AGRO-BIOGENICS

WORKING TOWARD A NEW BUSINESS PARADIGM THAT REDUCES THE GAP BETWEEN "RICH" AND "POOR"

ENERGY & MATERIALS AGRO-BIOGENICS PEOPLE

APIX_MDG_FREE-ENERGY 20,000

[CARBON SEQUESTRATION, CLEAN ENERGY, BIO-FERTILIZER, NATURAL FIBER COMPOSITES]

THE FUTURE GREEN MEGA-BUSINESS

APIX-SEP¶, ZERO-WASTE ZERO-CARBON BUSINESS-MODEL (ZW-ZC-BM)

CONVERTING AGROWASTES/FOOD WASTES/ANIMAL WASTES INTO ENERGY & ENGINEERING MATERIALS

Courtesy: Nick Vivian: http://www.pbase.com/nickviv/englishcountryside

¶ APIX-SEP is acronym for AGRO-POLYMER INDUSTRY COMPLEX-SUSTAINABILITY ENGINEERED PROJECTS (see in '2'...click: APIX-SEP)

HIGH-LIGHTS OF APIX_MDG_FREE-ENERGY$_{20,000}$_HYBRID CSEP PROJECT

The primary objective of this project is to show-case the concept that GLOBAL WARMING and POVERTY (GWP) could be solved through a new Zero-Waste Zero-Carbon Business-Model (ZW-ZC-BM). This is done through utilization/ recycling of available Renewable Vegetation Resources. The resultant products are: Energy (Combined Heat and Electricity), which would be offered FREE; Natural Fiber Polymer Composite Products (NFPC) such as Wood substitutes; Carbon Sink Engineered Products (**CSEP – using CARBON SEQUESTRATION TECHNOLOGY**), which could be further modified into high-value Industrial products; Biofertilizer, which would have about 97% water content (so that farm community could reduce need and energy for water); GREEN Sulfur and a few other Chemicals. It would be noted that this GREEN venture would be Sustainable even without any Government subsidies or other such concessions that are needed to support the various other GREEN ventures for their sustenance. The Project (named: **APIX_MDG_FREE-ENERGY$_{20,000}$**) has the following high-lights:

- Free Energy supply (Heat + Electricity) ..... Total @ 1, 125 KW
- Insitu Power used for various manufacturing processes ..... Total @ 275 KW
- Engineered Wood substitutes in the form of Molded Doors ..... 1, 500 T
- Carbon Sink Engineered products (as Hybrid CSEP Adhesives) ..... 9, 840 T
- Biofertilizer in sludge form (@ 1, 089 T solids) ..... Total 41, 184 T
- "Green" Sulfur ..... 23,1 T

These products all put together are valued $30 million

- Main Organic Raw materials are: Vegetation wastes, Food Wastes, Wood wastes and animal/ human wastes (click on this link: '5')

The total turnover in three shifts run in 3rd year = $30, 777, 380

Total Capital Investments are estimated @ $5, 244, 000. The estimated average ROI (depreciation counted) at manufacturing level = 32.6%; and the average cash-flow is estimated @ 40.58% on investments. The "break-even" is reached at the end of first year, after trial marketing- start.

An extract of estimated Costs and Economics of operation is shown below (click here: ECONOMICS):

(All Figures in US $)

TOTAL SALES	**2, 376, 350**	**11, 483, 070**	**29, 270, 940**	**30, 777, 380**	**31, 763, 530**	**32, 716, 440**
Total COSTS	**2, 168, 130**	**10, 349, 070**	**26, 072, 410**	**27, 330, 880**	**28, 155, 020**	**28, 999, 670**
GROSS MARGIN	**208, 220**	**1, 134, 000**	**3, 198, 530**	**3, 446, 500**	**3, 608, 510**	**3, 716, 770**
Nett Operating Profit	**-169, 980 (Loss)**	**-68, 150 (Loss)**	**1, 705, 420**	**2, 056, 200**	**2, 324, 650**	**2, 537, 540**
Nett Cash flow after repayments (carried over)	**(-9, 020)**	**(395, 490)**	**(1, 543, 880)**	**(3, 016, 340)**	**(4, 733, 200)**	**(6, 641, 310)**
Average Operating Profit = $1, 711, 132 (after depreciation) [About 32.6% on TOTAL Investment]						
Av. cash-flow before repayment = $2, 128, 262 (40.58% on Investment) ... payout during sixth year						

The project could be set up anywhere in the world, although the most optimum results would be seen in tropical nations (the less developed nations). The project could be set up in a period of ONE year, once the "Go-ahead" signal is obtained, along with basic local infrastructure arrangements and total funds. The entire technology would be based on APIX-SEP programs of AGRO-BIOGENICS [Please see: http://www.agro-biogenics.com and http://freeenergytoworld.wordpress.com/ . **The project is Self Sustainable venture, even without any subsidies, doles and concessions; and it is also possible to offer a value to the wastes, if the farm community is to be benefited**

WHY FREE ENERGY?

We are not operating any perpetual machine; nor are we involved in any magic! But, our contention is that we ASK FOR FREE ORGANIC WASTES (Vegetation wastes, Clean Plastics wastes, Wood wastes, Animal wastes, Human wastes and all carbonaceous non-toxic wastes) + a few specified Industrial Wastes. IN RETURN, we shall OFFER FREE POWER (both Heat + Electricity) to the group/ entrepreneur/ state, who arrange the wastes supplies. Our Wastes Conversion project/ technologies would convert the same into:

- ELECTRICITY + HEAT (offered "Free")
- Engineered composites
- Carbon Sink Engineered products (CSEP)
- Bio-Fertilizer
- "Green" Chemicals (e.g. pure Sulfur)

We shall do business, by selling the non-Power product systems (worth over $30 million per module, **APIX_MDG_FREE-ENERGY$_{20,000}$**). Estimated ROI = 32.6%

OUR IDEA OF GLOBALIZATION & MILLENNIUM DEVELOPMENT GOALS (MDG): At a time when the world is facing the "twin-problems" of Global Warming and Poverty (GWP), APIX_MDG_FREE-ENERGY$_{20,000}$ modules would simultaneously attack the same. While each project would develop power and certain specialty utilitarian engineered materials, the human resources that are utilized for these operational needs shall be mostly from the Developing Nations. This would make each project a truly Globalized venture; the various personnel from the developing world get better opportunities for their livelihood – at the same time the energy problems of the developed world being solved

GLOBAL WARMING & ENERGY CRISIS COULD BE SOLVED THROUGH WASTES CONVERSIONS

It is estimated that on an average, every adult human being is responsible for the creation of the following systems of Organic wastes:

- Basic Food wastes ..... 1 Kg per day
- Vegetation wastes/ wood wastes/ agrowastes ..... 3 Kg per day
- Animal/ other organic wastes (non toxic) ..... 2 Kg per day

Thus, each of us (even if it is an inadvertent relationship) would become automatic perpetrators of Global Warming through this waste generation! Added to this is the propensity to flaunt excess wealth and the resultant excessive (wasteful) consumption by those who wish to present themselves as "rich". These "organic" wastes form only a relatively smaller percentage of our overall wastage-culture; the major portion of that being taken up by many metallic and other mineral systems (about which we shall not consider here)

The estimated annual Organic wastes generation all over the world is about 10, 840, 500, 000 T [hereafter, we shall state merely "**wastes**" to specify "organic wastes", unless specified otherwise]. This could be converted into not less than 8, 029, 533, 139, 535 KWH (combined heat + Electricity). And, this works out to a whopping 1, 216.5 KWH per each person (young and old) living on earth (3.3333 units per day)! Not even 1% of these are tapped at the moment. Add to these the various other materials and human animal resources wasted every where. We would note that over 90% of all matter/ energy seem to get wasted, resulting in "over consumption" and further cascading effects of wastage.

We need to recognize, therefore, that our inclination to waste materials and energy **must** be curtailed. The best way this could be done is by RECYCLING.

The question may be asked: *How could we collect and utilize these disparate and individual wastes generated by every one on earth*? The answer is that *doing such collection of wastes generated by every one is not as difficult or costly as going down the earth a few Kilometers, to tap oil*! The need has arisen to do so; for, if this is not done soon enough, the catastrophic effects of Global Warming could soon overtake everything else to the point the world may not have enough economic resources to overcome this hovering Damocles sword!

1. INTRODUCTION/ MISSION

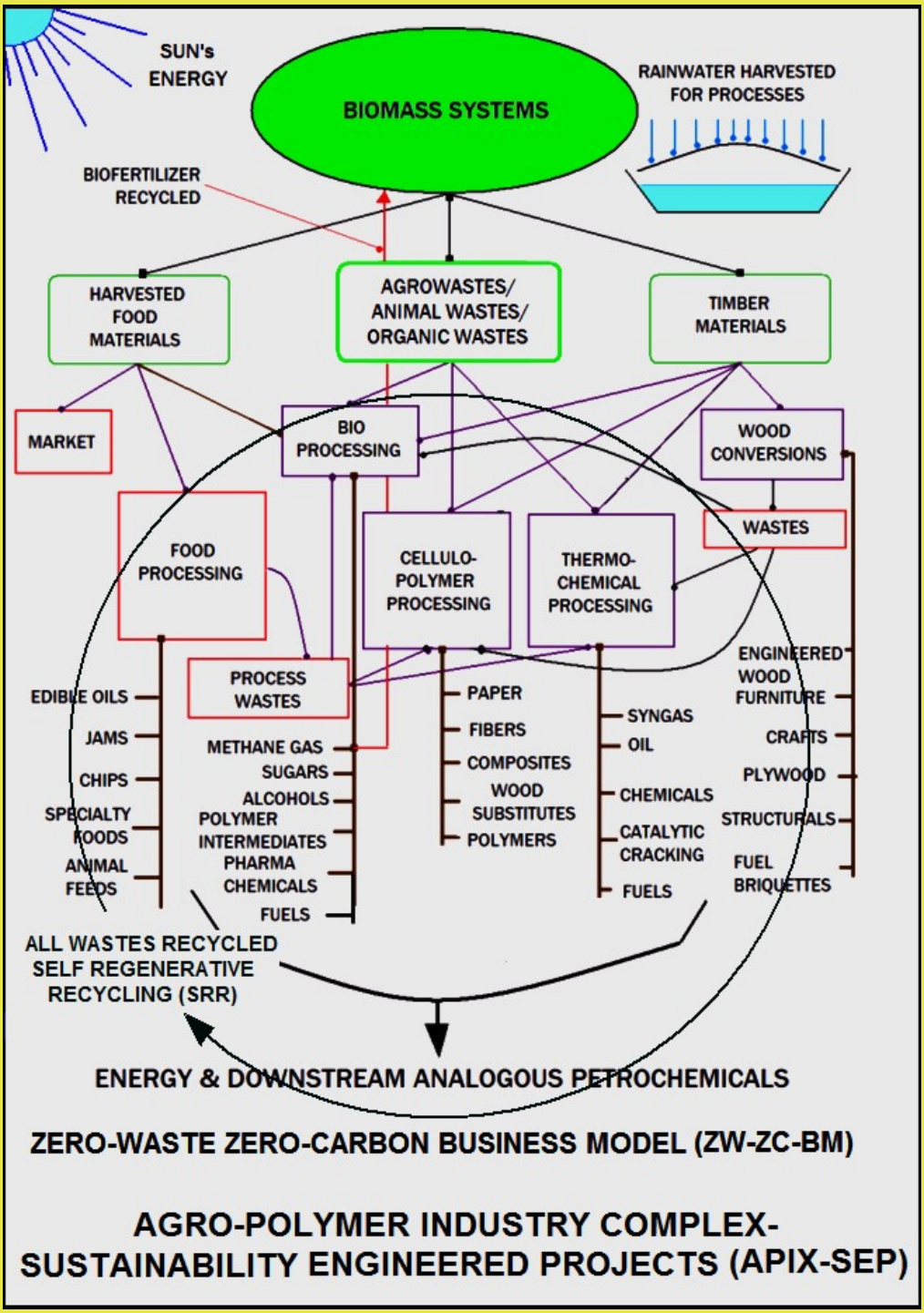
AGRO-BIOGENICS have developed a **Zero-Waste Zero-Carbon (Wealth generating) Business Model (ZW-ZC-BM)**, based on **Renewable Resources** (**RR**) and human resources. The world needs such a paradigm to answer the **twin problems of Global Warming and Global Poverty (GWP)** in one-shot. While the UN MDG's prescribe certain planned actions toward mitigating the "perceived" twin-problems, the business community too have come forward with various "GREEN" business strategies.

AGRO-BIOGENICS is not another "also-ran" business; but here we Define, Devise, Conceive and Operate a different theme, wherein Local Needs and Local Resources are the prime starting systems for human existence. We appreciate that, while science/technology/economics and experienced knowledge are important accelerators of development initiatives, the universal phenomena of TIME-ENTROPY principle would have to be respected, and every action would have to be tempered against the impact of these effects on all our actions. For, the TRUTH of the end-result of Time-Entropy principle is the **Heat Death of the universe!** Lest we promote this accelerated end-result through "plundering" and indiscriminate wastage of the limited world resources, the prime driving theme at **AGRO-BIOGENICS** shall be the careful utilization of RR, by practicing **Self Regenerative Recycling (SRR)**. We shall attempt to achieve these through our new Business paradigm, within democratic societies.

> The acronym, "**AGRO-BIOGENICS**", connotes a very broad theme conveying the totality of the systems of Materials and Energy that are germane to life on earth. **AGRO-BIOGENICS** may be defined as **the totality of the system environment that encompasses the whole of Renewable Resources (and could include both living and non living things) and all energy sources**. The first word-system (AGRO) connotes the theme that the resources are artificially created agriculture and plantation activity resources, including both plants/ vegetation based and animal based. The word – BIOGENICS – connotes the material and energy systems/ resources involved in the entire life forms and those that emanate from them (living and nonliving). We may also note that Agro-Biogenics would be the future, not only in terms of the human resources and energy needs, but also in creating the greatest New Ventures of the future.

Just look around us at our backyards; we would have the greatest business potentials there. We need to use and recycle all available local renewable resources, including human resources and various wastes, toward solving the needs and problems of local people. This "localization" would be the answer to present day problems of GWP. We need to recognize that Global Warming and Global Poverty are corollaries – a "cause and effect" phenomena. We have enough energy and materials to serve the needs of the local people, within local surroundings. But we need to "generate businesses" using these local resources (mainly RR). Businesses thus generated, creating values to local resources, are estimated at not less than US $4, 000 billion … may be $5, 000 billion, for each incremental $150 earned by the 4000 million poor people on earth! We shall initiate and pioneer this New Business Paradigm, through **AGRO-BIOGENICS.**

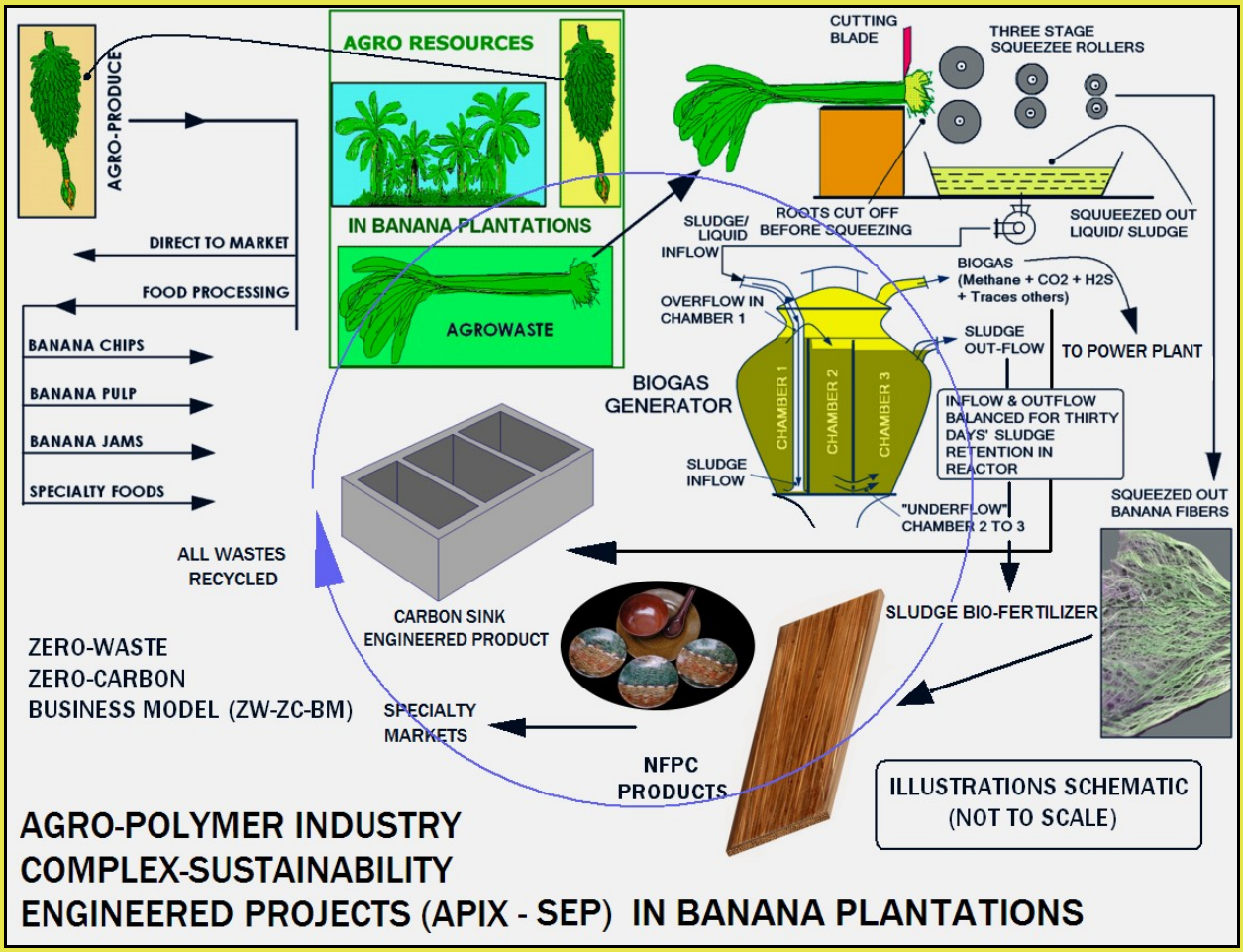
The following illustration shows a process model for achieving Zero-Waste Zero-Carbon business/ economic operations. The new business through **AGRO-BIOGENICS** would be implemented (at the ground level) through the Concept of **AGRO-POLYMER INDUSTRY COMPLEX-SUSTAINABILITY ENGINEERED PROJECTS** (**APIX-SEP**), as presented herein ...



OUR MISSION – to *mitigate poverty in village areas through wealth creation, utilizing/recycling Renewable Resources and biomass wastes*

AGRO-BIOGENICS would facilitate and create innovative, inclusive environmentally and socially benign businesses, recycling wastes and unused biomass into alternative energy/ engineering materials, resulting in wealth generation activities in rural areas, empowering local people with enhanced earning power

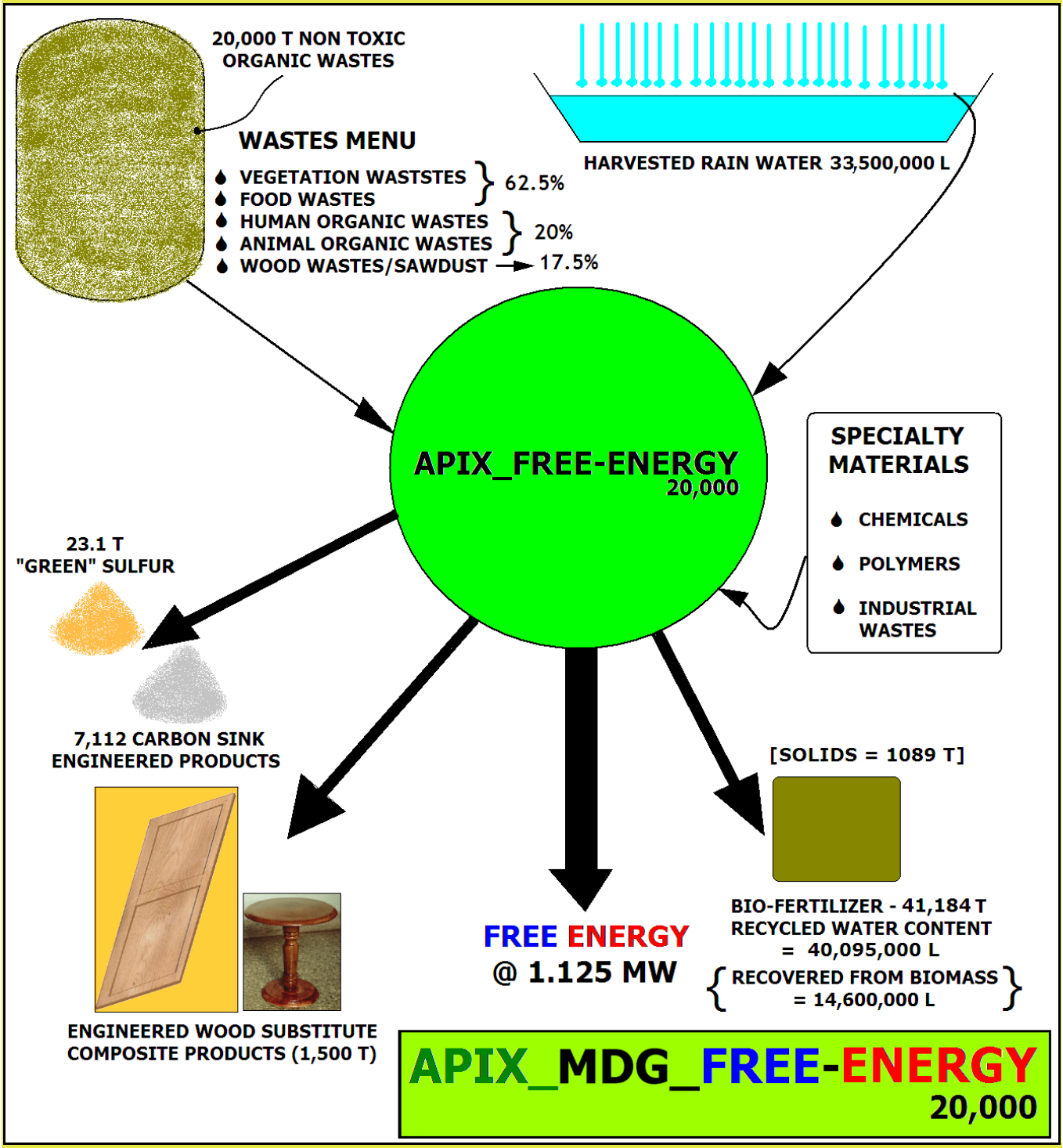
2. AGRO-POLYMER INDUSTRY COMPLEX-SUSTAINABILITY ENGINEERED PROJECTS



Whether we have farmlands with Banana plantations, Coffee plantations, maize or even if there are no plantations, the profuse volumes of vegetation system wastes such as plant clippings, stems cuttings, fallen leaves, grasses, shrub plants, and water hyacinths could all be converted into various value added GREEN products. The illustration above shows the business possibilities in a Banana Plantation system of APIX-SEP.

AGRO-POLYMER INDUSTRY COMPLEX-SUSTAINABILITY ENGINEERED PROJECTS (APIX-SEP) is the ground level business of AGRO-BIOGENICS, an "all encompassing" techno-socio environmental (ZERO-WASTE ZERO-CARBON BUSINESS MODEL – ZW-ZC-BM), which starts with any agriculture/ plantation operation or on the basis of the available renewable resources in a village region. All the available, annually renewable resources in an ecological surroundings (plants/ vegetation/ organic/ animal/ human wastes), including human/ manpower/ animal-power resources, are utilized through a SELF REGENERATIVE RECYCLING (SRR) process toward creating value additions. These result in Alternate Engineering Materials, Alternate Petrochemicals, Bio-Fertilizers, CO_2 SINK Engineered materials and Processed Foods. It is to be noted that APIX-SEP – the ZW-ZC-BM – could be set up even in an area bereft of any agricultural activity; and in this case the locally available vegetation and other animal/ human wastes could be the starting materials for the SRR processes. As expressed under the Business Objectives, it would be our endeavor to set up APIX-SEP in clusters of one thousand ha areas in different villages/ farmlands; each such unit would be named: **APIX_1000**. And these would be the centers of wealth creation in the range US $15 million and above per APIX_1000 unit.

3. INPUT-OUTPUT DATA OF APIX_MDG_FREE-ENERGY$_{20,000}$



The illustration here presents the overall data on the basic Input-Output involved in **APIX_MDG_FREE-ENERGY$_{20,000}$**. The input materials are: 20,000 T Biomass + Food wastes + Animal wastes; appropriate quanta of specialty chemicals, industrial wastes and polymers; 18,500,000 L of rainwater. Also, see the Schematic Illustration under '5' … page 10

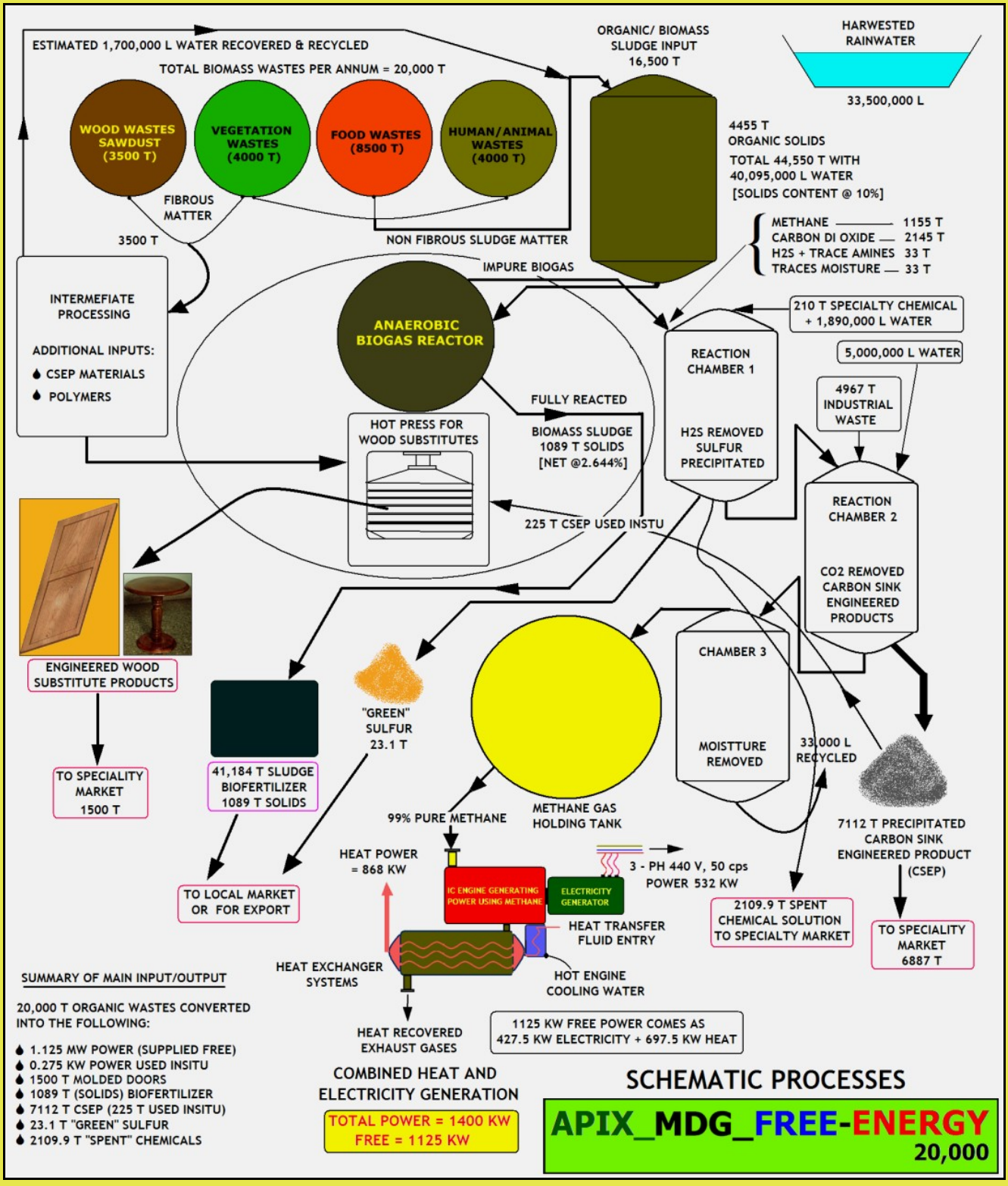
4. AN OVERVIEW OF APIX_MDG_FREE-ENERGY$_{20,000}$ BUSINESS POTENTIALS WORLDWIDE

We shall look at the possibilities of setting up a series of APIX_MDG_FREE-ENERGY$_{20,000}$ Modules in a few countries. The following nations are considered, against whom appropriate Business Potentials are also shown:

Serl. No.	Parameter	Kenya	Ethiopia	UK	India
1	Area of nation (sq. K-M)	583, 000	1, 221, 000	244, 000	3, 287, 000
2	Estimated APIX Module numbers	7, 000	10, 000	6, 000	100, 000
3	Power available	7, 875 MW	11, 250 MW	6, 750 MW	112, 500 MW
4	Other Business Potentials	$26.25 billion	$37.5 billion	$22.5 billion	$375 billion
5	Number of additional Jobs (**direct/indirect**)	2.1 million	3 million	Not estimated	30 million
6	Increased Purchasing Power of Villages	$7.875 billion	$11.25 billion	Not estimated	$112.5 billion
7	Estimated Business earnings	$5.12 billion	$7.32 billion	$4.4 billion	73.2 billion
8	Estimated Carbon Credits	60,669,000 (€1,516,725,000)	86,670,000 (€2,166,750,000)	52,002,000 (€1,300,050,000)	866,700,000 (€21,667,500,000)

Analysis of the above table shows the business potentials in developing nations would be more (from an economic/ business angle) than that in the developed nations, in so far as these Energy projects are concerned. Moreover, as these projects are carbon neutral as well as "carbon sinking" in nature, we have potentials to claim good volumes of Carbon Credits (up to an estimated 8,667 credits per Module). The above table has been prepared based on the logic that 30% of the land area could be considered for computing average vegetation/ biomass volumes; and each module is based on 20,000 T biomass (mostly the various non toxic organic wastes, including food wastes and wood wastes)

5. CONVERSION PROCESSES IN APIX_MDG_FREE-ENERGY$_{20,000}$



The illustration here is a schematic presentation of the overall process systems involved in **APIX_MDG_FREE-ENERGY$_{20,000}$**. Central to the entire manufacturing arrangement are TWO fundamental Production Technologies:

1. Technology of Pure methane Gas generation by anaerobically converting Biomass and Organic wastes, removing all impurities from the original biogas.
2. Technology of Manufacturing Engineered Composites (in the form of Wood Substitutes) using the Fibrous materials in vegetation systems + Sawdust/ wood wastes. The end product categorization is called: NATURAL FIBER POLYMER COMPOSITES (NFPC). Products such as high value Molded Doors and Furniture are involved

Additionally, there is also a highly developed Heat conversion engineering, whereby methane gas is burned inside modified Internal Combustion Engines (IC engines) … the "good old" automobile engines and other transportation engines. The total Heat available in burning methane gas is transformed into both Electricity and Heat, in the ratio 38::62. Thus, the "FREE" energy is supplied as Power @ 427.5 KW Electricity and 697.5 KW Heat, respectively.

The following Main Process Operations are involved:

1. Vegetation wastes/ Organic wastes Converted Anaerobically into BIOGAS (Methane + CO_2 + Traces H_2S, Amines and Moisture)
2. Biogas Conversion into Pure methane gas (processes to remove moisture, CO_2 and H_2S)
3. Sludge from Biogas system Converted into Biofertilizer
4. Methane gas conversion into Electrical + Heat Energy
5. Vegetation matter (mainly the fibrous portions) Converted into **Natural Fiber Polymer Composite** (**NFPC**) products (these products range from Molded Floors, Wood Substitute Boards, Molded Doors and Furniture systems … see MOLDED NFPC PRODUCTS, page 18)

The above main operational systems would also be supported by various "auxiliary" processes (e.g: rainwater harvesting, vegetation segregation/ shredding, among others). Collection, transportation of the main raw materials and supplying the products to the market are the various other "external" processes that are also involved.

6. THE PRODUCTS

The **primary product is Energy**, which we offer FREE, through this project. The following "secondary" products are marketed:

1. NFPC Wood Substitute Products (Molded Doors) ..... 1500 T @ $1000 ..... $1,500,000/00
2. Specialty CSEP (Carbon Sink Engineered Products) ..... 6887 T @ $312.50 ..... $2,152,187/50
3. Biofertilizer (Solids 1089 T in 41,184 T Sludge) ..... @ $260 ..... $283,140/00
4. "GREEN" Sulfur ..... 23.1 T @ $833/33 .... $19,250/00
5. "Spent" Chemicals (in Solution 2,109.90 T) ..... @ $52/00 ..... $109,717/80

TOTAL VALUES OF MARKETABLE PRODUCTS (Non Hybrid CSEP) $4,064,295/30

I. PRIMARY PRODUCT: ENERGY:

Our energy component of the Products package involves both Electricity and Heat. The estimated values are:

- Total Energy produced by converting 16,500 T Organic wastes ..... 12,221,510 KWH
- Power available 24 hrs x 360 days ..... 1,414.5 KW
- Electricity component (@ 38%) ..... 537 KW
- Heat component (@ 62%) ..... 877 KW
- Power component used, insitu ..... 289.5 KW

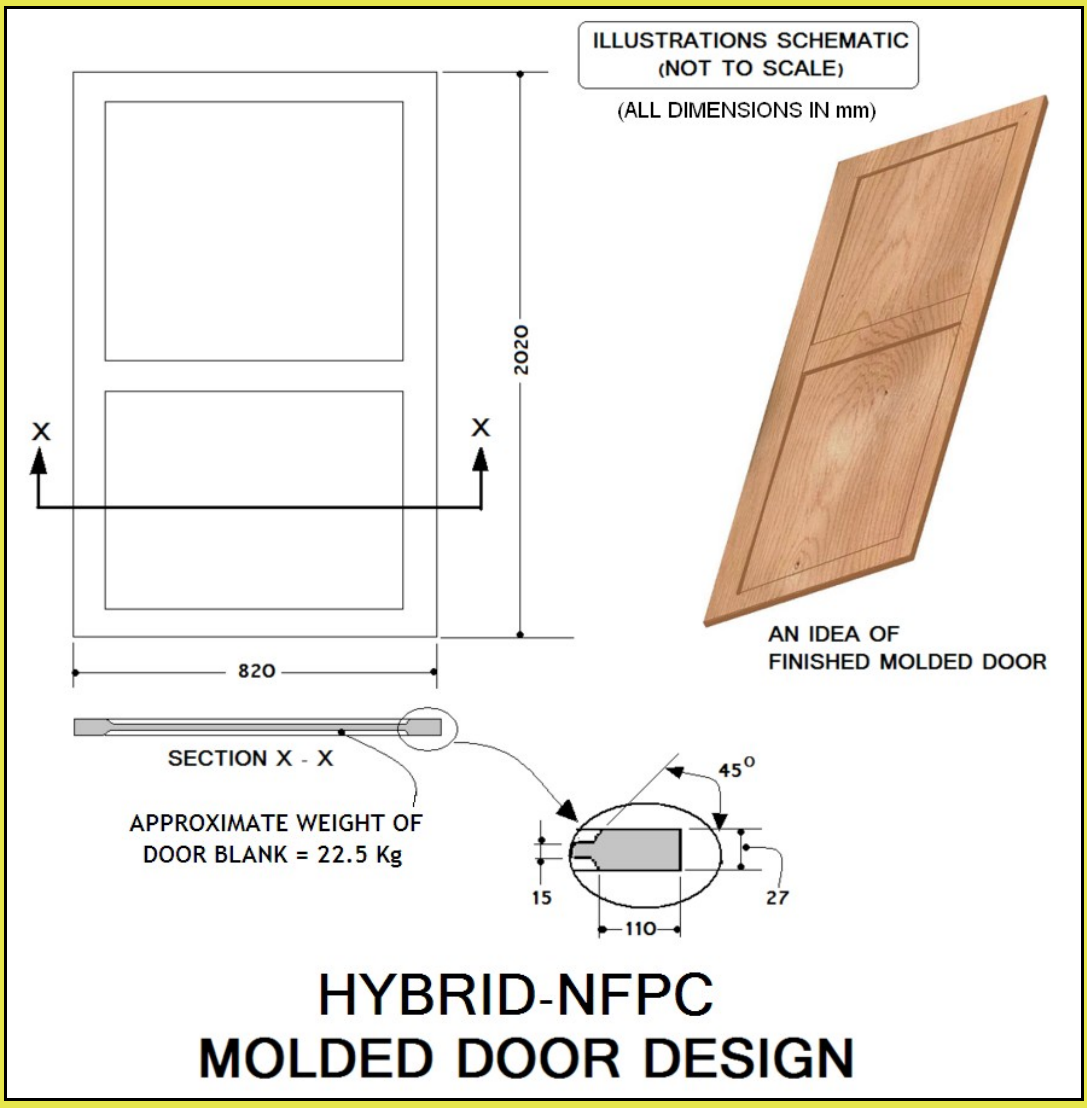
FREE ENERGY PORTION (@ 1125 KW)
Electricity ..... 427.5 KW
Heat Power ..... 697.5 KW

It may be noted that, while electricity could be transmitted through "grid power" system, the heat portion would need that the "target consumers" are near the plant/ unit. This is needed so that only minimum heat is lost in transit (heat cannot be transmitted in the manner electricity could be moved efficiently). These factors need to be considered in locating the unit. Additionally, the end consumers may be supported/ encouraged to set shop closer to the Energy unit.

II. SECONDARY PRODUCT-1: NFPC WOOD SUBSTITUTE MOLDED DOORS:

Molded Wood Substitute Doors are relatively new; but the market is pretty large for any Good Quality Wood Substitutes.

The Photo-Illustrations above show a few designs of Molded Doors and Wood Substitute Boards. These have been developed using the fibrous material systems in biomass (vegetation matter), combined with wood wastes and saw dust. These are molded using the Compression Molding Technology, and the product categorization is under NATURAL FIBER POLYMER COMPOSITES (NFPC). While the value addition in these products would be high, with respect to the original value of the wastes, the end-products compete with other alternate materials (including original wood), both in quality and cost/ economics. Additionally, these products could be produced with superior "ready-made" finish and aesthetics + "water-proof" quality.



An idea of the Door Blank Design is presented in the Illustration here. And, if we were to consider this "blank" as the standard for computations, the following may be noted:

- Annual Production of NFPC Molded Doors ..... 1500 T
- Number of "Door-Blanks" (size = 2020 mm x 820 mm x 27 mm) 66,667
- Unit Door-Blank value (@ Tonnage value of $1150) $25/87
- Total value of 1500 T Door-Blanks $1,725,000/00

The market for such high quality "water-proof" Door-Blanks" would be the various households, new housing, industrial/ commercial establishments and various tourist lodges.

III. SECONDARY PRODUCT-2: CARBON SINK ENGINEERED PRODUCT (CSEP):

CSEP is produced by reacting the CO_2 in the biogas to form inorganic Filler/ Extender materials that could be used in Polymer Composites. These materials could also be in the form of "as molded" building construction products such as Bricks, partition Boards and the like. A specified quantity of CSEP produced would be used, insitu, in the manufacture of Molded Doors.

- CO2 component in Biogas (from 16,500 T) ..... 2145 T
- CSEP conversion, using additional (4967 T) Inorganic Industrial wastes ... 7112 T
- Insitu utilization as Filler for NFPC Molded Doors ..... 225 T
- Marketable volume of CSEP ..... 6887 T valued ($312/50) $2,152,187/50

[NOTE: By utilizing and recycling the CO_2 formed, we offset that much volume of CO2 from being spewed into the atmosphere]

Note: These CSEP inorganic filler materials could be used as extenders and fillers in various Polymer Composite systems, Fiber Glass Composites, PVC Pipe compounds, and in Adhesives/ Calking Compounds. These formulations could use as much as 70% or more of fillers on weight basis, and it is in this category that we may have the "best" markets. It may also be useful for us to consider manufacturing such **HIGH-VALUE CSEP Adhesive** formulations, so that we have a higher value added product instead of the filler. **If, for example, we formulate a special home-use or general purpose Industrial Adhesive (a "two-component system), the quantity that could be produced (@ 70% filler addition) is 9840 T, valued $27, 060, 000 (over TEN times value addition) ...We shall be doing so in this project too**

It is observed that CSEP, being a new product system in the market, would need special marketing efforts to establish the market. However, in view of the demand for these Filler/ Extender materials (as pointed out earlier), we should be able to enter the market through appropriate "market-education". Most of the current product systems are Mineral based materials, and not based on Renewable Resources; whereas CSEP would be recycling industrial wastes and hence, GREEN.

IV. SECONDARY PRODUCT-3: BIOFERTILIZER:

We have an estimated 66 Kg of solids in Biofertilizer form (Nitrogen and nutrient rich) per each ton of Organic wastes that we process through Anaerobic reactor. The following are the resources in this project:

- Solids content of Biofertilizer ..... 1089 T
- Water content (@ 2.644%) ..... 40,095,000 L
- Total Sludge biofertilizer ..... 41,184 T
- "Packed" Marketable value (@ $260) $283,140/00

Market for these would be the local farmers, who need excellent Organic fertilizer, and as there would be about 97% water in the sludge, their water needs could be curtailed to lesser volumes ... thereby saving in energy and water.

NOTE: Secondary Products '4' and '5' are essentially Chemicals (One being GREEN Sulfur, the other being spent solution). These would be sold back to the Chemicals market from where the "reaction chemicals" are to be arranged/ bought. The estimated Green Sulfur volume is 23.1 T (valued $19,250) and the other spent chemicals volume is 2,109.9 T (valued $109,717/80)

7. TECHNOLOGY & KNOW-HOW

The different Technology systems are based on Tried/ Tested scientific principles of the following:

1. **ANAEROBIC CONVERSION OF BIOMASS** (For Methane gas generation and Biofertilizer)
2. **COMPRESSION MOLDING POLYMER COMPOSITES TECHNOLOGY** (For NFPC Molded Tiles)
3. **COMBINED HEAT POWER** (**CHP**) SYSTEM (Modified IC Engine with Generator and Heat Exchanger)
4. **CARBON SINK TECHNIQUE** (For Carbon Sink Engineered Products – CSEP)
5. **SCRUBBING BIOGAS OFF H2S/CO2** (To remove Sulfur from the Biogas, and purifying Methane)

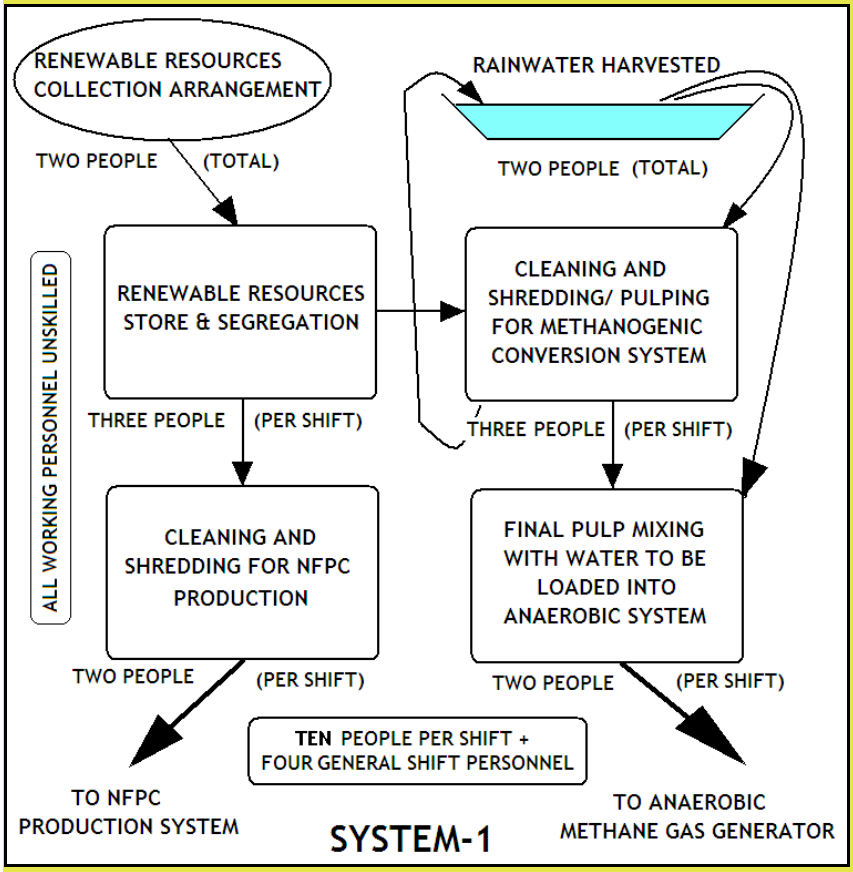
The Appropriate Engineering and Total Know-How would be provided by the collaborator parent AGRO-BIOGENICS with HQ in India.

Note: This is a FIRST TIME GREENFIELD VENTURE, and there are no precedents. Hence, the entire Plans, Strategies and execution would be done very carefully and in total unison with the support group-entrepreneur/ JV partner.

HIGH-VALUE MOLDED NFPC PRODUCTS, WHICH COULD BE MANUFACTURED

8. PRODUCTION SET-UP [PLANT & MACHINERY]

1. SYSTEM-1: BIOMASS PRE-PROCESSES

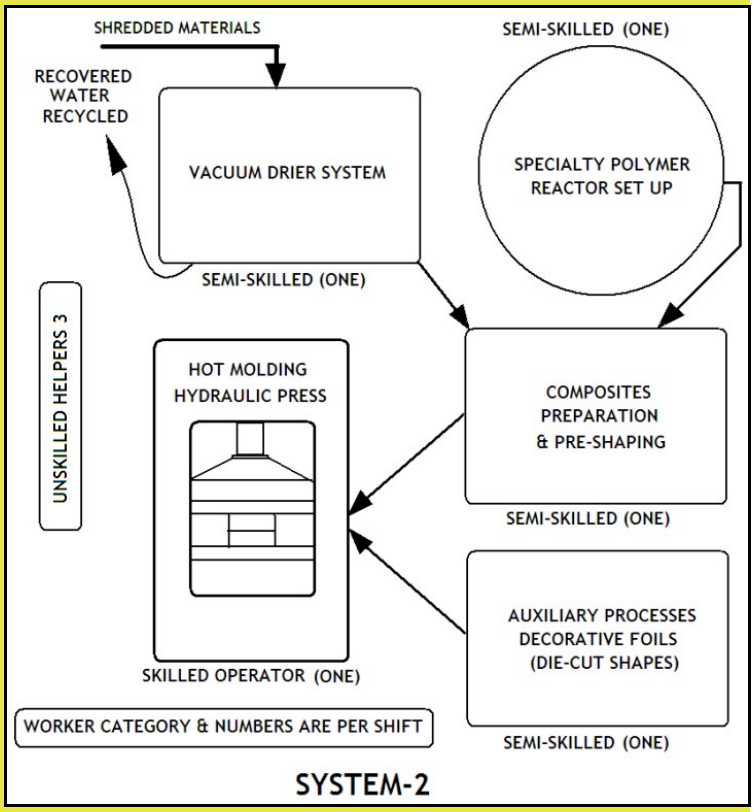


NOTE: SYSTEM-1 is the RR PRE-PROCESS arrangement

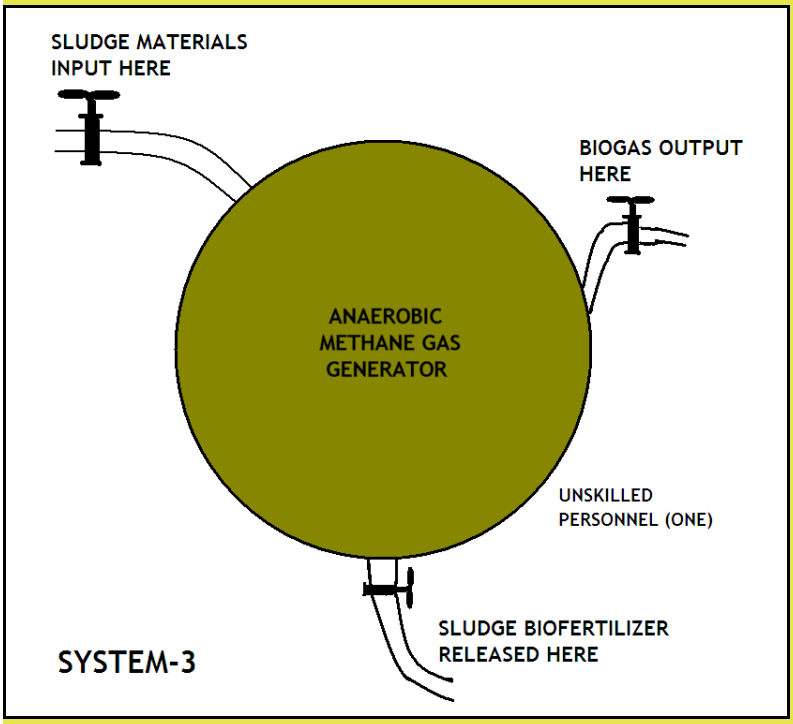
1. RR Collection and Rain-water Harvest system would have total four workers
2. Other sub-systems would have ten workers per shift. All are Un-skilled
- Single Shift 14
- Two Shifts 24
- Three Shifts 34

2. SYSTEM-2: NFPC MOLDING

NOTE: SYSTEM-2 is the NFPC Tiles Production Process arrangement
1. General Helpers... Three
2. All sub-systems would have One Semiskilled worker per shift in each; The Molding Press needs One Skilled Operator Number of Workers for different shifts (SYSTEM-2): Three unskilled, Four Semiskilled; One Skilled
- Single Shift ... Unskilled (3); Semiskilled (4); Skilled (1) .... = 8
- Two Shifts ... Unskilled (6); Semiskilled (8); Skilled (2) ... = 16
- Three Shifts ... Unskilled (9); Semi-skilled (12); Skilled (3) = 24



3. SYSTEM-3: ANAEROBIC BIOGAS GENERATION



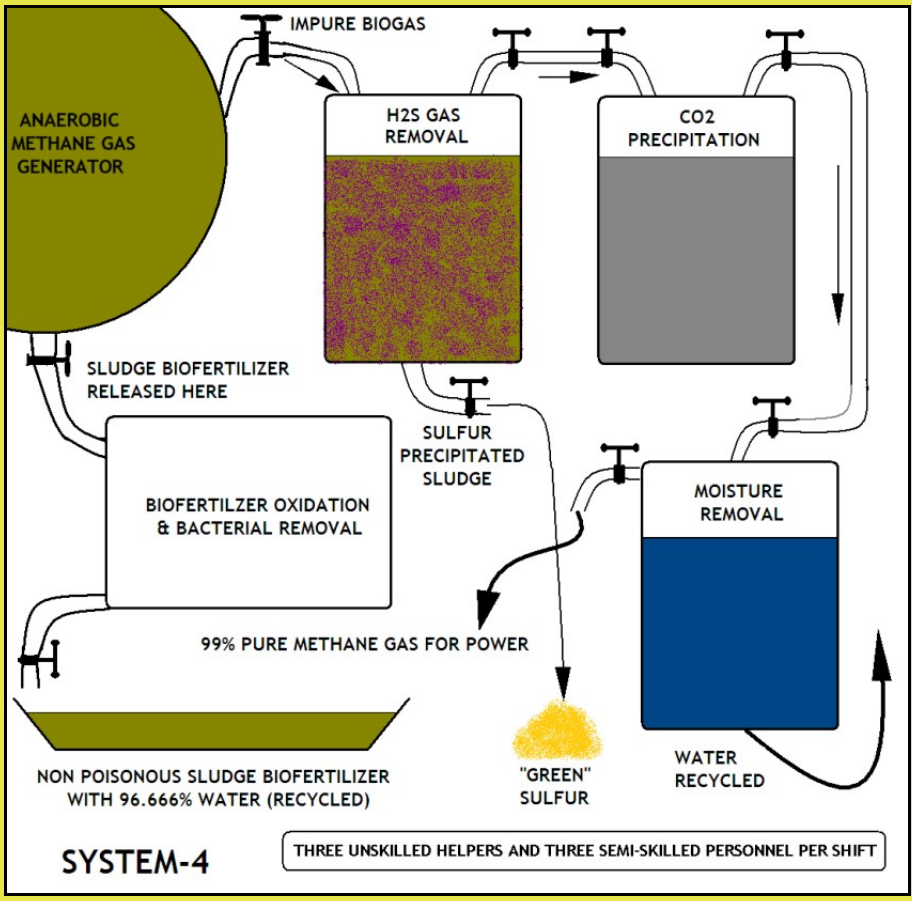
NOTE: SYSTEM-3 is the Anaerobic Methane Gas/ Biogas generator. Here we have only One unskilled personnel per shift

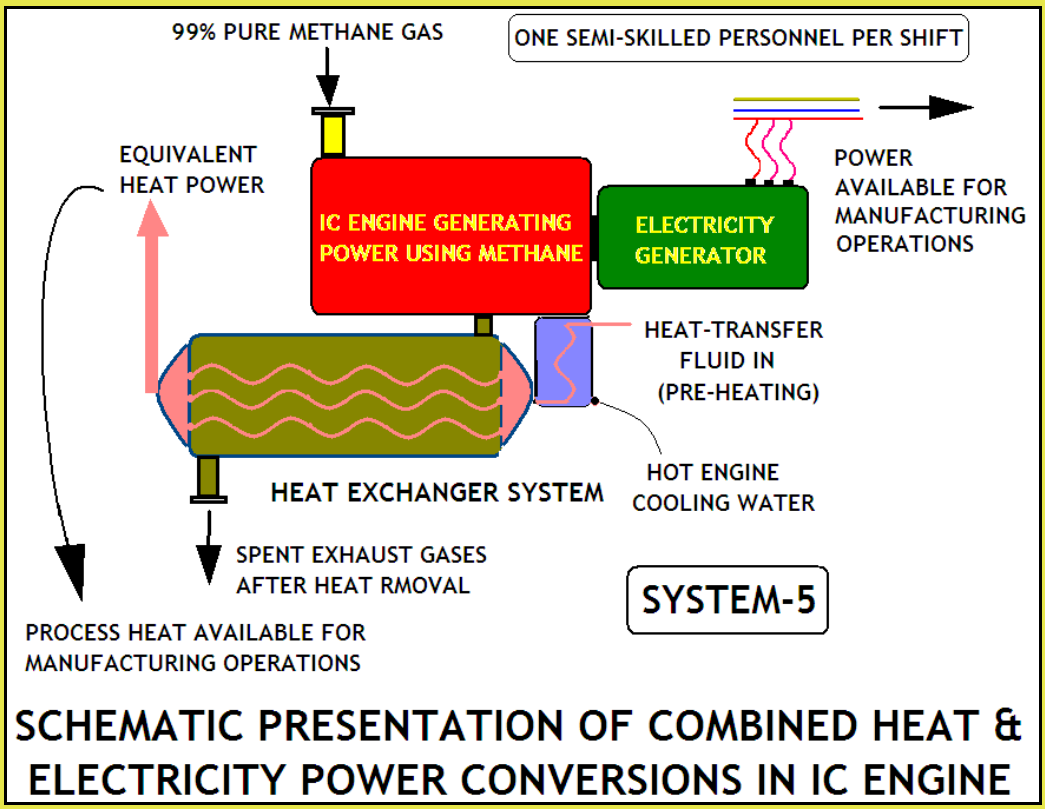
1. Single Shift … Unskilled (1)
2. Two-shifts ….. Unskilled (2)
3. Three-shifts … Unskilled (3)

4. SYSTEM-4: PURE METHANE GAS GENERATION

NOTE: SYSTEM-4 is Biogas Scrubbing/ Purification arrangement. Here we have only Three unskilled personnel and three Semi-skilled personnel per shift

1. Single Shift … Unskilled (3); Semi-skilled (3) = 6
2. Two-shifts … Unskilled (6); Semi-skilled (6) = 12
3. Three-shifts … Unskilled (9); Semi-skilled (9) = 18





SCHEMATIC PRESENTATION OF COMBINED HEAT & ELECTRICITY POWER CONVERSIONS IN IC ENGINE

5. SYSTEM-5: COMBINED HEAT + ELECTRIC POWER GENERATION

NOTE: SYSTEM-5 is POWER Generation system. Here we have only One Semi-skilled personnel per shift:
One Technical personnel (Engineer)
1. Single Shift .... Semi-skilled (1)
2. Two-shifts .... . Semi-skilled (2)
3. Three-shifts ... Semi-skilled (3)

The most important "product" in this project is the Energy component, which decides the "make-or-break" condition of the project! This is The POWER Generation system. Power would be generated by converting the Methane gas into Electricity + Heat inside a modified IC Engine. It is possible to achieve an efficiency (overall) of 70% + with respect to the heat energy available in methane gas. It is estimated that each ton of "green weight" agrowastes + food wastes + organic wastes could be converted into 741 KWH equivalent Heat + Electricity (in the ratio 62::38). Thus, the corresponding categorized energy quanta are: Heat = 459.5 KWH; and Electricity = 281.5 KWH. It is possible to estimate the energy (and the related Power) involved for every 1000 T Organic wastes conversion. That would be @ 85.7638 KW (24 hrs x 360 days) ... One twelve thousand ton wastes processing plant would generate continuously (24 hrs x 360 days) @ 1029 KW (= 1.029 MW)

Note: **There would be THREE Supervisors (Systems 1 & 2; Systems 3 &4; System 5 ...one each/ shift**. Additionally, each shift would have three "errand" service personnel (unskilled category)

9. HUMAN RESOURCES/ PERSONNEL

[NOTE: The data presented are based on Indian experience, using non-corporate wage/ salary structure. All salary/ wages are presented in Indian Rupees (INR: to be converted @ INR.48 = 1 US $). Final dollar converted tabulation is shown in TABLE of HR Salaries on page 23]

A. MANUFACTURING OPERATIONS

Labor/ category	General Shift	Single Shift	Two Shifts	Three Shifts
Unskilled	4	17	34	51
Errand boys/helpers		3	6	9
Semi-Skilled		8	16	24
Stores personnel		1	2	3
Skilled		1	2	3
Supervisors		3	6	9
Engineer	1			
Factory Office staff	1			
Security (semi-skilled)		1	2	3
Total in each	6	34	68	102
Grand Total personnel	108 (in manufacturing)			

B. ADMINISTRATION AND MARKETING

[Indian Standard Non-Corporate Costs in Small Towns/ Villages – Higher values than current practice]

- Office Assistants ..... @ INR.20, 000/ pm ..... 2 ..... annual INR.480,000
- Stores/Sales-in-Charge ..... @ INR.20, 000/ pm ..... 1 ..... annual INR.240,000
- Accountant-cum-Cashier ..... @ INR.25, 000/pm ..... 1 ..... annual INR.300,000
- Errand/ Helpers ..... @ INR.7, 500/ pm ..... 2 ..... annual INR.180,000
- Security ..... @ INR.10,000/ pm ..... 2 ..... annual INR.240,000
- Technician/ Electrician ..... @ INR.20, 000/ pm ..... 2 ..... annual INR.480,000
- Marketing Supervisor ..... @ INR.35, 000/ pm ..... 1 ..... annual INR.420,000
- Marketing Support ..... @ INR.25, 000/ pm ..... 2 ..... annual INR.600,000
- Driver/ Skilled ..... @ INR.15, 000/ pm ..... 1 ..... annual INR.180,000
- Manager ..... @ INR.45, 000/ pm ..... 1 ..... annual INR.540,000

[Total annual outgo salaries ... INR.3,660,000 ... 15% benefits = INR.549,000; All TOTAL = INR.4,209,000]

TOTAL ADMIN/ MANAGERIAL 15

[All total personnel, direct jobs: (both Manufacturing and Administration sections) = 123]

C. ESTIMATED ANNUAL COSTS OF PERSONNEL/ LABOR ETC

(a-1) Manufacturing Section: General, non-shift category:

- Engineer ..... @ INR.45,000/pm ..... 1 ..... INR.540,000

- Office staff ..... @ INR.20,000/pm ..... 1 ..... INR.240,000
- Unskilled ..... @ INR.7,500/pm ..... 4 ..... INR.360,000

[Total 6 personnel … Annual salaries outgo ... INR.1,140,000 … 15% additional benefits … INR.171,000; TOTAL OUTGO, inclusive of all benefits … INR.1,311,000]

(a-2) Manufacturing Section: Shift category: (Single shift)

- Supervisors ..... @ INR.35,000/pm ..... 3 ..... annual INR.1,260,000
- Skilled ..... @ INR.15,000/pm ..... 1 ..... annual INR.180,000
- Stores personnel ..... @ INR.20,000/pm ..... 1 ..... annual INR.240,000
- Semi-Skilled ..... @ INR.10,000/pm ..... 8 ..... annual INR.960,000
- Security staff ..... @ INR.10,000/pm ..... 1 ..... annual INR.120,000
- Unskilled ..... @ INR.7,500/pm ..... 17 ..... annual INR.1,530,000
- Errand/helpers ..... @ INR.7,500/pm ..... 3 ..... annual INR.270,000

[Total annual outgo salaries = INR.4,560,000 .... 15% benefits = INR.684,000; Total annual outgo = INR.5,244,000]

D. ANNUAL COSTS INCURRED

NOTE: The operations are on the basis of the following:

- First four months would be trial run + initial marketing; only one shift operated (volumes of productions are on the basis of 50% efficiency)
- First year of operation is to begin after that "trial-run" period … on single shift
- Second year would run at three-shifts, @ 75% efficiency of three shifts
- Third year onwards at three-shifts at full efficiency
- Annual wages/ salary/ benefits increments @ 3%

CONSOLIDATED HR SALARY/ WAGES

[Main figures in Indian Rupees (INR); Figures in parenthesis = US $ … parity @ INR.48/$)]

Category	Trial-run period	Year-1	Year-2	Year-3	Year-4	Year-5
Factory basic	1, 900, 000 ($39, 583)	5, 700, 000 ($118, 750)	11, 571, 000 ($241, 063)	17, 618, 130 ($367, 044)	18, 146, 674 ($378, 0560)	18, 691, 074 ($389, 397)
Factory benefits	285, 000 ($5, 938)	855, 000 ($17, 813)	1, 735, 650 ($36, 159)	2, 642, 720 ($55, 057)	2, 722, 001 ($56, 708)	2, 803, 661 ($58, 410)
Admin. basic	1, 220, 000 ($25, 417)	3, 660, 000 ($76, 250)	3, 769, 800 ($78, 538)	3, 882, 894 ($80, 893/65)	3, 999, 381 ($83, 320/45)	4, 119, 362 ($85, 820)
Admin. benefits	183, 000 ($3, 813)	549, 000 ($11, 438)	565, 470 (11, 781)	582, 434 ($12, 134/10)	599, 907 ($12, 498)	617, 904 ($12, 873)
Total HR cost	3, 588, 000 ($74, 750)	10, 764, 000 ($224, 250)	17, 641, 920 ($367, 540)	24, 726, 178 ($515, 129)	25, 467, 963 ($530, 583)	26, 232, 002 ($546, 500)

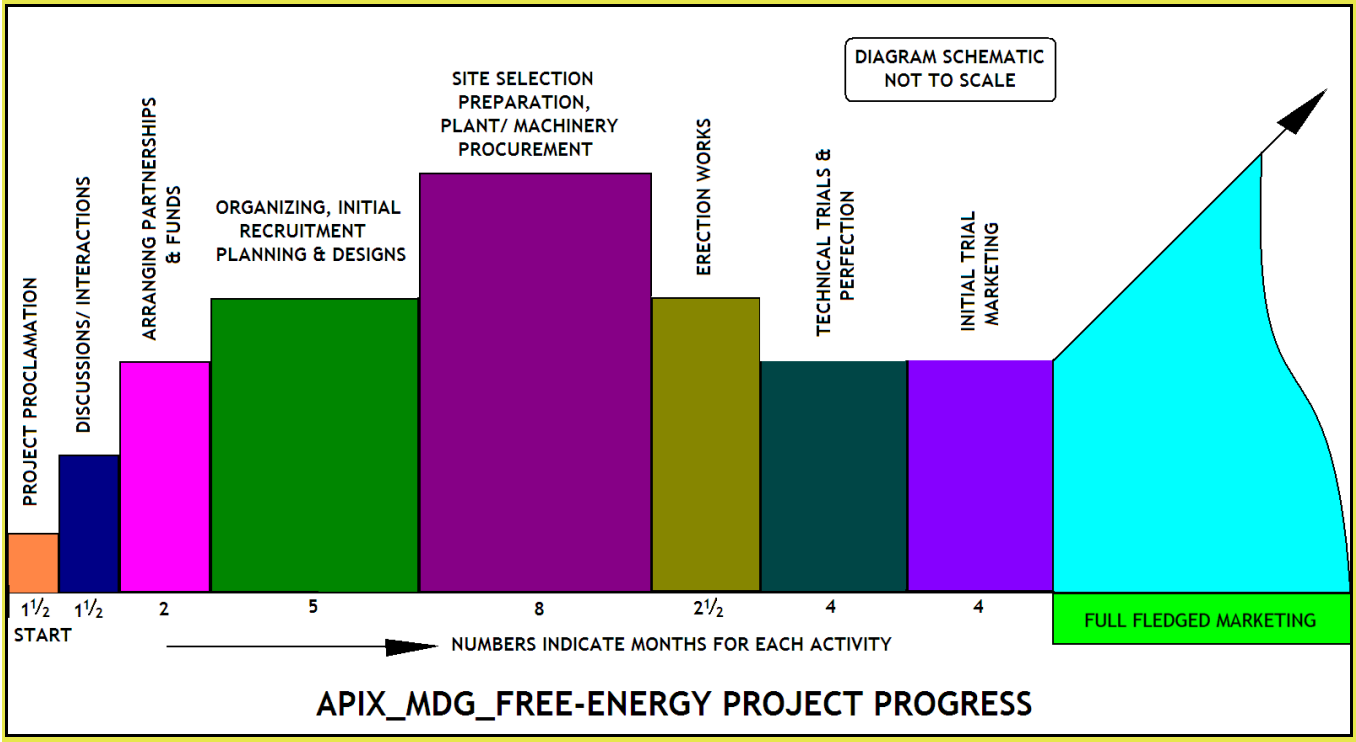
10. ESTIMATED COST OF APIX_MDG_FREE-ENERGY$_{20,000}$ PROJECT

[NOTE: THE PROJECT IS PLANNED TO BE SET UP IN THE PREMISES OF SOCIAL/ CHARITY ORGANIZATIONS IN DEVELOPING NATIONS; AND LAND IS PRESUMED TO BE AVAILABLE. It may also be noted that this FREE_ENERGY Module would have production set up to manufacture Hybrid value CSEP systems... the particular CSEP product in this project would be: **CSEP Hybrid Adhesives**]

- Initial prospecting, preliminary studies, legal expenses, etc $62, 500
- Land and site preparation (Presumed as available land 2 ac) $20, 830
- Sheds/ Buildings/ Office [total 2000 sq m @ $215] $430, 000
- Plant & machinery and Auxiliaries (Basic) $2, 375, 000
- Additional Plant & machinery for High-Value products $417,000
- Other incidentals on machinery (including erection and trials) @ 10%.. $279, 200
- Imponderables (@ 10% of all above) $358, 450

TOTAL CAPITAL INVESTMENTS (not considering first yr Working Capital) $3, 942, 980
(Say ... $4, 000, 000)

NOTE: There would be an initial "commissioning and product-market matching" period of four months, before the Trial Marketing period of Four Months. Thus, it may be noted that up to TEN Months may have to be set aside for these Initial "Gearing-up" works. The estimated total costs for these are taken @ 1.67 times the costs of operations during the initial Trial Market period = $3, 620, 800. The estimated costs, to be incurred during the commissioning period = $1, 244, 400. **This value, when added, the TOTAL capital cost of Project = $5, 244, 400**



APIX_MDG_FREE-ENERGY PROJECT PROGRESS

11. BRIEF PROJECT ECONOMICS

ASSUMPTIONS:

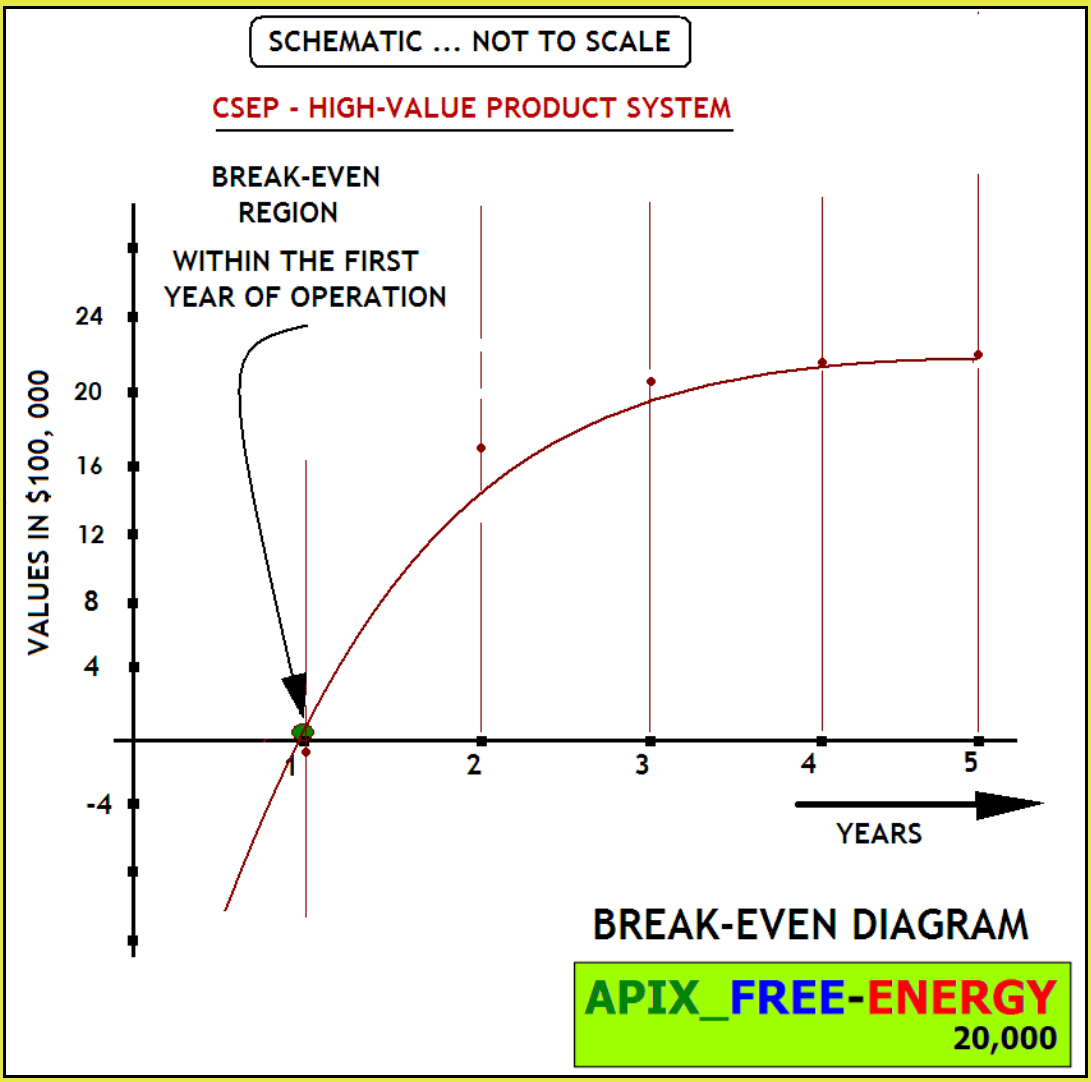
1. Although the project envisages "Free Supply" of Agrowastes, Food wastes and other Organics and Wood wastes, we shall consider a nominal waste cost of $26 per ton (delivered at site)
2. First four months of operation would be considered @ 50% efficiency, working only single shift
3. Effective Annual Production are as follows:
   i. Power for "Free" … 1,125 Units per hr … Total production = 1,400 Units per hr: First four months … effective (= 1,008,000 units .. Free = 806,400 units); First year @ 50% capacity (= 6,048,000 units … Free = 4,838,400 units); Second year onward Full capacity run (= 12,096,000 units … Free = 9,676,800 units)
   ii. Wood Substitute NFPC Molded Doors: First four months (= 85 Tons); First year (= 450 T); Second year (= 935 T); Third yr (= 1,450 T); Fourth yr (= 1,500 T)); Fifth yr (= 1,500 T)
   iii. CSEP materials: trial period (= 574 T); First year (= 2,545 T); second yr (= 6,887 T); third yr (= 6,887 T); fourth yr (= 6,887 T); fifth yr (= 6,887 T) ...[NOTE: We shall presume that these CSEP are further converted into specialty Adhesives as follows … first four months (= 275 T); First yr (= 3, 936 T); Second yr (= 9,840 T); third yr (= 9,840 T); fourth yr (= 9,840 T); fifth yr (= 9840 T)]
   iv. Biofertilizer: first four months trial period (= 90.75 T solids); First yr (= 544.5 T solids)
4. Energy supplies are 24 hrs x 360 days; hence, we shall consider 25% "over-time" work and wages for Operations personnel (this being effectively up by 50%) … this would not qualify for additional benefits on the same
5. Organic wastes are assumed to be bought at these volumes: trial (= 1,667 T); First year (= 10, 000 T); third year onward (= 20, 000 T)
6. Annual "lease rentals" are @ $10, 420 (Approximately @ 5% of current land costs at village level … 2 ac considered)
7. Other raw materials costs: (i) *For Wood substitute*: **Polymers** @ $1,950 (16.15 T trial period; 85.5 T in first yr; 177.65 T in second yr; 275.5 T in third yr; 285 T in fourth yr; 285 T in fifth yr … Other **Chemicals/ additives** @ $1,562/50: trial period (2.55 T); First yr (= 13.5 T); second yr (= 28.05 T); Third yr (= 43.5 T); Fourth yr (= 45 T); Fifth yr (= 45 T) (ii) *CSEP systems*: **Industrial wastes** @ $125: Trial (= 389 T); first yr (= 1,867 T); second y (= 4,667 T); Third yr (= 4,667 T); fourth yr (= 4,667 T); fifth yr (= 4667 T); **Special resin** @ $7,295: Trial (= 246 T); First yr (= 1,180 T); second yr (= 2,951.4 T); third yr (= 2,951.4 T); fourth yr (= 2,951.4 T); fifth yr (= 2,951.4 T); (iii) *H2S removal*: **Specialty Chemical** @ $1,562/50: trial (= 17.5 T); First yr (= 110.5 T); second yr (= 210 T); third yr (= 210 T); fourth yr (= 210 T); fifth yr (= 210 T)
8. All Raw materials would have annual 3% cost increase (not applicable in first year, after trials)
9. Process wastage are considered @ 1.5% of all raw materials (wastage is minimal in our processes)
10. Costs of repairs/ maintenance @ 1.75% of raw materials
11. Overheads and various imponderables @ 2.5% of Sales
12. SALES: we shall consider the Sales of the following: (i) NFPC Wood Substitute molded Doors @ $1150 per T; (ii) CSEP Specialty Adhesive @ $2,750/ T; (iii) Biofertilizer @ $260/ T (solids wt)
13. Sales rates would be increased @ 3% per annum, from second year, inclusive in that year
14. Working capital is estimated @ $1/7^{th}$ of sales, and at interest rate of 12.5%
15. Overall finance costs are estimated @ 10% of Total Capital Costs ($5, 244, 400 … This is considered on the balance after repayments (repayment from 2^{nd} yr @ &1, 000, 000)
16. Depreciation @ 10% of $3, 071, 200... the combined costs of Plant/machinery and related investments. An additional "write-off" @ 10% on $1, 757, 800 also considered

ESTIMATE OF COSTS AND OVERALL ECONOMICS – CSEP_HIGH-VALUE PROJECT

[Note: All figures are in US $; rounded off to the nearest tens. Power generation costs also shown]

Description	Trial period	Year-1	Year-2	Year-3	Year-4	Year-5
No. of shifts	1	1	2	3	3	3
Effective days	54	300	300	300	300	300
Effective hrs	340	1, 800	3, 740	6, 000	6, 000	6, 000
NFPC DOORS (Sales $)	85 T (97, 750)	450 T (517, 500)	935 T (1, 107, 510)	1, 450 T (1, 769, 050)	1, 500 T (1, 884, 950)	1, 500 T (1, 941, 500)
CSEP Adhesive (Sales $)	820 T (2, 255, 000)	3, 936 T (10, 824, 000)	9, 840 T (27, 871, 800)	9, 840 T (28, 707, 950)	9, 840 T (29, 569, 190)	9, 840 T (30, 456, 270)
Biofertilizer (Sales $)	90.75 T (23, 600)	544.5 T (141, 570)	1, 089 T (291, 630)	1, 089 T (300, 380)	1, 089 T (309, 390)	1, 089 T (318, 670)
TOTAL SALES	2, 376, 350	11, 483, 070	29, 270, 940	30, 777, 380	31, 763, 530	32, 716, 440
COST OF MANUFACTURE ($)						
Organic wastes ($)	1, 667 T (43, 340)	10, 000 T (260, 000)	20, 000 T (535, 600)	20, 000 T (551, 670)	20, 000 T (568, 220)	20, 000 T (585, 270)
NFPC Chemicals etc	35, 480	187, 820	401, 960	661, 700	684, 110	704, 630
CSEP Chemicals	1, 843, 200	8, 841, 470	22, 777, 250	23, 460, 570	24, 164, 390	24, 889, 320
Other Chemicals	27, 340	172, 660	337, 970	348, 110	358, 550	369, 310
Wastage	29, 240	141, 930	360, 790	375, 330	386, 630	398, 230
Repairs etc	34, 110	165, 580	420, 920	437, 890	451, 070	464, 600
Labor & HR + Benefits	74, 750	224, 250	367, 540	515, 130	530, 580	546, 500
Operations for Energy/ CSEP	21, 260	68, 280	138, 610	211, 050	217, 380	223, 900
Overheads etc	59, 410	287, 080	731, 770	769, 430	794, 090	817, 910
Total COSTS	2, 168, 130	10, 349, 070	26, 072, 410	27, 330, 880	28, 155, 020	28, 999, 670
GROSS MARGIN	208, 220	1, 134, 000	3, 198, 530	3, 446, 500	3, 608, 510	3, 716, 770
FINANCIAL COSTS Etc						
Working Capital int.	42, 430	205, 050	522, 700	549, 600	567, 210	584, 220
Int. on Capital	174, 810	524, 440	524, 440	424, 440	324, 440	224, 440
Depreciation Write-off	102, 370 58, 590	296, 880 175, 780	267, 190 175, 780	240, 480 175, 780	216, 430 175, 780	194, 790 175, 780
Nett Operating Profit	-169, 980 (Loss)	-68, 150 (Loss)	1, 705, 420	2, 056, 200	2, 324, 650	2, 537, 540
Gross Cash-flow	- 9, 020	404, 510	2, 148, 390	2, 472, 460	2, 716, 860	2, 908, 110
Capital Repayment	Nil	NIL	1, 000, 000	1, 000, 000	1, 000, 000	1, 000, 000
Nett Cash flow (carried over)	(-9, 020)	(395, 490)	(1, 543, 880)	(3, 016, 340)	(4, 733, 200)	(6, 641, 310)
Average Operating Profit = $1, 711, 132 (after depreciation) [About 32.6% on TOTAL Investment]						
Av. cash-flow before repayment = $2, 128, 262 (40.58% on Investment) ... payout during sixth year						
Av. cash-flow after annual repayments = $1, 328, 262 (25.32% on Total capital investment)						
BREAK-EVEN EXPECTED AT THE END OF ONE YEAR AFTER TRIAL MARKETING period						

BREAK-EVEN DIAGRAM – CSEP_HIGH-VALUE PROJECT



It is noted that the various presentations and figures/ values shown in this report are general estimates, and are not sacrosanct. Final verifications and analyses are needed before actual start