

Zero Waste

5R Concept

- Reduce** Generation of Waste At the Source
- Reuse** Glass Bottles & Electronic Products
- Recycle** Discarded Material
- Restore** Polluted Eco Systems & Public Healths
- Recover** - Maximize calorific Value from the Remainder that can not be either reused or Recycled



एक कदम स्वच्छता की ओर

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Bhakti Energy

Plasma Pyrolysis, Gasification, Biomethanation



Technology by IPR

1. About us

“Bhakti Energy” was established in 2006 by Mr. Alpesh Vora, a technocrat having expertise in biomass gasification. The business of the company is to produce energy from agro waste based on research and development in the area of biomass gasification, solid waste gasification and plasma pyrolysis. The company has successfully developed and commercialized variety of gasifiers ranging in size from as small as 5 KWe output to 5000 Kwe using not only agro based gasifier but lignite based gasifier too. It has extensive tie-ups in research and development, manufacturing and testing facilities for gasifier setups for demonstration and training. Bhakti Energy provides total solutions on various models for all Waste to Energy needs and also provide consultancy, technology know how solutions and other support as per requirement.

2. Vision

To be a leader in production of sustainable ecofriendly clean energy for society.

3. Mission

To generate clean electricity through various current and future clean energy technologies for treating MSW, Industrial hazardous or nonhazardous waste. Our short term goal is to produce 200 MW of such clean electricity by AD 2022.

4. Our Value Proposition

Current waste energy plants in India and elsewhere are either shut down or non-functional because of severe environmental or judicial activism as it produces hazardous / toxic gases such as Dioxins, Furans, PolyChlorinated Biphenyl, SOX and NOX gases. These pollute land and water through leachate when the solid waste residues are accumulated in landfills. To solve this problem, Bhakti Energy has entered into a technology transfer partnership with various technology partners to acquire technology for clean energy. One such partnership is with the Facilitation Center for Industrial Plasma Technologies (FCIPT) Gandhinagar, Gujarat by Institute for Plasma Research, (IPR). Bhakti Energy has scaled up this plasma pyrolysis technology to treat unsegregated mixed municipal waste for 150+ tpd. Similarly we are in the process of tying up with other technology partners to acquire, modify and develop Solid Oxide Fuel Cells and other similar future technologies.





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5. Scope of Work (Please refer page 8.)

As Per Planning Commission of India, India has potential of producing approximate 32980 tons of RDF each day which can support 88 power plants of 5 MW each in a foreseeable future of 5 – 7 years based on incineration, gasification or pyrolysis technologies. i.e. 440 MW of energy production from waste to energy technologies. This number can increase to 215 plants by 2031 and 556 power plants by 2050 generating 2780 MW of power. This increase is sustainable because humans will create waste forever. Bhakti Energy is targeting about 20 – 25% of this market.

6. Present Scenario of MSW (Please refer page 9.)

The municipal authorities are collecting and transporting wastes in three different streams (a) Domestic / Commercial wastes, (b) Street sweeping and Silting from drains, and (c) Construction and demolition wastes. Municipal waste is a valuable resource from which compostable, recyclable energy can be recovered. However, it is contaminated with pollutants which need to be arrested and neutralised. Thus, Municipal waste being of highly variable composition needs different technological treatments for achieving a sustainable solution for disposal without environmental degradation. Several technologies are under development across the world. A comprehensive pollution abatement system addresses this issue in three phases, Pre-Combustion, Combustion and Post Combustion phases. These phases together cover various processes such as segregation, odour treatment, in-house effluent treatment, control of emission of toxic gases, treatment of heavy metal discharges, and land filling of residues.

In the present scenario, it is observed that there is a severe health hazard and pollution in segregation work. Controlling leachate has been largely unsuccessful. Untreated hazardous gases are being released in the environment. Residue is piling up and large amounts of precious land is being consumed to hoard waste. Due to these problems, the Honourable Courts and National Green Tribunal have come down heavily on the Government, Municipal Bodies and the companies who have been awarded the W2E contracts but have failed to control the pollution.

7. Present Scenario of Industrial waste & other waste

Industrial waste comprises of chemical, solvents, pigments, sludge, metals, ash, paints, sandpaper, paper products, industrial by-products, and radioactive wastes. These may be toxic, hazardous, ignitable, reactive and corrosive. It could be recyclable or non-recyclable but may have high CV but treatment at source and/or in CETPs not effective. Govt. has now declared 'Zero Discharge Policy'. In absence of eco – friendly technology industries are paying huge money to dispose of waste 'somewhere else' and doing harm to the environmental resources and mankind. Now eco – friendly plasma pyrolysis technology is available to treat industrial waste completely without causing any environmental or public health damage and this is big opportunity.



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8. Plasma Pyrolysis: (Please refer page 10.)

Plasma is the fourth state of matter containing a significant number of electrically charged particles. A plasma arc torch increases the temperatures in the reactor gasification vessel to as high as 15000 – 20000 centigrade. The high temperature conditions in plasma gasification results in the decomposition of organic compounds (such as plastic, used tires, agriculture residue, medical waste) into their elemental constituents, forming a high-energy synthesis gas (Syn Gas) of CO and H₂. It Helps in cracking of Tar, PCB, Dioxins, Furans etc. to convert them in to syn gas. The inorganic compound (glass, metal oxides, silicates, and heavy metals) is melted and converted into a dense, inert, non-leaching vitrified slag. Therefore whereas the decomposition of organic waste produces synthesis gas which can be used for efficient production of electricity and / or heat, the inorganic waste decomposition produces slag which can be converted to vitrified block and grit for road construction.

9. Approximate RoI (Please refer page 6.)

Bhakti Energy's innovative technology and process of installation and commissioning is very economical as compared to the prevalent competition. Our Biomass Gasifiers cost about Rs. 55,000/- per KWe and Plasma Pyrolysis plant can cost from Rs. 2.0 lakh per KWe approx. Return on investment is within 4 years. In certain states incentives such as Viability Gap Funding, Tipping Fee for collecting waste, extra charges for electricity uploaded on Grid, etc. are available. With such incentives the RoI can be significantly better.

10. Future Business Scope

Government of India has now mandated Zero Discharge Policy. Hence all organisations and communities are now bound to treat all waste they produce at site or before final release into the environment. This creates a huge potential for treating all kinds of waste – Municipal, Hospital, Industrial, Agricultural.





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Bhakti Energy Team



Mr. Jitendra Vyas, Chairman. Retd. Senior Govt. official from the Forest Department understands how Government systems work. Has vast experience in administration, Govt. policy formulation and implementation, liaison, budgeting, and environmental matters. He is B.Sc. (Agriculture), GAU, Anand.



Mr. Alpesh Vora, CEO. Hails from a business family and has over 14 years area of Thermal energy, gasification and Waste to Energy business. He is BE (Chemical), Nirma University. Ahmedabad.



Mr. Ashutosh Vyas, CFO. Has over 10 years' experience in Management, Liaison, Production, Finance, Operations and Marketing in different businesses. He is MBA (Finance), IBMR. Ahmedabad.

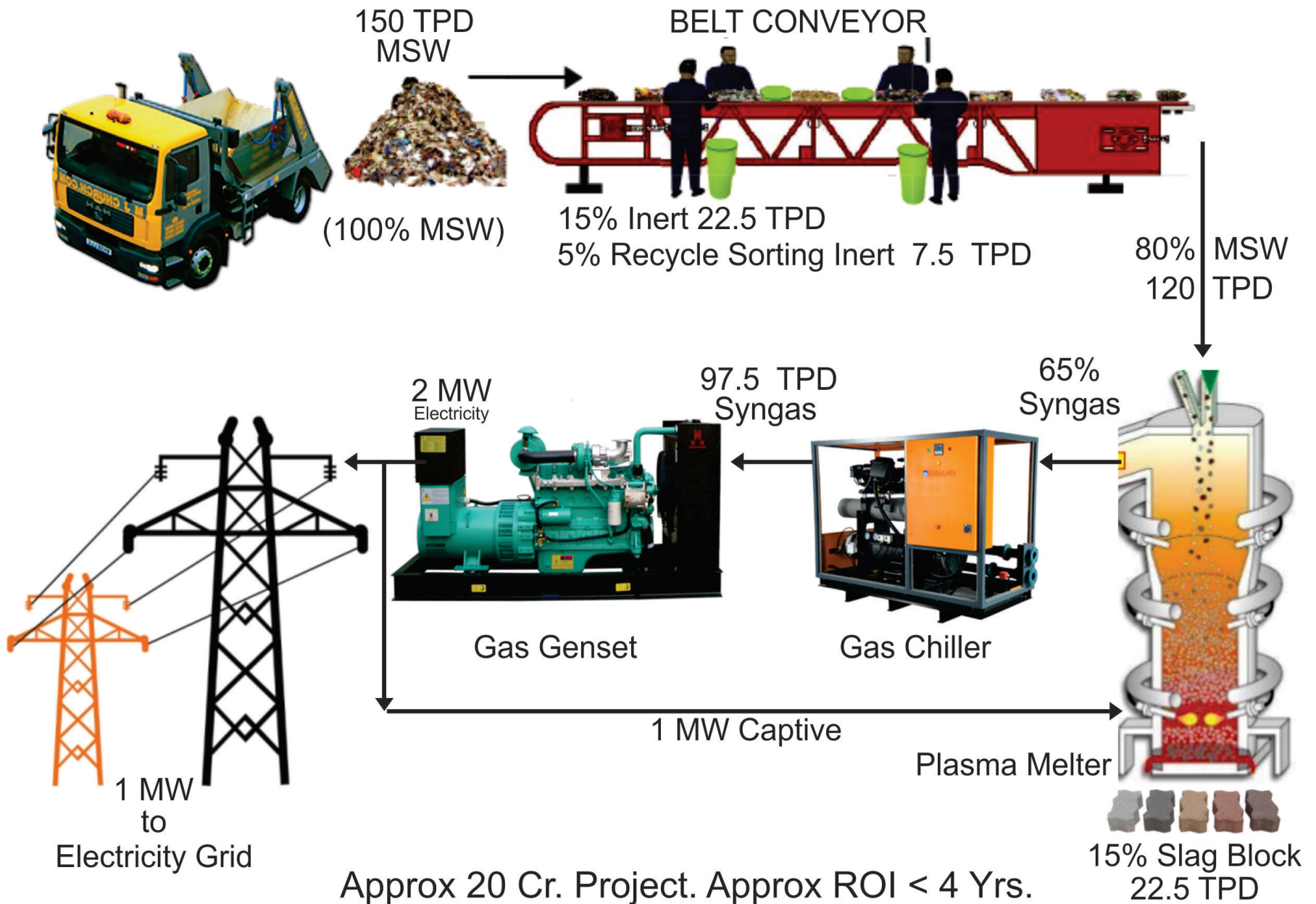


FEATURES OF A 150 TONNES PER DAY MSW PLASMA PYROLYSIS W₂E PLANT

Sr. No.	Description	Value
1.	AMOUNT OF WASTE RECEIVED (TONNES PER DAY - UNSEGREGATED)	150
2.	TOTAL WASTE PROCESSED PER DAY (TONNES PER DAY)	120
3	TOTAL GROSS ELECTRIC POWER GENERATED (MW _{el})	2.0
4	TOTAL NO. OF DAYS THAT WASTE WOULD BE RECEIVED PER YEAR	365
5	TOTAL NO. OF HOURS PER ANNUM OF ELECTRICITY GENERATION	7500
6	TOTAL NET SELLABLE POWER GENERATED PER ANNUM (MW _{el})	7500
6.	TOTAL SPACE REQUIRED (METER SQUARE/ACRES)	3000 - 4000 / 1.0
7	TOTAL RETURNS TO SUPPLIER (% OF WASTE RECEIVED – INCLUDING C & D WASTES)	<15
8	TOTAL TIME TAKEN TO IMPLEMENT THE PROJECT (MONTHS)	10-12**

***Subject to approvals and favorable climatic conditions*

WASTE TO ENERGY PLASMA PYROLYSIS SYSTEM



The industries that we cater to:

MSW

DISTILLERIES

HAZARDOUS WASTE



PHARMA

BIO-MEDICAL

AGRO WASTE

CHEMICAL WASTE

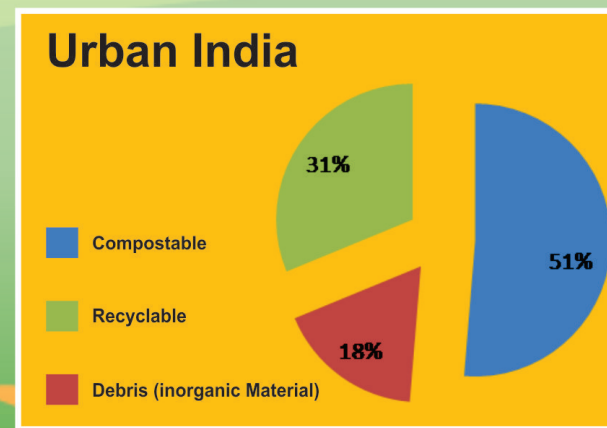
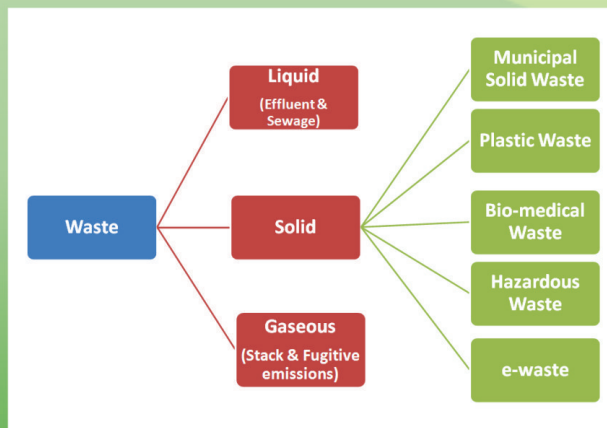
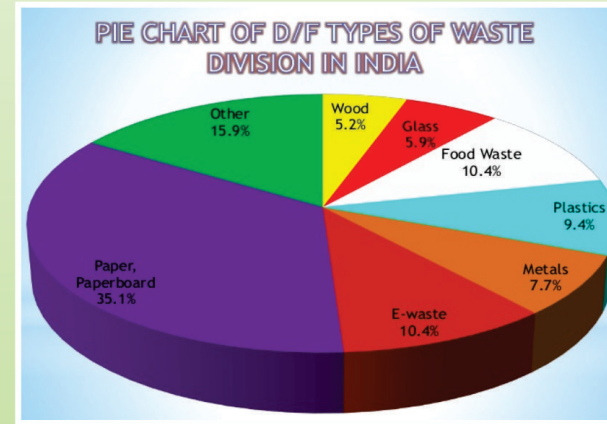
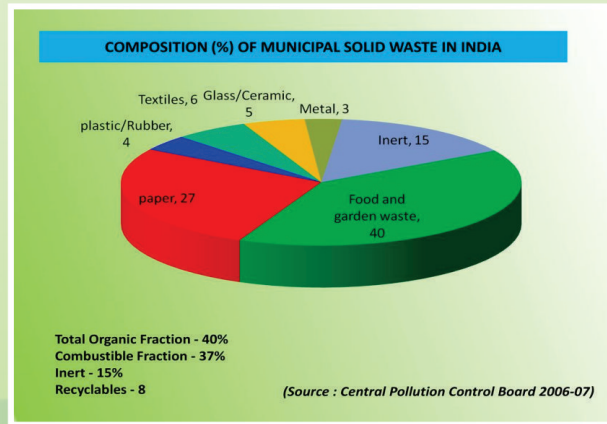


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WHY PLASMA PYROLYSIS IS SUITABLE FOR DISPOSAL OF ALL / MIXED SOLID WASTE

- ➔ NO OPEN DUMPING OF WASTE. HENCE NO SPREAD OF DISEASES, NO LEACHATE & AIR POLLUTION
- ➔ SEGREGATION REMOVES METALS, GLASS & INERTS
- ➔ NO OXIDATION/BURNING OF WASTE. THEREFORE NO AIR POLLUTION.
- ➔ SAFE DISPOSAL OF PLASTICS INCLUDING PVC.
- ➔ CLEAN GREEN HYDROGEN RICH GAS FROM WASTE FOR POWER PRODUCTION.
- ➔ LEAST AMOUNT OF SPACE REQUIRED FOR SYSTEM.
- ➔ COMPLIES WITH GOVERNMENT'S 'ZERO DISCHARGE POLICY.'
- ➔ ENVIRONMENTAL & SOCIAL SERVICES FOR CLIMATE CHANGE.





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12. Our Mentors

FCIPT- Indian Plasma Research team.

MR. Ketan Vavaiya, CEO, Plasma Induction, Gandhinagar.

Mr. Sajan Joseph, Center for Corporate Excellence, Ahmedabad.

Mr. Dipak Patel, M.Tech. (IITK,) Head (BI & Analytics,) BT Global Bus. Services

Mr. Bhavesh Dodiya, Partner, Himalaya Refrigeration.

Mr. Jaydev Patel, Kshitij Technology, Ahmedabad.

Mr. Mayank Patel, Arth Infosoft Pvt. Ltd., Ahmedabad.

Mr. Kamlesh Kapupara, Dow Chemicals, Chicago, USA.

Mrs. Archana Patel, Engineer, Water & Carbon Group, Australia.

Mrs. Priya Patel, Professor Environment, Nirma University

Mr. Jinesh Patel, Energy Distribution Engineering Services, Gandhinagar.

Mr. Nilesh Khunt, Movya Consultancy, Ahmedabad.

Mr. Amit Sonpal, Design Engineer, Shell, Bengaluru.

Mr. Murtuza Kapasi, Assistant Vice President, ARCIL.

Mr. Jaydeep Aghera, Elpie Engineers, Rajkot.

13. Our Achievements

We have successfully installed and commissioned gasifiers in Chattisgarh. Have also contributed to setting up specially customised plants for research purposes in eminent institutes such as CSMCRI, Bhavnagar and Nirma University, Ahmedabad.





A technology transfer agreement (on a non-exclusive basis) was signed between IPR and M/s Bhakti Energy, Rajkot for transfer of plasma pyrolysis technology for solid organic waste (non-biomedical) on 29th August, 2016 at IPR main campus. M/s Bhakti Energy, a Rajkot based firm engaged in manufacturing gasifiers has now plans to setup waste disposal and gasification systems utilizing plasma pyrolysis technology. The picture shows the exchange of the technology transfer agreement between Mr. A. Varadarajulu, Chairman - SPC, representing IPR and Mr. Alpesh Vora, Proprietor - Bhakti Energy being exchanged in the presence of Dr. S. Chaturvedi, Director, IPR.