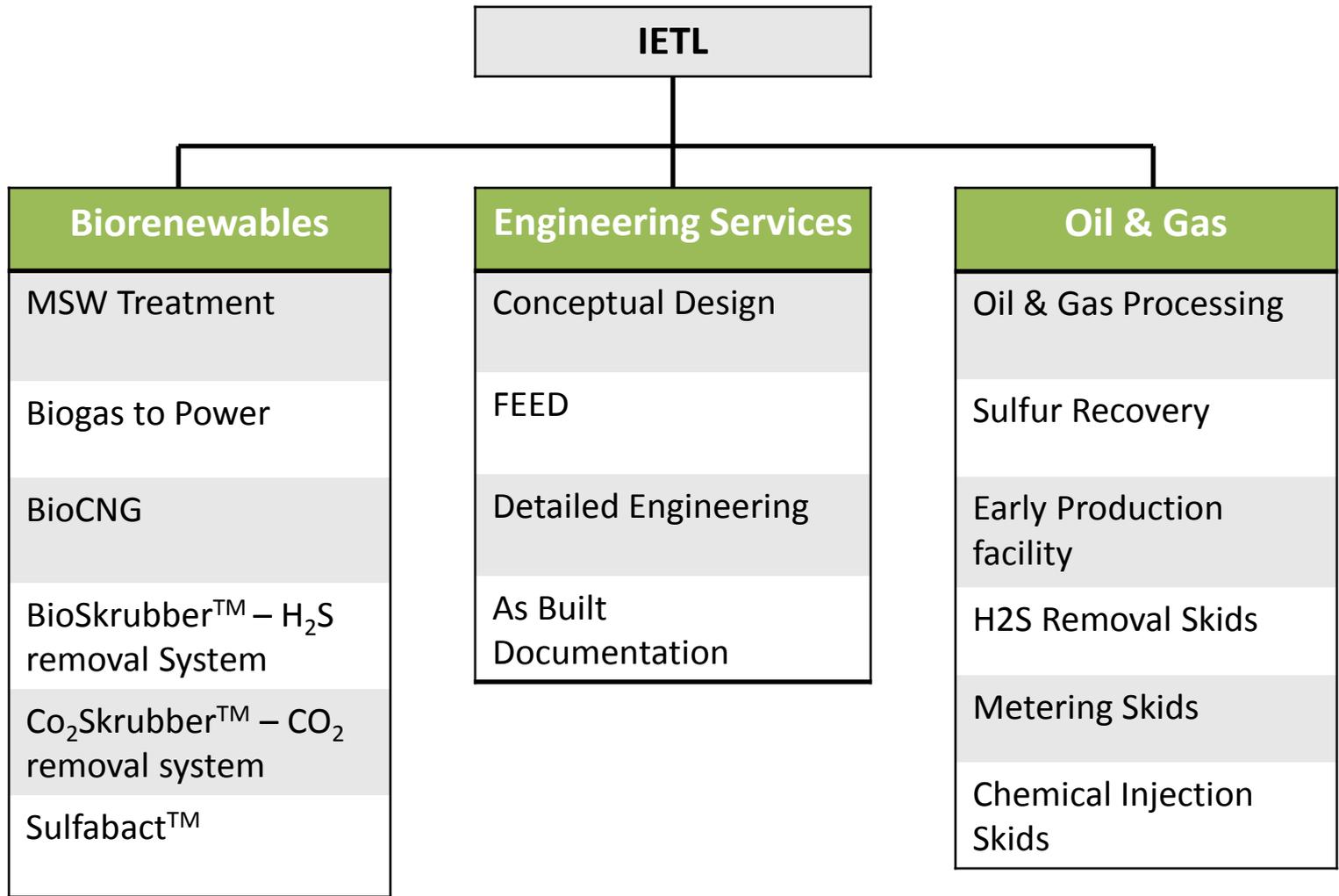
- 20+ years of EPC experience in the areas of renewable energy, clean technology and gas scrubbing
- **Commissioned and operating India's first large scale waste to Bio-CNG project: 9 Tons /day or equivalent to 700 cylinder of LPG**
- India's first large-scale Biogas to Power plant
- **65 MW power equivalent biogas-based power generation**
- **33+ Biogas to Power projects**
- Staff of 70+

HOW ?

EPC TURNKEY PROJECTS:

- **BIOGAS TO POWER:** Biogas genset based projects for conversion of waste to bio-power
- **BIOGAS TO BIOCNG:** Projects for conversion of waste to CNG grade fuel





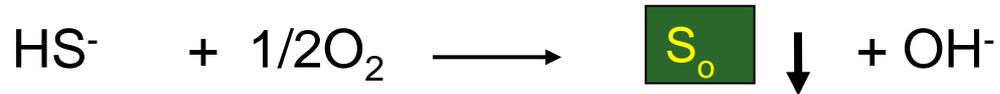
H₂S REMOVAL - Bioskrubber™ System

Bioskrubber™ is a biochemical scrubber to remove H₂S from biogas / natural gas, in which the spent caustic solution is continuously regenerated in the bioreactor.

Equation No. 1



Equation No. 2



IETL's strengths in CO₂ scrubbing

• Pressurized Water Scrubbing

- Robust, reliable and functional system
- Proven technology designed for varying operating conditions
- **Reflux process to reduce loss of methane**
- High plant availability – no clogging, quick start up.
- Low system downtime; quick and dedicated service team



Sulfabact™ (Patent Pending)

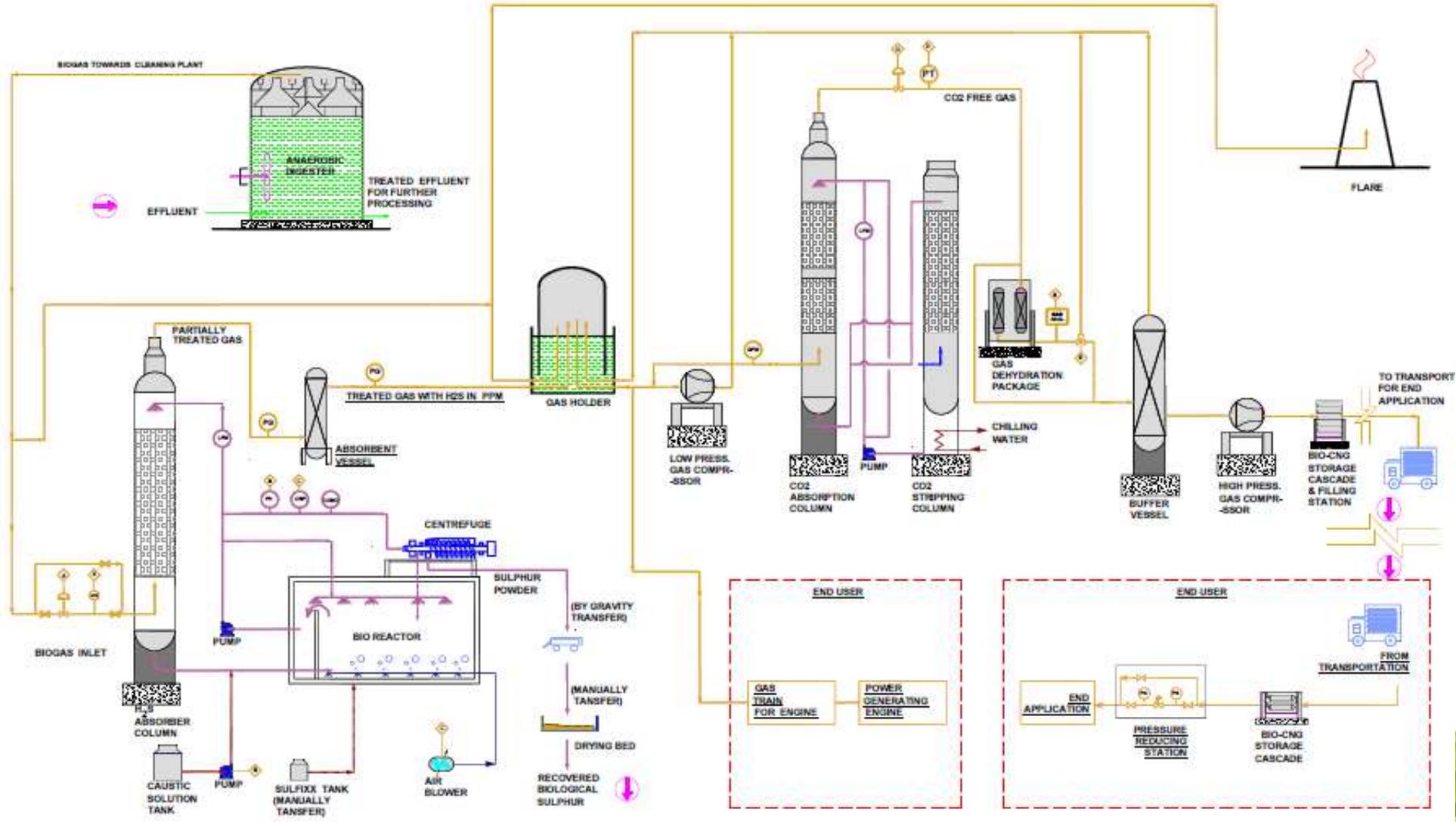


**India's First Biogas to
Bio CNG plant**

Project Bio-CNG – 9 Tons / Day

- IETL has implemented the first large scale Biogas to Bio-CNG upgradation project for **Spectrum Renewable Energy at Warana** in India on press mud and distillery biogas.
- IETL has provided the entire Biogas Upgradation Plant consisting of H₂S cleaning, CO₂ removal, moisture removal system
- Upgraded Biogas i.e. Bio-CNG contains more than 95% Methane, H₂S less than 5 ppm and moisture at -40° C DP
- Bio-CNG is used as LPG replacement
- The plant has been successfully in operation for more than year.
- Upgraded Gas (Bio-CNG) has been tested at ONGC lab.

Bio-CNG - PFD



Biogas to BioCNG- Case Study

IETL has designed, constructed and commissioned the **First large scale** Biogas to BioCNG upgradation project for Spectrum Renewable Energy at Warana in India on pressmud and distillery biogas.

- IETL has provided the entire Biogas Upgradation Plant consisting of H₂S cleaning and CO₂ removal system
- Upgraded Biogas i.e. BioCNG contains more than 95% Methane, H₂S less than 5 ppm and moisture at -40° C DP
- This BioCNG is being used as industrial LPG replacement
- The project status: Successfully commissioned

Pressmud	Distillery Gas	Biogas Generation	BioCNG Generation	BioPower
100 T/day	14,000 m ³ /day	22,000 m ³ /day	9 T/day	500 KW

Bio-CNG Plant Specs

Sr. No.	Parameter	Raw Biogas	Bio-CNG
1	Quantity (SCMD)	20,000	12000
2	Methane (%)	60	95
3	Hydrogen Sulfide (ppm)	30,000	Less than 5 ppm
4	Carbon Dioxide (%)	35	5
5	Moisture(%)	2	- 40° C DP

First large-scale Waste to Bio-CNG plant in India

Press mud storage and Feeding tank



First large-scale Waste to Bio-CNG plant in India

Anaerobic Digestion



First large-scale Waste to Bio-CNG plant in India

Power Generation post **Bioskrubber**[™] H₂S removal



First large-scale Waste to Bio-CNG plant in India

BioCNG Generation



First large-scale Waste to BioCNG plant in India

BioCNG transportation through **Cascade** / Supply through **Grids**



Advantages of Bioskrubber™ System

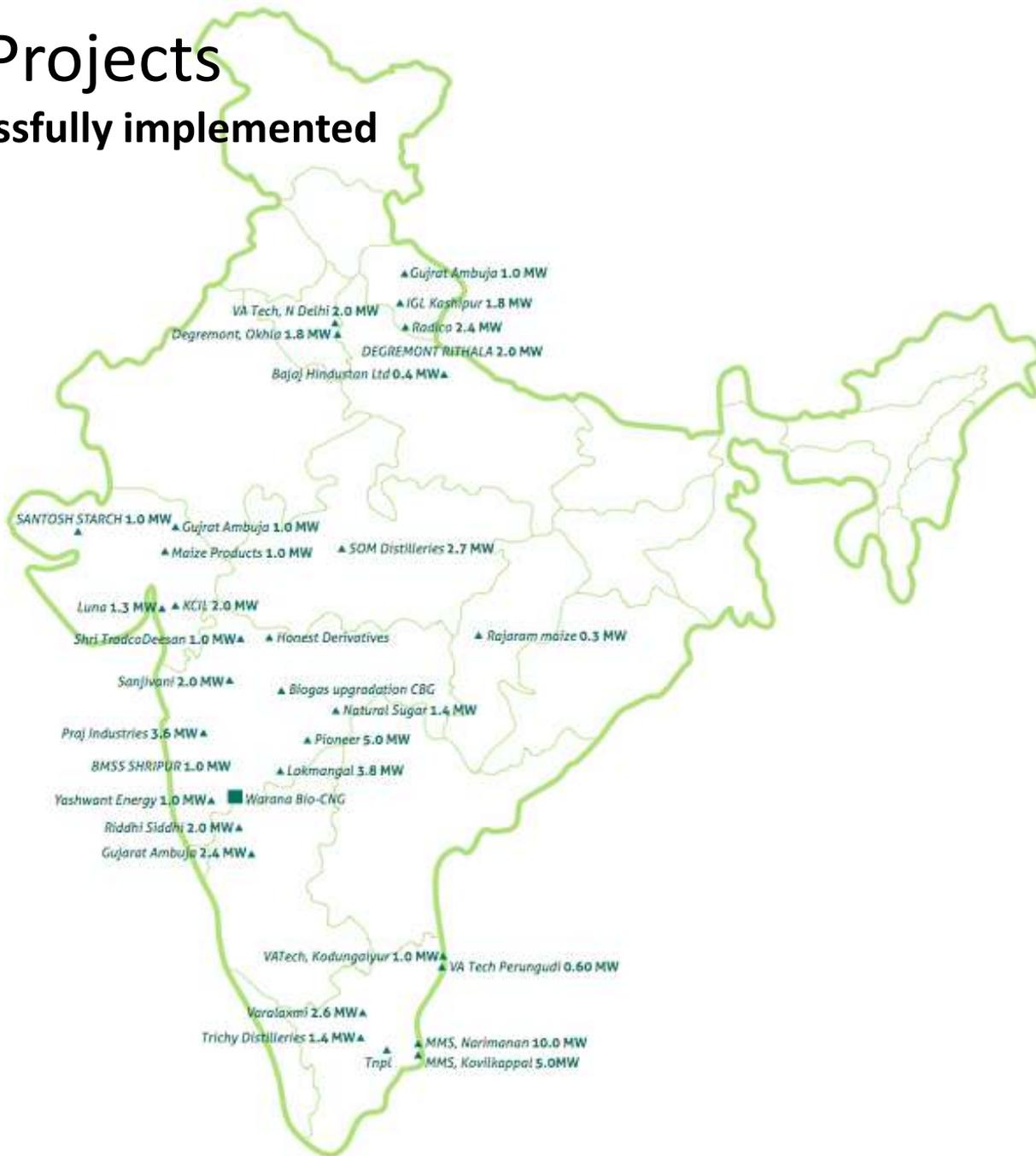
- Clean Bio Technology for H₂S cleaning
- Low cleaning cost as up to 92% caustic requirement is regenerated in the process
- Very high H₂S removal efficiency – greater than 99%
- Partial CO absorption of Carbon Dioxide
- No expensive catalyst or chemical required
- Operations at ambient temperature and pressure
- Elemental sulfur as a by product with 90 % purity

Biogas to BioCNG

- Upgradation of Biogas to BioCNG/ BioMethane increases its Gas Calorific Value from about 4500 Kcal/m³ to 8000-9000 Kcals/m³.
- It is a replacement of Industrial LPG.
- Highest return for every m³ of biogas.
- Supplementing of fossil fuel e.g. LPG/CNG/diesel/petrol.
- Reduction in carbon footprint- Clean Development Mechanism (CDM), Certified Emission Reduction (CER) benefits
- CO₂ emission reduction by 97 % (164 gCO₂eq/km for Petrol vs. 5 gCO₂eq/km for BioCNG/ BioMethane).
- Can be fed to the gas network directly.

Reference Projects

32 projects successfully implemented



Key Clients

- **Kanoria Chemicals** Anchor client since 1998; continues to give us business
- **Petrofac** One of the largest companies in Oil & Gas
- **Dhampur Sugar** One of the largest distilleries in Uttar Pradesh
- **India Glycols** One of the largest distilleries in Asia; makes MEG from alcohol
- **RSGBL** India's largest starch manufacturer
- **Bajaj Hindustan** India's largest sugar manufacturer
- **Praj Industries** One of the largest ethanol plant manufacturers in the world
- **United Spirits** One of the largest ethanol producers in the world
- **Spectrum** Project development company for Biogas to Bio-CNG
- **Green Elephant** German project developer for Biogas to Bio-CNG



Sr. No.	PROJECT	Year of Installation	FLOW m ³ /hr	H ₂ S In %	H ₂ S Out ppm	Equivalent MW
1.	Kanoria Chemicals & Ind. Ltd., Ankleshwar, Gujarat	1998	875	2.0	500	2.0
2.	SOM Distilleries, Bhopal, M. P.	2000	1250	3.0	500	2.7
3.	BMSS Ltd., Shripur, Dist. Solapur, (Maharashtra)	2000	500	3.0	1000	1.0
4.	Degremont India Ltd. For Delhi Jal Board, Delhi. At Rithala	2002	840	1.0	1000	2.0
5.	India Glycols Ltd Kashipur, Uttaranchal	2006	800	4.6	0.1	1.8
6.	VA Tech Wabag Ltd. For Chennai Metro-Perungudi	2006	381	1.0	630	0.60
7.	VA Tech Wabag Ltd. For Chennai Metro-Kodungaiyur	2007	521	1.0	630	1.0
8.	MMS Steel & Power Pvt. Ltd Narimanan ,T.N.	2006	3333	0.08	10	10.0
9.	MMS Steel & Power Pvt. Ltd Kovilkallapal, T.N.	2006	1666	0.08	10	5.00
10.	Luna Chemicals Ltd. Asnad, Gujarat	2009	650	3.5	500	1.30
11.	Riddhi Siddhi Gluco Biols Ltd. Gokak, Karnataka	2006	1200	2.0	500	2.0
12.	Trichy Distilleries & Chem. Ltd. Trichy, T. N.	2008	750	5.0	500	1.4
13.	The Sanjivani (Takli) S. S. K. Ltd. Koperagaon, Maharashtra	2009	1000	5.0	500	2.0
14.	Maize Products Ltd Ahmedabad, Gujarat	2009	500	1.5	500	1.0

15.	V A Tech Wabag Ltd For Delhi Jal Board at Kondli ,New Delhi	Order under execution	1100	1.0	500	2.0
16.	Degremont India Ltd For Delhi Jal Board , at Okhla ,U.P.	2012	720	1.3	1000	1.8
17.	Rajaram Maize Products, Rajnandgaon, Chattisgarh	2010	150	1.5	500	0.3
18.	Natural Sugar and Allied industries Ltd., Latur,Maharashtra	2010	750	3.0	200	1.4
19.	Gujarat Ambuja Exports Ltd, Uttarakhand	2010	500	1.5	200	1.0
20.	Varalaxmi Starch Industries Ltd, Salem, Tamil Nadu	2012	1300	1.5	200	2.6
21.	Gujarat Ambuja Exports Ltd, Himmatnagar, Gujarat	2011	500	1.5	200	1.0
22.	Pioneer Distilleries, Nanded, Maharashtra	2011	2300	4.0	200	5.0
23.	Lokmangal Agro Industries Ltd, Solapur, Maharashtra	2012	1500	4.0	200	3.8
24.	Radico Khaitan Ltd, Rampur, Uttar Pradesh	2011	1200	4.0	200	2.4
25.	Santosh Starch Ltd, Bhuj, Gujarat	2011	500	1.5	200	1.0
26.	Praj Industries Ltd, Pune, India For Green Futures Inc. in Phillipines	2013	1583.33	1.5	200	3.6
27.	Bajaj Hindusthan Ltd, Uttar Pradesh	2012	208.33	3.5	200	0.4
28.	Spectrum Renewable Energy Ltd(SREL) For Warana SSK Ltd, Kolhapur,India	2013	916.67	3.0	200	CBG
29.	Gujarat Ambuja Exports Ltd, Hubli, Karnataka	2013	1250	1.5	200	2.4
30.	Honest Derivatives Pvt Ltd, Jalgaon, Maharashtra	2013	500	1.5	200	1.0
31.	Yashwant Energy Pvt Ltd, Sangli, Maharashtra	2013	500	1.5	200	1.0

32.	Shri Tradco Deesan Pvt Ltd, Dhule, Maharashtra	Order Under Execution	500	1.5	200	1.0
33.	Maize Product Ahmedabad, Gujarat	Order Under Execution	600	1.5	200	1.0
34.	Dhampur Sugar Mills Limited Moradabad, Uttar Pradesh	Order Under Execution	1667	3.5	200	4
35.	Bajaj Hindustan Ltd. Moradabad, Uttar Pradesh	Order Under Execution	600	3.5	200	1.4

Contact Us

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