



BIOMASS

ENERGY GENERATOR

WORLD'S TOP BIOFUEL CROPS

FOOD WASTE

WOOD SCRAPS

SOY

PALM OIL

SUGAR CANE

RICE STOCK



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BIOMASS & BIOFUEL



Biomass is the only renewable energy source that can be converted into liquid biofuel such as **ethanol** and **biodiesel**.

Ethanol is made by fermenting biomass rich in carbohydrates, such as sugar cane, wheat, or corn.

Biodiesel is made from combining ethanol with animal fat, recycled cooking fat, or vegetable oil.

Biofuel does not operate as efficiently as gasoline. However, biofuel can be blended with gasoline to efficiently power vehicles and machinery. In many countries biofuel is considered now as a sufficient source of renewable and clean energy.

The advantage is that biofuel doesn't release emissions associated with fossil fuels.

For example, ethanol has become a popular substitute for wood in residential fire places. When it is burned, it gives off heat in the form of flames, and water vapor instead of smoke which is one of the well-known air pollutants.

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BIOFUEL – FOR BETTER LIFE

BIOFUEL energy involves efficiently extracting considerable quantities of clean, low-emission electricity from waste.

Different scale connections of the grids can be designed for the reliable delivery of electricity to households and businesses.

CNG can be produced for vehicle fuel.

INNOVATIVE APPROACH

Our Company offers unique small and middle-scale stations which operate on verified and patented technology involving the biodegradation of organic waste (biomass) material and its conversion into biogas. [info.](#)

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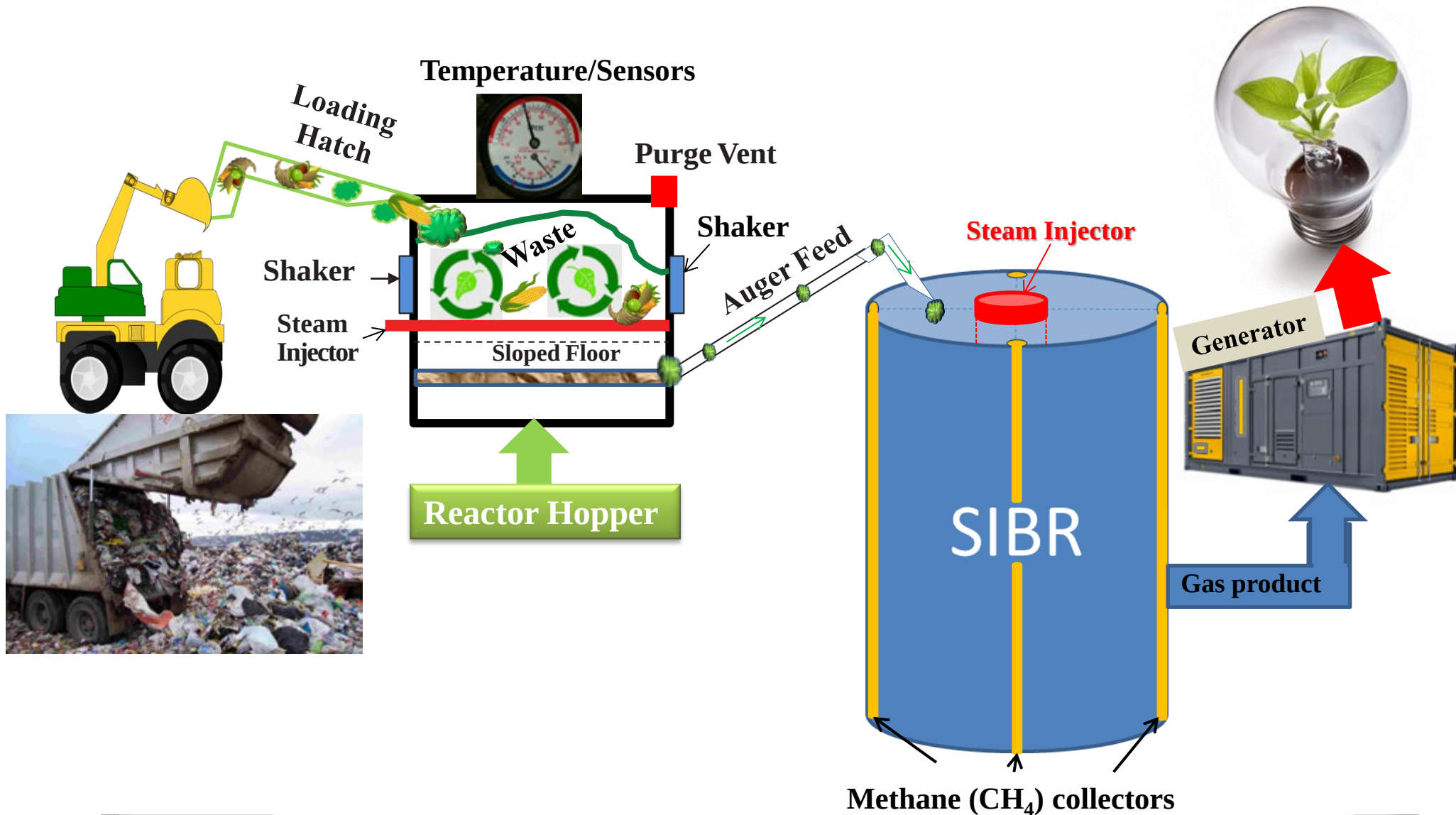
STEAM INJECTED BIOMASS REACTOR (SIBR): HOW DOES IT WORK

BASIC CONCEPT : Steam Injected Biomass Reactors (SIBR) involving leachate re-circulation increases humidity of the landfill and accelerates production of **methane gas (CH₄)** as much as seven to ten times more in a shorter time-frame than normal Municipal Waste (**MW**) landfills with no leachate re-circulation.

Our innovative approach: Our Company developed and patented a process that mimics the conditions of a landfill inside a reactor chamber.

A pilot study performed at the Miramar Landfill in San Diego, CA proved this concept. This experimental test suggests that with rising humidity of landfill to 100%, the maximum amount of methane gas is produced based on the amount of organic matter available.

SIMPLIFIED SCHEMATICS OF THE STEAM INJECTED BIOMASS REACTOR TECHNOLOGY



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PROTOTYPE – needs to be seen



Our company has created a Digestion Rate Test (DRT) experimental station at a Universal Waste Services site in Perris, CA.

The purpose of the DRT is to determine the digestion rate of various feedstocks when steam was injected into it.

OUR SIBR method versus TRADITIONAL (Wet Digester)

STEAM INJECTED BIOMASS REACTOR (SIBR)

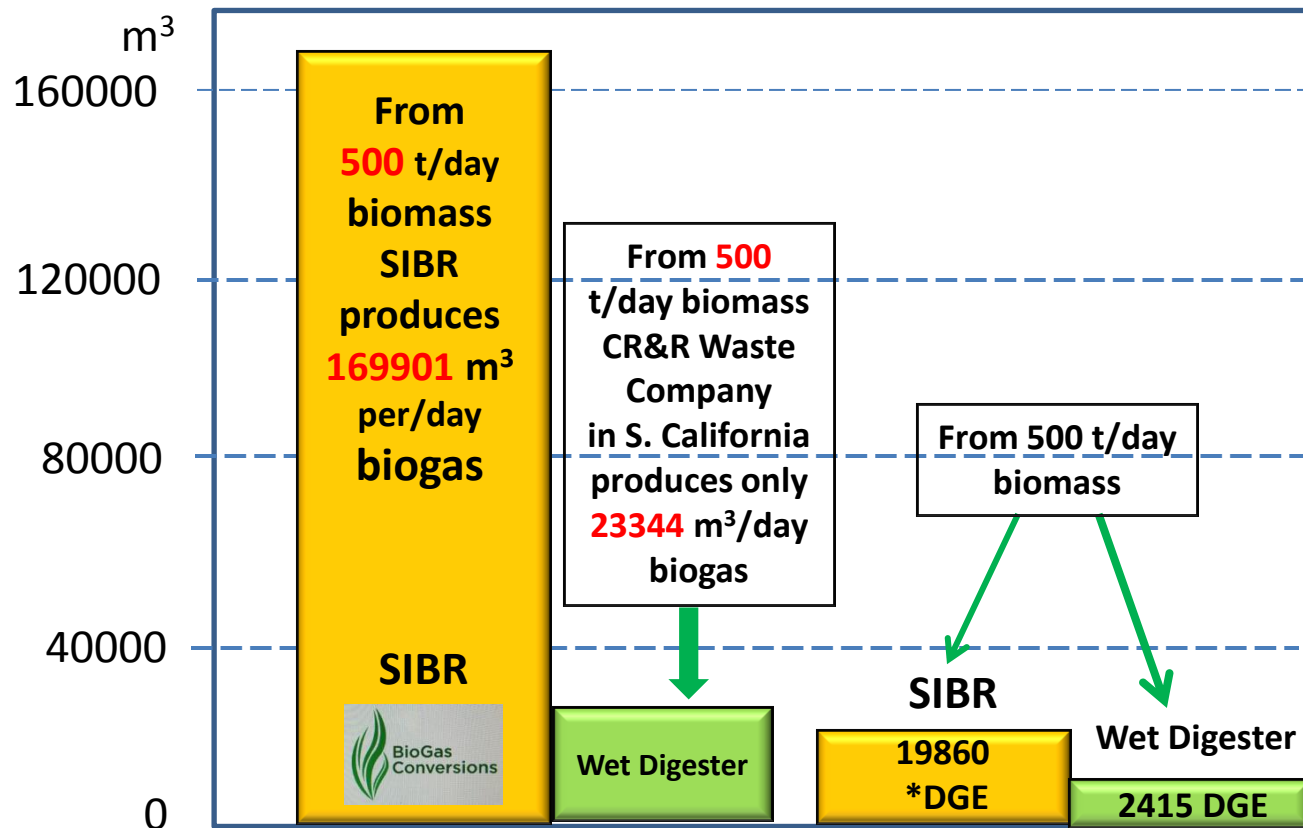
- 100% organic material is digested
- 12,000 cubic feet of biogas/ton
- 56 gallons of water/steam/ton used
- All of the water/steam is used
- No wastewater
- Conversion in minutes
- Continuous operation
- <1% biogas for steam
- Bottom discharge of dirt
- Cow Antibiotics will not harm SIBR
- Rate of digestion controlled by steam
- Can digest green waste
- Add little Ferric Chloride to treat H₂S
- Smaller cheaper tanks
- 500 ton steam reactor = \$2.5 million

WET DIGESTER

- Only 30% organic material is digested
- 3,000-4,000 cubic feet of biogas/ton
- 2,000 gallons of water/ton used
- With 1mil. gals. water only 10,000 is used
- 990,000 gals. of wastewater/500 tons org.
- Conversion 21 day cycle
- Stop to change water & remove digestate
- >26% biogas to warm water
- Tank must be excavated to remove dirt
- Cow Antibiotics will kill wet digester
- No control over rate of digestion
- Cannot digest green waste
- Need thousands of gals. Ferric Chloride
- Very large costly tanks
- 500 ton wet digester = \$25 million

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EXAMPLES of COST EFFECTIVENESS: SIBR vs. WET DIGESTER



*DGE – Diesel Gallon Equivalent

**Only 2% Of The Waste Converted Per Hour Will
Produce 6,000,000 Cubic Feet Of Biogas Per Day**



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COMPARITIVE SIBR vs. WET DIGESTER

It would take 6 - 1.2 million gal. wet tanks to digest 500 tons / day.
Only 7 Percent Solids



It would take 1 – 1,000 ton tank and 2 hopper tanks to digest 500 t / day.
100% Percent Solids



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Our technology will make a Landfill operate as a bioreactor

ADVANTAGES:

- 1. It increases opportunity of waste to energy transformation even on small landfills.**
- 2. Can produce 27 times more LFG than natural processes.**
- 3. Recovers airspace allows 10x more waste**
- 4. Provides sustainability.**

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CONVERSION TABLE FOR POWER AND CNG

Power is based on the heat rate of 9700 Btu/Kwhr and 60% methane. CNG is based on 60% methane and 40% CO2. Gas scrubbing and compression is based on 80% efficiency.

Power/Mw/hr	Cubic Feet CH4	BTU/Day	Tons/Day	LFG/scfm	Gallons DGE 145cf/Gal.	Gallons GGE 120cf/Gal.	Trucks/Day 60gal/Truck
0.5	122,400	122,400,000	17	142	675	816	11
1.0	244,800	244,800,000	34	283	1,350	1,632	22
1.5	367,200	367,200,000	51	425	2,026	2,448	34
2.0	489,600	489,600,000	68	567	2,700	3,264	45
2.5	612,000	612,000,000	85 1	708	3,376	4,080	56
3.0	720,000	720,000,000	100	833	3,973	4,800	66
3.5	842,400	842,400,000	117	975	4,648	5,616	78
4.0	964,800	964,800,000	134	1,117	5,322	6,432	89
5.0	1,180,800	1,180,800,000	164 2	1,367	6,514	7,872	109
6.0	1,404,000	1,404,000,000	195	1,625	7,746	9,360	129
7.0	1,656,000	1,656,000,000	227	1,892	9,137	11,040	152
8.0	1,872,000	1,872,000,000	260	2,167	10,328	12,480	172
8.5	1,980,000	1,980,000,000	275 3	2,292	10,924	13,200	182
9.0	2,088,000	2,088,000,000	290	2,417	11,520	13,920	192
10.0	2,304,000	2,304,000,000	320	2,667	12,712	15,360	212
11.0	2,548,800	2,548,800,000	354 4	2,950	14,062	16,992	234
12.0	2,793,600	2,793,600,000	388	3,233	15,413	18,624	257
13.0	3,038,400	3,038,400,000	422	3,517	16,764	20,256	279
14.0	3,240,000	3,240,000,000	450 5	3,750	17,876	21,600	298
15.0	3,484,800	3,484,800,000	484	4,033	19,226	23,232	320
17.0	4,000,000	4,000,000,000	554	4,618	22,069	26,666	368

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