SOCIAL/ENVIRONMENTAL, FOOD-

SOCIAL/ENVIRONMENTAL, FOOD AND DEVELOPMENT

SOCIAL/ENVIRONMENTAL, FOOD AND DEVELOPMENT FAST **AGROVISION's WB2E SOLUTIONS (MORE REGIONAL CONSULTINGS AND/OR METALLURGIC PARTNERS AND/OR INVESTORS -** The new and revolutionary VOLCANO II CFB fast gasifier by AGROVISION BRAZIL)

TECHNOLOGY 100% BRAZIL

It generates up to 2.5 MW with only 1 ton of any type and even high moisture or Low Calorific Power of urban waste, biomass, animal and human faeces, food leftovers and industrial and processors residues

AGROVISION

HOW TO WIN AND TO MAKE A LOT PROFITS AND RESOLVE THE GREAT ENVIRONMENTAL, SOCIAL AND ENERGY CHALLENGES OF THE WORLD?

Urban waste and food leftovers

Urban and rural sewage

Faeces and urine of confined animals

Destruction of flora, fauna and biota

Fast soil degradation and desertification

Contamination of air and surface water and groundwater

Chemical debris, plastic wastes and rubbers residues (up to 500 years to decompose)

Degradations by oil derivatives more ore, coal and natural gas productions

Growing migration peoples to cities and abandonment of the countryside

Competition in areas for grain and food by ethanol and biodiesel

No REAL prioritization of Socio-Environmental causes

Non-compliance with signed agreements

THE NEW AND REVOLUTIONARY VOLCANO II AGROVISION BRAZIL GASIFIER: "HIGHLIGHTS AND ECONOMICS"

1) In northern European countries there are 8 large companies that already manufacture larger CFB gasifier for their own use (and / or for sales) but they are very expensive (some also for urban waste) and already with high scale per plant (up to 72 tons / hour) and high average productivity (generation of up to 3.0 MWh / 01 ton urban waste and / or biomass). However, most are only for manufacturing synthetic fuels with biomasses and waste, but some already generate electricity only via the Rankine Cycle (very expensive and water dependent) or by the combustion of the Syngas (Otto cycle engines). As examples, we have Lurgi, ECN-Bivkin / Milena, Foster Weller; Fraunhofer; CUTEC, UHDE, EQTEC, OUTOTEC and others. In the USA we already have the Westinghouse and in Japan the Mitsubishi.

2) Our AGROVISION BRAZIL VOLCANO II CFB (circulating fluidized bed) Gasifier can be considered as a technical, operational and economical advance in the old designs. Also the complete design for our VOLCANO II is ready (with the help of the "inventor" application) and it has been carried out by an environmental engineering and small metallurgical company of the city of São Paulo (Brazil).

3) VOLCANO II processes urban and rural waste plus animal feces and sewage with up to 80% humidity more forest and other biomasses plus industrial debris and food leftovers.

4) VOLCANO II also processes litter even though it is poor and with LCP (Low Calorific Power) above 600 kcal / kg because it can be enriched in several ways.

5) VOLCANO II does not heat water directly or indirectly (burning) as old systems for the production of recoverable steam and that will drive the turbine generating electricity. In addition to no viscosity, the thermal water range is very low and only 100 points (fluctuation between 0º C to 100º C), besides Rankine cycle being a very fast operation.

6) Our VOLCANO II Gasifier reheats slowly, circulating and internally large volumes of thermal fluid (also reheated by the Syngas firing). Modern thermal fluids are widely used in new and giant heliothermic solar plants (up to 450º C), where they allow an additional generator of up to 15 hours and up to 100 steam / water / steam cycles, as it is very viscous (like lava from a volcano) and it has a very high possible thermal range and up to 537º C (fluctuation between 13º C to 550º C). After being stocked and circulating in at least big 4 underground thermal tanks (in very special steel plus concrete casing), the thermal fluid will then exchange heat for several hours in the special "heat transfer" with the warm water coming from the turbines producing a lot of circulating steam (Rankine cycle). Thus, there is no burning of the syngas in expensive, noisy, very heavy and environmentally troublesome Otto cycle engines or diesel cycle. Also, we are researching to manufacture a new modified Stirling Engine - driven only by cold and natural air picked up and pressed - capable of generating at least 500 KW in each cylinder (total 2.0 to 5.0 MW per engine). In the USA there is a manufacturer that developed for NASA and then patented and now offers a large engine Stirling – still very expensive - but capable of generating 2.5 MWh only by compressing natural air or helium gas (recoverable) on each machine.

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7) The syngas produced by VOLCANO II contain 40-46% hydrogen and only about 8% methane. These volumes are exactly the opposite of biogas (widely used in Europe), but whose production in Brazil is considered to be very slow (up to 40 days), dangerous and environmentally incorrect.

8) After production the Syngas is cooled and filtered (obligatory step in Brazil), which eliminates all gases and chemicals harmful to air, soil and water.

9) Each VOLCANO II plant can process between 1 ton to 10 tons/hour of waste or other dirty raw materials per hour. Thus, each unit can serve population between 40 thousand inhabitants (01 ton./hour) to 400 thousand inhabitants (10 ton./hour). Every 01 ton of dirty raw material will have its moisture reduced to the required standard (18%) and also increased its minimum temperature (53o C), both to increase the productive efficiencies of Syngas over thermal fluids.

10) The total manufacturing cost of each VOLCANO II unit by AGROVISION BRAZIL is only US $ 1.5 – US$ 2.5 million per ton of waste, biomass, waste or to be processed.

11) The final The final price for sale per 01 ton of waste to be processed will depend on the location and taxes to be paid. **However, in all cases, the final price should be at least half of the international competitors and still it has performed well above them.**

12) Considering a purchase value of a small VOLCANO II unit by one small municipality to process only 1 ton of garbage per hour (22 tons per day from 40,000 inhabitants) by US $ 4.0 million, our simulations indicate that the total value of Investing in the plant (including area, sheds, vehicles, electric distribution station etc.) would be around US $ 5.0 million. In this minimum project there would be a generation of 2.6 MWh, which would allow initial annual net revenue of US $ 1.0 million / plant (already discounted all costs and taxes, except payment for investors or financing). The net pay back would be 54 months and the Return on Investment index (ROI) of 17.4% per year. In Brazil a plant of this nature can operate for 30 to 40 years, provided that with "up grade" each 05 years.

13) Likewise, a large plant to process 10 tons of waste per hour by one medium municipality (220 tons a day from 400 thousand inhabitants) for the approximate value of US $ 32.0 million, our simulations indicate that the total amount to be invested in the plant (Including area, sheds, vehicles, electric distribution station etc.) would be around only US $ 35.0 million. In this minimum project there would be a generation of 25 MWh, which would allow an initial annual net revenue of US $ 10.0 million / plant (already discounted all costs and taxes, except payment for investors or financing). The net pay back would be only 40 months and the Return on Investment Index (ROI) of 23.9% per year. In Brazil a plant of this nature can operate for 30 to 40 years, provided that with "up grade" every 5 years.

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14) Only Brazil has about 5,000 municipalities looking for such cheap and high-yielding VOLCANO II plants, since a strict Environmental Law of 2010 prevents the burning and incineration of urban waste and makes it difficult the maximum to waste disposition in neighbor Landfills even with good engineering projects (with many heavy and recurrent environmental fines). So, many old landfills are being closed and abandoned. Also, we have about 100 thousand industries (from the 400,000 total) looking for own systems to generate electricity and heating / cooling themselves with their waste or bought from neighboring companies more than junk from neighboring cities (all to replace our expensive electric energy from national hydroelectric plants plus domestic natural gas or coming from Bolivia).

15) In the future, the Volcano II, in a maximized version, will also be part of the complete hybrid system (plus solar heating captured in PTC - Parabolic Through Collector with thermal fluid too) of medium and large size (also already patented by the master researcher and CEO of AGROVISION) to produce own electricity, heating or cooling from timber, cellulose, biodiesel, sugar-cane, grains processors and other rural industries (including meats, dairy products, vegetables and legumes processors) more from biomass and other industries, including the processing of pasty faeces from animal and human plus industrial more own waste and debris and from neighbors.

16) Also in the future, the Volcano II, in a minimized version, is also part of a complete hybrid system (plus solar thermal capture in PTC too) of mini and small (also patent required) to produce electricity, heating or cooling, own by residences, condominiums, buildings, hospitals, prisons, airports, shopping - including office and food courts waste - and other buildings, including processing human feces plus biomass plus food leftovers more pruning of trees and gardens plus waste itself or neighbors.

17) In the United States there are 3 companies that already gasefy waste and biomasses (gardens & trees) in neighboring containers, but with low results for external sale and still burning the syngas produced in Otto type engines to generate electricity (environmentally and economically undesirable situation). Also, they do not add collector equipments of solar heating (as our modern PTC) for own and additional electrical generation nor do they continuously reheat thermal fluids or molten salt from them (via modern and cheap heat transfer) to produce a lot of circulating and recoverable steam to generate much more electricity (cycle Rankine), above all, for external sales during times of higher demand or higher prices, as in VOLCANO II.

"THE NEW AND REVOLUTIONARY VOLCANO II GASIFIER COMPLETE SYSTEM (PATENTED IN BRAZIL) INCLUDING CHAMBER AND SERPENTINE TO FAST PROCESS OF MEDIUM TO LARGE VOLUMES OF BIOMASS MORE URBAN WASTE PLUS ANIMAL DEJECTS AND OTHER DEBRIS, PRE-DEHYDRATED AND PRE-HEATED, PRODUCING MUCH MORE SYNGAS PLUS REHEATING CIRCULATING THERMAL FLUIDS, ALL TO OBTAIN LARGE VOLUMES OF VERY HOT POWER RANKINE STEAM MORE UP TO 24 HOURS STORAGE FOR INDUSTRIAL USE OR ADDITIONAL ELECTRICITY GENERATION IN HIGH DEMANDS HOURS"

Disposal, deodorize, metal catch more crushing

THE VOLCANO II FCB GASIFIER (FLUIDIZED AND CIRCULATING BED) with chamber and serpentine for slow and circulating high volumes of thermal fluid for re-heater to generate 2,5 MWH with 01 ton hour of dirty raw materials

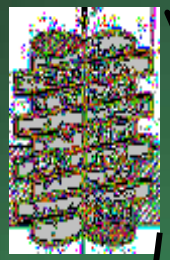
Semi-dirty Syngas output

Very hot thermal fluid outlet

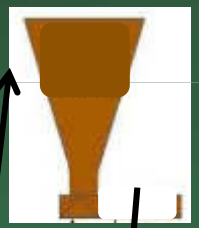
Steam turbines

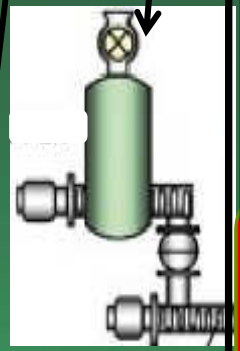
Central 1 for production of steam with re-circulating thermal fluid (HEAT TRANSFERS)

Screw press (fast moisture reduction to 18%) releasing lots of treatable water



Gravity feeder





Pre-heater to 53º C by smoke from clean syngas burn

Screw feeder

Support grid

Syngas

Mass flow (pyrolysis + oxidation + reduction combined)

Fluidized and circulating bed

High pressure steam input

Sand

Cyclone for initial cleaning syngas

Circulator

Three very hot thermal fluid tank

Cold thermal fluid

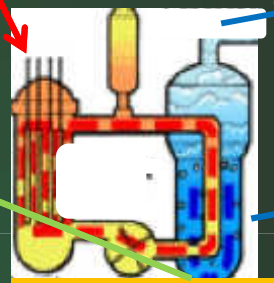
Cold thermal fluid inlet

Filter's Cleaning System

Cooling and cleaning syngas

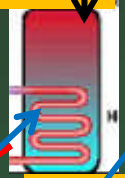
Ash screw collector

Partial steam production with syngas ONE BIG FIRE TUBE (for thermal fluid Re-heating too)



Hot Steam Stocked 24 hours

Central 2 from stocked steam



Steam to water flash regeneration

Special new gene rators for 01 Mwh each and weighing only 130kg

Various possible future "thermal fluid stirling engines" for much aditional generation (as absorption chiller)

Thanks

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Prof. MB Cezar Clímaco – AGROVISION – Brasília capital (BRAZIL) E-MAIL: climaco23@gmail.com

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