Presentation on
Biogas Upgradation→BioCNG
A novel approach for waste to energy recovery

At

Renewtech 2011,Mumbai,India

By

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About Us

IETL has 20+ years of experience in the areas of renewable energy with people strength of 50+

- **Key focus areas:**
- H_2S removal plant using "Bioskrubber™" process
- CO_2 removal using "CO_2skrub™" process
- Biogas recovery from organic effluents and biomass
- Biogas based power generation –
- BioMethane plants
- Natural gas cleaning
- Tail gas cleaning

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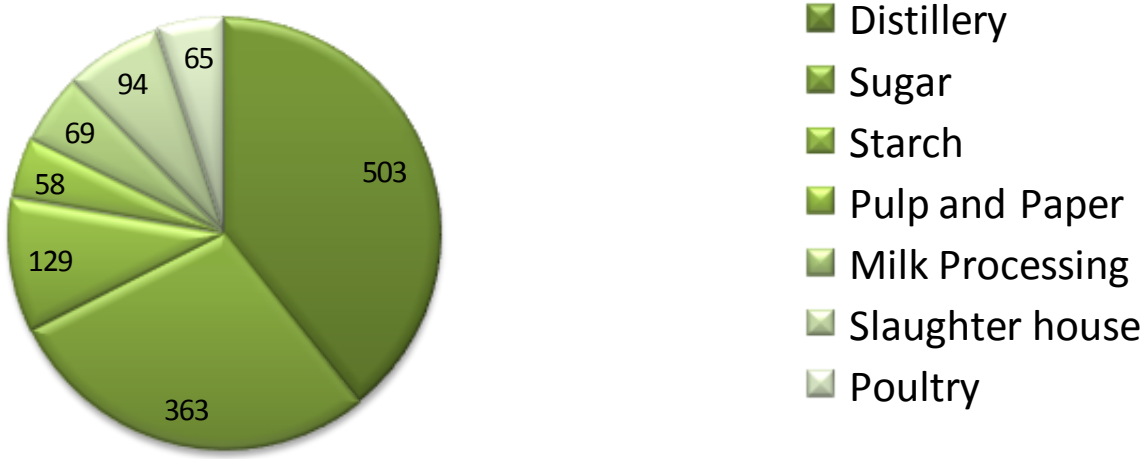
Biogas Generation Potential in terms of Electrical Power Generation (MW)

(*as per MNRE Data
Presentation by Mr.A.K.Dhussa,Director,MNRE at Methane to Markets Expo 2010)

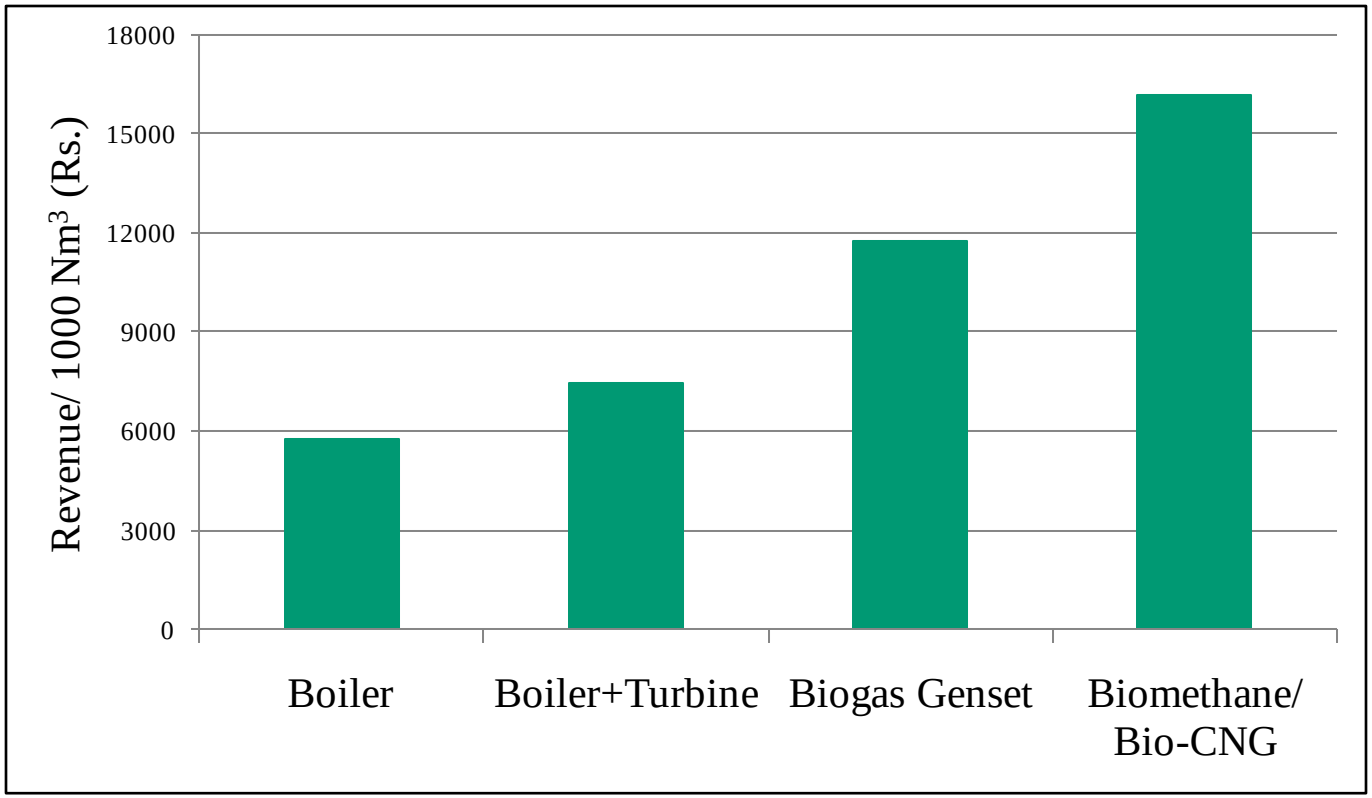
Total Potential 1281 MWe



Creating value Addition to Biogas

Sr. No	1000 Nm^3 as benchmark	Output	Value Creation
1	Boiler as fuel	1. Steam (@ 21 kg pressure) 550 kg	1. 550*Rs.1050 per Ton = Total= **Rs.5770**
2	Boiler-turbine	1. Steam (@ 45 kg pressure) 450 kg 2. Electrical power 500 kW	1. 450 * Rs.1050 per Ton= Rs.4725 2. 500 kW* Rs.5.50 per unit=Rs.2750 Total= **Rs.7475**
3	Biogas Genset after H2S removal	1. Electrical Power 2000 kW 2. Steam (@ 10.5 kg pressure) 700 kg	1. 2000kW *Rs.5.50 per unit =Rs.11000 2. 1400* Rs.1050 per Ton=Rs.1470 Total= **Rs.12,470**
4	BioCNG/BioMethane	1. 600 Nm^3 of upgraded Biogas i.e. BioCNG/ BioMethane	1. 600 * Rs. 27 per Nm^3 Total= **Rs.16,200**

Value Addition to Biogas



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Typical Composition of Biogas

Raw Biogas	Biogas specs for boiler application	Biogas required for Power Generation	Biogas required for Bio-CNG
CH_4 60-65 %	CH_4– 60-65 %	CH_4– 60-65%	CH_4 > 95 %
CO_2 – 30-35 %	CO_2 – 30-35 %	CO_2– 30-35 %	CO_2 < 5%
H_2S– 0.1-4.5 %	H_2S– 0.1-4.5 %	H_2S < 200ppm	H_2S < 5ppm
Moisture–1-3 %	Moisture–1-3 %	Moisture– RH<80	Moisture -40^o C DP

Project BioCNG/BioMethane

- IETPL is implementing the first large scale BioCNG project for a client in India at a distillery unit.
- IETPL to provide the entire Biogas Upgradation Plant consisting of H2S cleaning and CO2 removal system
- Upgraded Biogas i.e. BioCNG will contain more than 95% Methane, H2S less than 5 ppm and moisture at – 40^{o} C DP
- This BioCNG will be used as vehicular fuel/LPG replacement
- The project will become functional within 4- 6 months

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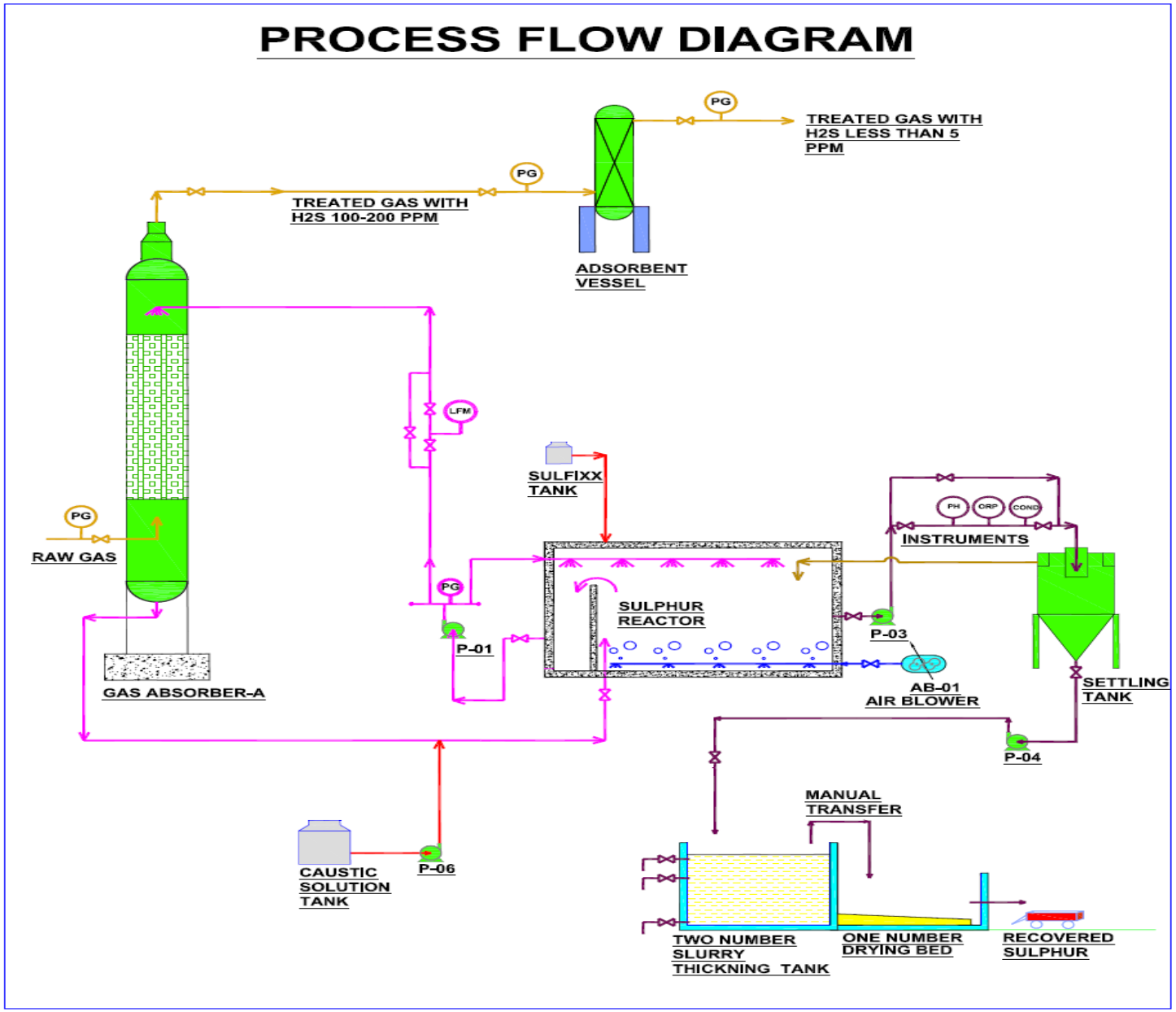
BioCNG Plant specs

Sr.No.	Parameter	Raw Biogas	BioCNG
1	Quantity (cub.mtrs per day)	20,000	12000
2	Pressure (bar(g))	0.25	7 -8
3	Methane(%)	60	95
4	Carbon Dioxide(%)	35	5
5	Hydrogen Sulphide (ppm)	30,000	Less than 5 ppm
6	Moisture(%)	2	- 40^{o} C DP

Typical Schematic diagram for Bioskrubber™ Process



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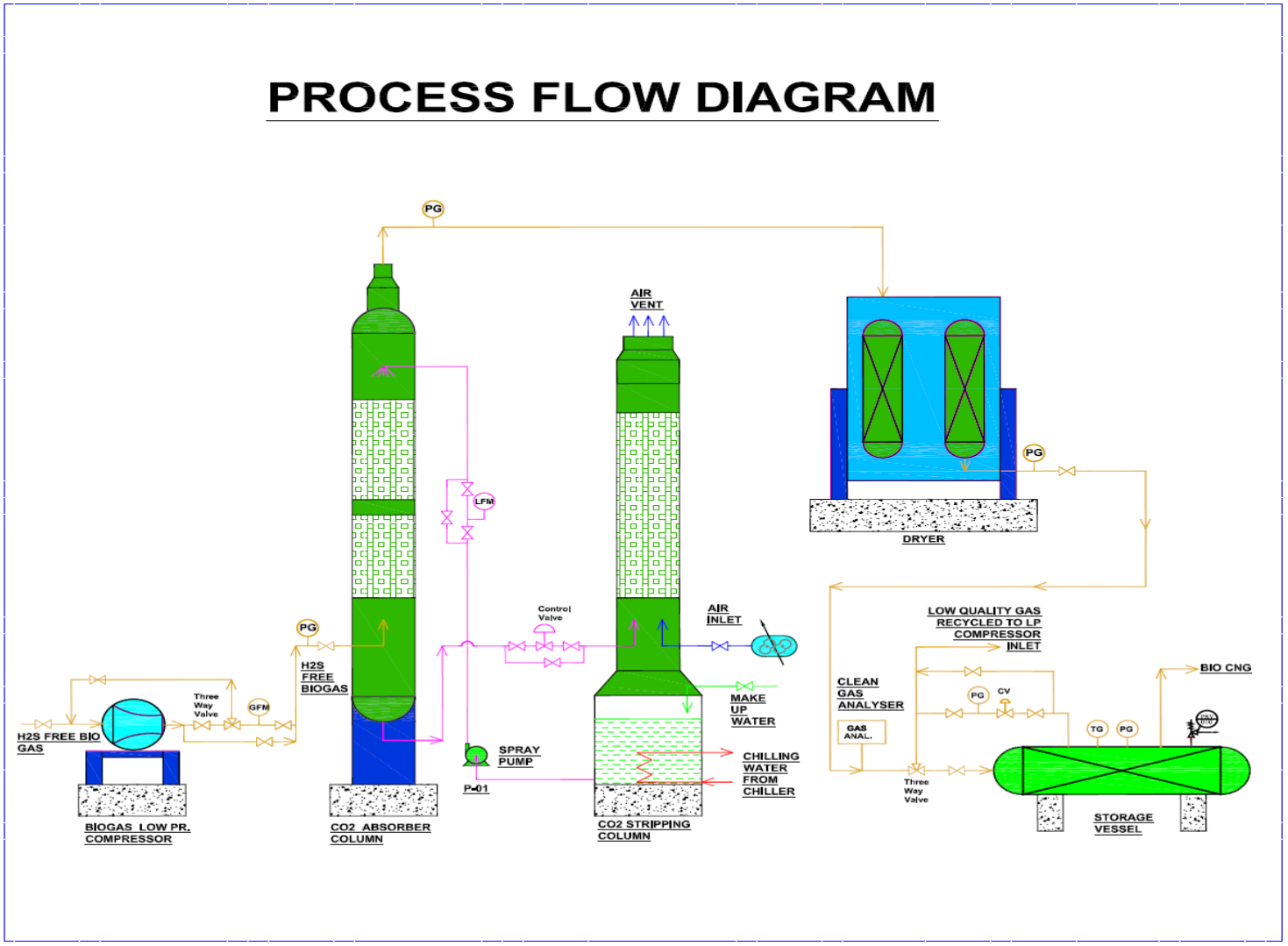
Schematic diagram for CO2scrub™ Water scrubbing system



About Bioskrubber™

Bioskrubber™ is a biological caustic scrubber to remove H_2S from biogas, in which the spent caustic solution is continuously regenerated in the bioreactor and sulphur produced as a biproduct.

Equation No 1

$H_2S_{gas} + OH^- \rightarrow HS^-_{liquid} + H_2O$

Equation No 2

$HS + 1/2O_2 \rightarrow S_o \downarrow + OH$

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Advantages with Bioskrubber™

- Rich experience in Biogas scrubbing with High H2S ppm
- Robust, Reliable and Functional System
- Proven, Robust technology designed for Indian operating conditions
- Technology preferred by key clients, engineering OEMs and consultants like IGL, Praj, JGC Japan
- High plant availability – no clogging, quick start up.
- Lowest system downtime as compared to alternate technologies

Advantages with Bioskrubber™

- No risk of fire hazard due to explosion in the scrubber system as Biogas stream and air stream never mix with each other
- Strong service back up
- Clean technology – Less water,less effluent,no nox pollution, No post process H2S release, Elemental Sulphur as end product.

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Our Experience

- Bioskrubber™ has 32 installations across various sectors viz. Distillery,Starch,STP, Oil and Gas
- No. of years in operation::
- Kanoria Chemicals,Gujarat:12 years
- BMSS,Maharashtra: No grid connection for the last 10 years. Very High reliability
- India Glycol Ltd,Uttaranchal:5 years
- Degremont India Ltd(For DJB STP at Rithala):9 years
- VA Tech Wabag Ltd(For CMWSSB at Perungudi and Kodungaiyur): 4 years
- Sanjivani SSK,Ahmednagar, on BOOT Basis:2 years

Our Experience

- Cumulative biogas cleaning project experience of close to

  -5,00,000 m^3/day or

  - 60 MWe

  in India comprising of distillery, starch, sewage treatment plants, sour gas sweetening as on date

- Projects under implementation of more than 32 MWe

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Sr.No.	PROJECT	Year of Installation	FLOW M^3/hr	H_2S In %	H_2S Out ppm	Equivalent MW
	Distillery Sector					
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	India Glycols Ltd Kashipur, Uttranchal	2006	800	4.6	0.1	1.8
5	Trichy Distilleries & Chem. Ltd. Trichy, T. N.	2008	750	5.0	500	1.4

Sr.No.	PROJECT	Year of Installation	FLOW M^3/hr	H_2S In %	H_2S Out ppm	Equivalent MW
6	Luna Chemicals Ltd. Asnad, Gujarat	Under Commissioning	650	3.5	500	1.3
7	The Sanjivani (Takli) S. S. K. Ltd. Koperagaon, Maharashtra	Commissioned in March 2009 on Build-Own-Operate(BOO) Basis	1000	5.0	500	2.0
8	Natural Sugar and Aliied industries Ltd,Latur,Maharashtra	2010	750	3.0	200	1.4
9	Pioneer Distilleries,Nanded,Maharashtra	2011	2300	4.0	200	5.0
10	Radico Khaitan Ltd,Rampur,Uttarakhand	2011	1200	4.0	200	2.4
11	Lokmangal Agro Industries Ltd,Solapur,Maharashtra	Under Commissioning	1500	4.0	200	3.4
12	Project for German Project Developer in Maharashtra	2011	1200	3	200	2.4

Sr.No.	PROJECT	Year of Installation	FLOW M^3/hr	H_2S In %	H_2S Out ppm	Equivalent MW
13	Praj Industries Ltd,Phillipines Project	Under Implementation	1583	1.5	200	3.0
14	Spectrum Renewable Energy Ltd,Maharashtra	Under Implementation	917	3.0	200	2.0
15	Bajaj Hindusthan Ltd,Uttar Pradesh	Under Implementation	208	3.5	200	0.4

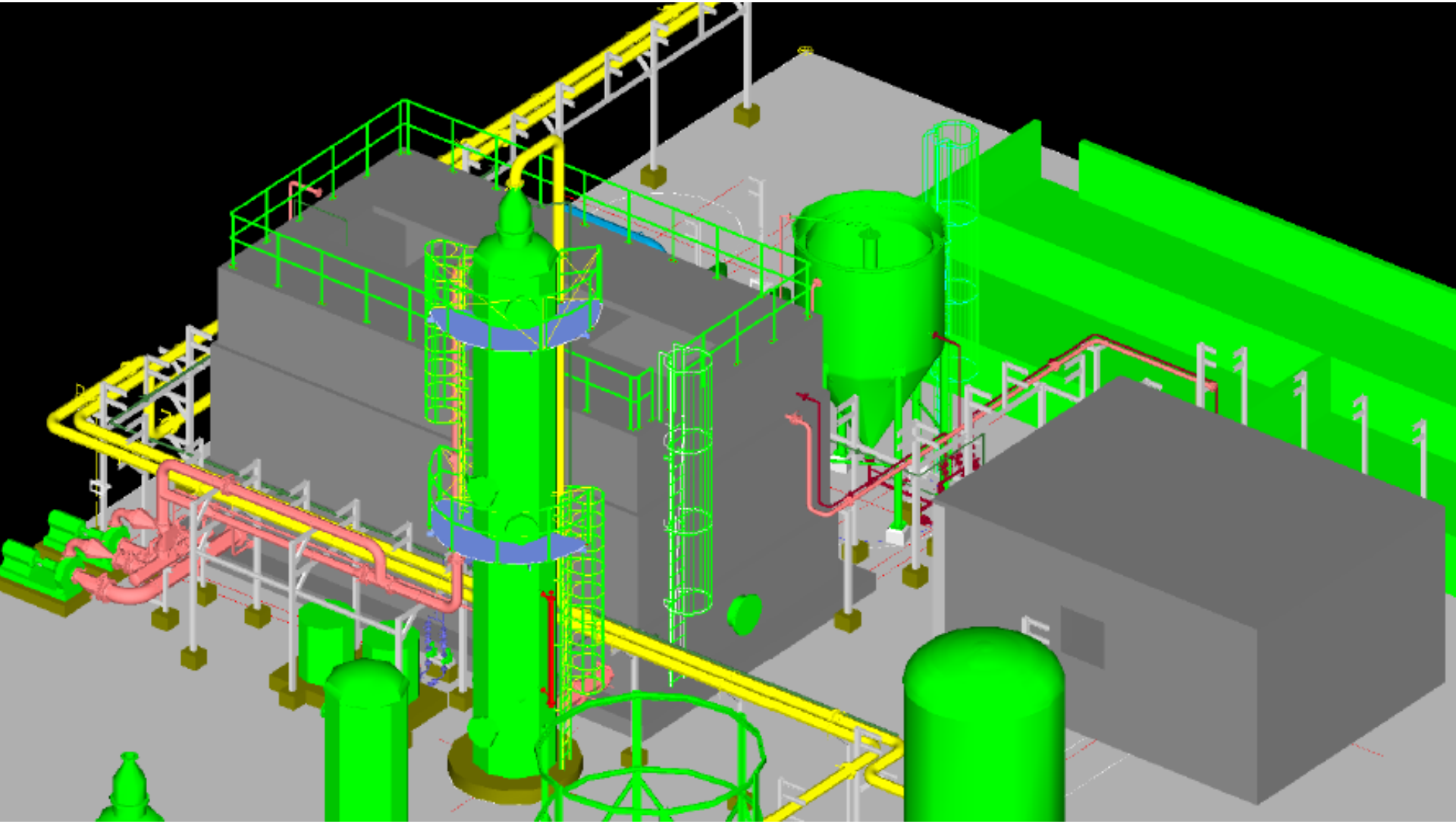
Sr.No.	PROJECT	Year of Installation	FLOW M^3/hr	H_2S In %	H_2S Out ppm	Equivalent MW
	Starch Sector					
1	Riddhi Siddhi Gluco Biols Ltd. Gokak, Kamataka	2006	1200	2.0	500	2.0
2	Maize Products Ltd Ahmedabad,Gujarat	2009	500	1.5	500	1.0
3	Rajaram Maize Products,Rajnandgaon,Chattisgarh	2010	150	1.5	500	0.3
4	Varalaxmi Starch Industries Ltd,Salem,Tamil Nadu	Under Implementation	1300	1.5	200	2.6
5	Gujarat Ambuja Exports Ltd,Uttarakhand	2010	500	1.5	200	1.0
6	Gujarat Ambuja Exports Ltd,Gujarat	2010	500	1.5	200	1.0
7	Santosh Starch Produccts Gujarat	Under Implementation	500	1.5	200	1.0

Sr.No.	PROJECT	Year of Installation	FLOW M^3/hr	H_2S In %	H_2S Out ppm	Equivalent MW
	Starch Sector					
8	Gujarat Ambuja Exports Ltd. Hubli, Karnataka	Under Implementation	1250	1.5	200	2.5
9	Honest Derivatives Pvt Ltd Dhule,Maharashtra	Under Implementation	500	1.5	200	1.0
10	Yashwant Energy Pvt Ltd, Sangli,Maharashtra	Under Implementation	500	1.5	200	1.0

Sr.No.	PROJECT	Year of Installation	FLOW M^3/hr	H_2S In %	H_2S Out ppm	Equivalent MW
	Sewage Treatment Plants(STP)					
1	Degremont India Ltd. For Delhi Jal Board ,Delhi. At Rithala	2002	840	1.0	1000	2.0
2	VA Tech Wabag Ltd. For Chennai Metro-Perungudi	2006	381	1.0	630	0.60
3	VA Tech Wabag Ltd. For Chennai Metro-Kodungaiyur	2007	521	1.0	630	1.0
4	V A Tech Wabag Ltd For Delhi Jal Board at Kondli ,New Delhi	Under Implementation	1100	1.0	500	2.0
5	Degremont India Ltd For Delhi Jal Board , at Okhla ,U.P.	Under Implementation	720	1.3	1000	1.8

Sr.No.	PROJECT	Year of Installation	FLOW M^3/hr	H_2S In %	H_2S Out ppm	Equivalent MW
	Sour Gas Cleaning					
1	MMS Steel & Power Pvt. Ltd Narimanan ,T.N.	2006	3333	0.08	10	10.0
2	MMS Steel & Power Pvt. Ltd Kovilkallapal, T.N.	2006	1666	0.08	10	5.00

Snap Shot of Bioskrubber™ H_2S removal plant



The Sanjivani(Takli) SSK,A'nagar,Maharashtra

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Project for a German Project Developer in Maharashtra

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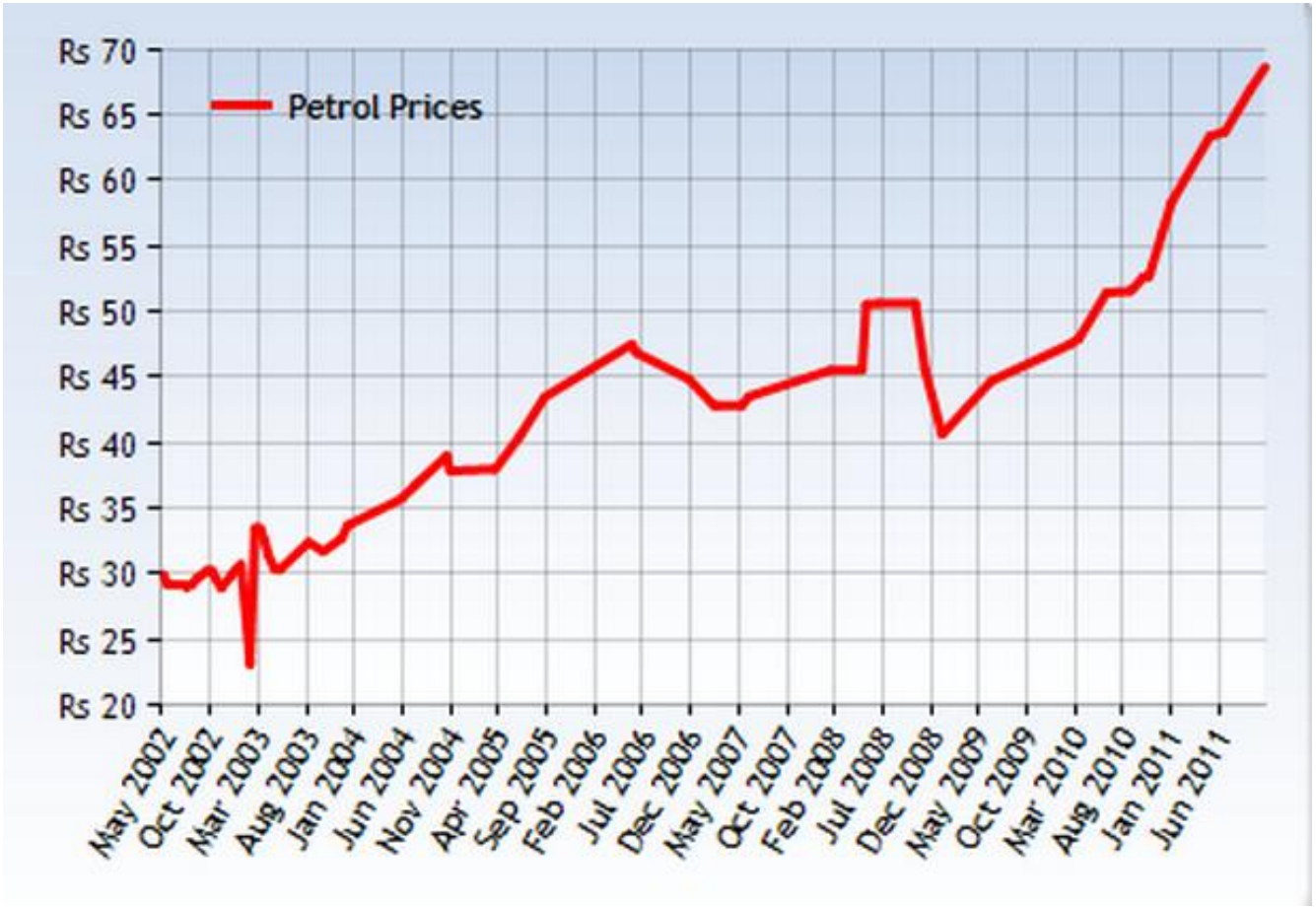
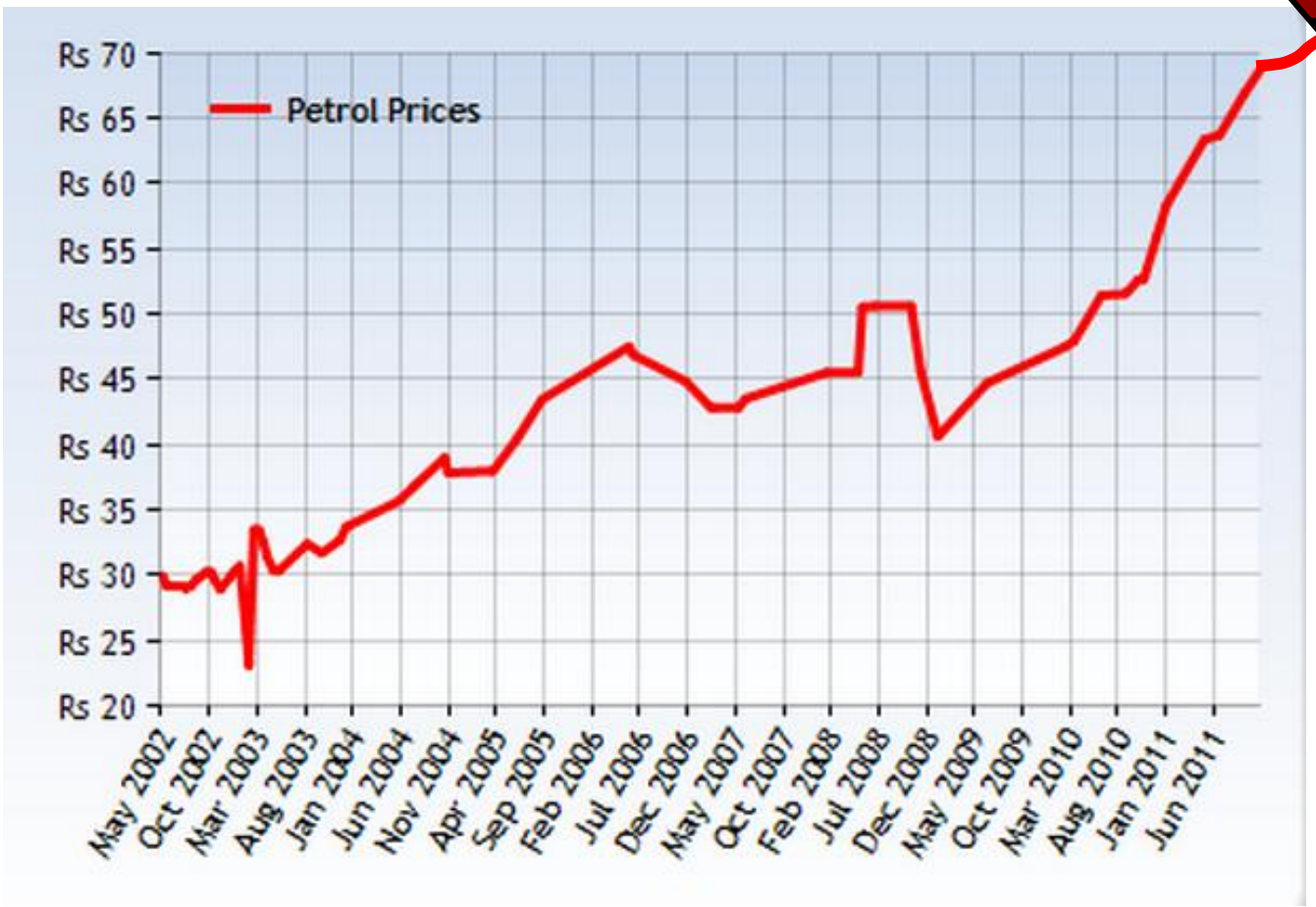
Petrol Prices: India 2002-2011



Source: http://www.mypetrolprice.com

Petrol Prices in the Future ?



THANK YOU

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