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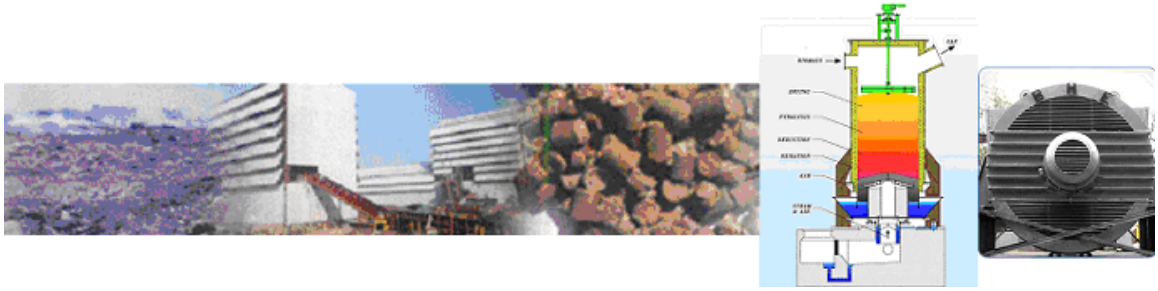

Proposal

For

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Municipal Solid Waste (MSW) Conversion to Briquette (1300 MSW Tons per Day)

Gasification

&

35 MW Power Plant

CHAMCO, Inc.

The MSW / Electricity process is done in three stages:

(1)
Sorting, drying, mixing, crushing, extruding MSW,
to make Briquette

(2)
Gasification
Thermal cracking of fuel (briquettes) at a high temperature of 1100 deg. C in the minimal presence of Oxygen
to produce Synthesis Gas or Syn-Gas

(3)
Electric Generation
Injecting SynGas directly into gas engine generator,
which has been modified exclusively by CHAMCO
to work with syngas to produce Electricity

Introduction:

Production of the electricity from Municipal Solid Waste (MSW) is an environmental project and most profitable one in a long run. More expensive than gas and coal power plant, but due to the negative cost of fuel, return of investment is much lower.

The City of ……..., …….. with a population of 2.7 millions, produces more than 2000 Tons of MSW per day which, from 1300 Tons of that per day could produce 35 MW electricity.

For financing purposes, we suggest to start with 35 Tons of MSW per day to generate one MW first.

The one MW pilot plant will help financing the second phase of the project.

Second phase of the project is to convert all available MSW into Briquette and while selling the Briquettes as coal-substitute to the coal power plants and other industries to finance the 35 MW gasification and power plant.

Possible phases of the Project:
Phase I, 1 MW plant.
Phase II, 2000 Tons of MSW/Briquette Plant
Phase III, Gasification & 35 MW Power Plant

Reason for this plan is to use 1 MW plant as a showcase and collateral to obtain financing for Briquette making & 35 MW plant.

This plan could continue for even 50 and 100 MW projects.

Project Cost for Phase III:

The total cost of the Sorting and Briquette making facilities, Gasification and Power Plants including; survey, feasibility study and planning, engineering, procurement, contracting, test, commission and training for 35 MW out put, **Turnkey,** is approximately $175,000,000 (one hundred seventy five million US Dollars)

That is $5,000,000 (five million USD) per Mega Watt.

Project Income:

A – "Power Purchase Agreement" (PPA) for electricity, which the national grid pays to the owner of the plant. For calculation purposes we will use 17 cents per kilowatt hour (KWH).
Assume that the PPA for 35 MW of electrical power generation at a fixed price is $0.17 per KWH.
Sale of electricity =
35 MW (net power generation) x 1000 x 24 (hours) x 365 (days) x $0.17 x 0.85(Efficiency Factor) = $44,303,700 gross income from power generation annually.

B - Tipping Fee: Municipalities pay the plant operators/owners a tipping fee for each Ton that they receive and handle per day. The average tipping fee is around $20 / T:
Tipping Fee = 2000 (T/D) x $20 (per Ton) x 365 Days = $14,600,000 Annually.

C - **Operation & Labor Cost**. For this project of 35 MW power plants and RDF plant, a work force of about 20 technical and 80 non-technical workers are estimated.
Assuming $80,000 per technical and $40,000 per non-technical works, the approximate labor costs will be: 20 x $80,000 + 80 x $40,000 = $4,800,000

D – Spare and Maintenance approximately $2,000,000 per year.

Summary:

- Assume 6 years Return On Investment (ROI)
- Cost of facilities $175,000,000
- Income from PPA $44,303,700
- Income from tipping fee $0.0 Special case in ……..
- Labor costs $4,800,000
- Maintenance costs $2,000,000

- ROI=175,000,000/(44,303,700+0–4,800,000–2,000,000) ~ 5 years

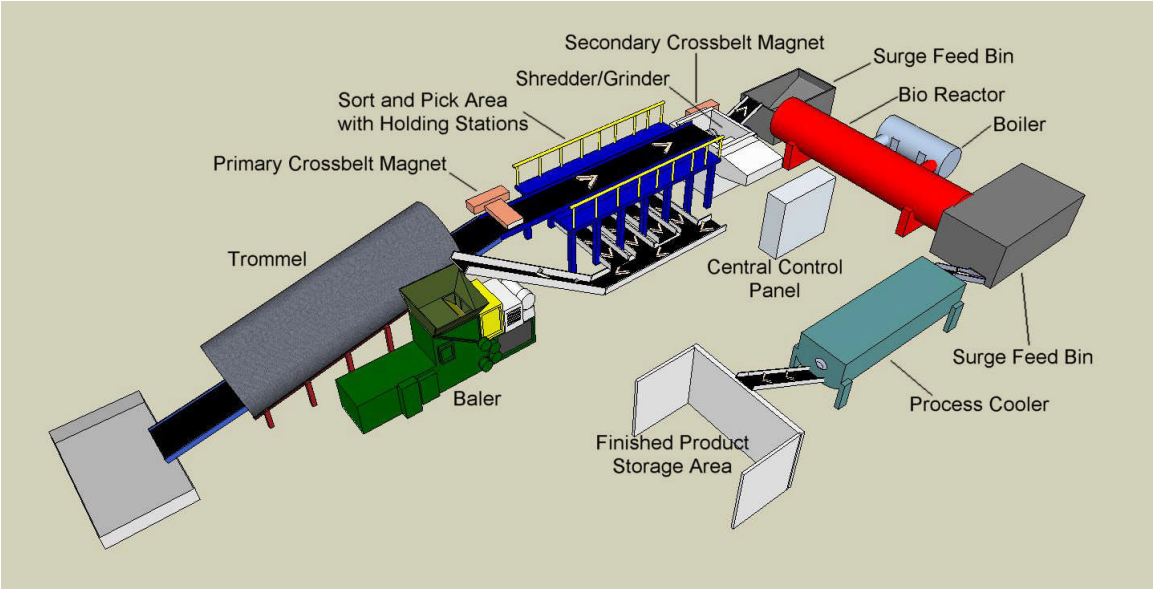
  Return of investment in coal power plant is around 20 years.

Municipal Solid Waste Conversion to RDF

CHAMCO, Inc.

The Municipal Solid Wastes (MSW) should be sorted first into recyclable and combustible components.

This is a simple and very typical, sorting facility and Briquette making plant. The Bioreactor is used if composting or making fertilizer.



Depending on the conditions of the MSW, if the moisture is high, it should be dried. The combustible component of the MSW is turned into RDF (Refused Derived Fuel) pellet by shredding, crushing, electromagnetic separations.

Furthermore if chemicals are needed to be added in the process for specific conditions, then the unit is modified accordingly.

Pictures of few types of equipment are shown here:

The final product is shown here. This has a caloric value of 3,000 Calories per Kg, which is the fuel for Gasification unit:

In a coal gasification our coal gasifier consumes 418 Kg coal with 6000 Kcal/Kg caloric value to produce 1 MWH.

Therefore:
1 MW coal gasification power plant requires 10 Tons of coal / day.

Since the caloric value of MSW Briquettes is about 3000 Kcal/Kg, therefore:
1 MW MSW gasification power plant needs about 20 Tons of MSW Briquettes / day.

We assume this 20 Tons of briquettes will be derived from around 30 or 35 Tons of MSW in the proposed site at ……..

Gasification

CHAMCO, Inc.

Gasification is a flexible, reliable, and clean energy technology that can turn a variety of low-value feedstock's into high-value products and can provide a clean alternative source of base load electricity.

Gasification has been reliably used on a commercial scale worldwide for more than 50 years in the refining, fertilizer, and chemical industries, and for more than 35 years in the electric power industry.

GASIFIERS- (Pyrolyzers) are receiving backing & subsidies from various Governments the world over. They utilize any type of biomass including MSW, coal, waste wood, sawdust, furniture scraps, bagasse, rice husk, coconut shells, poultry litter, plastic, rubber, tires, or any other combustible material.

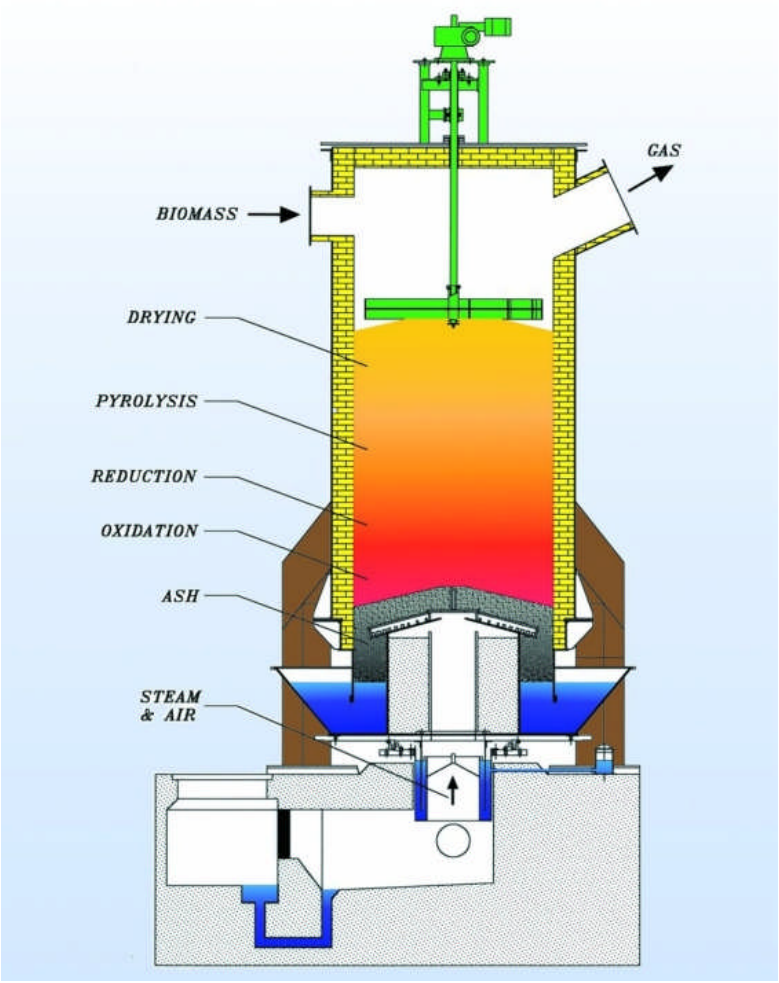
In the updraft gasifier, moist biomass fuel is fed at the top and descends though gases rising through the reactor. In the upper zone a **drying** process occurs, below which **pyrolysis** is taking place. Following this, the material passes through a reduction zone (gasification) and in the zone above the grate an **oxidation** process is carried out (combustion).

Syn-Gas has the following composition:
CO- 40%, H2- 30%, CH4- 11%, CO2-6 to 8%, N2-8 to 10% , which has Caloric value of 1800 Kilo Calories /cubic meter.
The Caloric value of Natural Gas is more than twice of Syn-Gas.

1 MW Gasification Unit

CHAMCO 1 MW Gasification under Construction

Gasification Operation:



To supply air for the combustion process and steam for the gasification process, moist hot air is supplied at the bottom of the reactor. Combustible gas at a low temperature (because of the evaporation of moisture in the **drying** zone) is discharged at the top of the reactor, and inert ash from the heat-generating combustion process is extracted from the reactor bottom through a water lock.

Certificate for the SynGas produced by CHAMCO gasification

CHEM-BAC *Laboratories, Inc.*

P.O. BOX 19198 CHARLOTTE, N.C. 28219
TEL: 704-394-6381 • FAX: 704-394-6382

Certificate of Analysis

Client: Tucker Engineering Associates
PO Box 326
Locust, N.C. 28097
Attn: Richard Tucker/Jerry Tucker

Client Number: 3564
Work Order: 2051-10
Sample Date: 08-31-10
Report Date: 09-03-10

Heat of Combustion of Gas Samples

Sample ID
1) Cylinder A
2) Cylinder B

Cylinder A

Gas Components	% of Total Combustibles	% of Combustibles
C_1 Alkane	42.1 %	34.1 %
C_2 Alkane	12.8 %	10.4 %
C_3-C_5 Alkanes & Alkenes	1.9 %	1.5 %
C_6-C_8 Alkanes & Alkenes	1.0 %	.8 %
C_5 Cycloalkenes	.6 %	.5 %
Benzene	.7 %	.5 %
Toluene	.1 %	.1 %
Xylene	.2 %	.2 %
Styrene	0 %	0 %
Hydrogen	1.2 %	1.0 %
Carbon Monoxide	39.4 %	31.9 %

BTU/# of the gas submitted with inerts is 13,155 BTU/#.
BTU/ft³ of the gas submitted with inerts is 766 BTU/ft³.

Cylinder B

Gas Components	
Nitrogen	4.1 %
Carbon Dioxide	14.9 %
Oxygen	<.10 %
Mercaptans	< 10 ppm
Total Sulfur (SO_2)	< 10 ppm
Hydrogen Sulfide	< 10 ppm
Mercury	<.010 ppm

Analytical Methods: Gas chromatography FID, TCD; Atomic Absorption, Colorimetric

Respectfully Submitted,
Chem-Bac Laboratories, Inc.
James T. Ward
Supervising Chemist

Electric Generation

CHAMCO, Inc.

Ultra clean gas is fed into the engines with the help of a microprocessor based, oil to gas conversion system. When a load is activated the dual-fuel mode of operation of the engine will start automatically at 85% gas and 15% furnace oil, for a short duration then reverts back to 100% gas mode when the load becomes constant.

The exhaust emissions of the engine can be used for a Waste Heat Recovery Boiler. 800 Kg Steam at 7kg. Pressure per hr. can be obtained. This excess heat can be put to use for other thermal applications.

This is our unique know-how!

We modify the natural gas engines to run with low calorie syngas.

This, not only uses nearly 100% energy of the syngas, but also avoid any loses due to boiler and steam loses. Furthermore, it eliminates many of the units such as boiler and steam turbine and consequently lower cost of the project and operation.

Due to low Caloric value of syngas, we install 6 sets of 3.5 MW Caterpillar gas engine generators (3512 Series) to have an output of 15 MW.

Five percent of the energy is feed back to the system, which could be compensated by Solar Power to have a constant 15 MW output.

A note: Power Generation:

The ultra-clean Syn-gas from the Gasification System is injected through a Gas & Air control valve, directly into the Natural Gas Generating set, exclusively modified by us for Syn-Gas mode of operation. The exhaust gases from the Engine are monitored by an On-line gas analyzer for emission of unburnt CH4, CO, & H2. This is connected to a 4-20 Milliampere PLC along with the Gas control valve to adjust automatically the Syn-gas to air ratio.

Synchronization Panel:
The Generating set is connected to the Synchronization Panel equipped with various features viz.:

1. Operation of Generating set possible in Island mode.
2. If Multiple Generators are installed, it parallels all Generators as also their supply to National Grid.
3. If there is shut down of the grid, then the Gen-set does not get affected.
4. If the Gen-set is shut down, then there is no effect on the grid.
5. Reverse Power Shut down for the Generating Set
6. Overdraw shut down for the Generating set.

Step-up Transformer or Electric Substation: It steps up the voltage of the generating sets to be equal to the Distribution network voltage of either 33KV or 66KV or higher KV, as the case may be.
Thereafter the Power will be evacuated to be fed to the Power house of Distribution network.